Memorandum

Date: March 16, 2017

From: Research Misconduct Officer, Office of Research Oversight (10R)

Subj: VA Findings of Research Misconduct – Birmingham VA Medical Center

To: Director, Birmingham VA Medical Center (Facility 521/00)

1. In accordance with VHA Handbook 1058.02 ("Research Misconduct") §24d(1)(d), the Office of Research Oversight (ORO) hereby notifies you of the VA adjudicated findings of research misconduct made against the Respondent, **Santosh K. Katiyar**, Ph.D.

2. As indicated in a memorandum, dated March 8, 2017 (*see* attached), the Director of the Southeast Network (VISN7) adjudicated the case and determined that the Respondent committed research misconduct as indicated in the allegations listed below:

   - **Allegation 1:** Misrepresented the cell line used in Figure 1A (Paper 1). The article states that the data represents the FaDu cell line. However, the figure appears to be very similar to, or the same as, Figure 1A in a *BMC Complementary and Alternative Medicine* article (Paper 5) that is referred to as the A431 line.
   - **Allegation 3:** Misrepresented data in Figure 5D (Paper 2) in that the second panel (labeled "0.1") and the third panel (labeled "1.0") appear to be identical.
   - **Allegation 4:** Misrepresented the data in figure 5 (Paper 3) in that the lower right portion of panel E (labeled Silymarin 10 μg/ml) appears identical to the top-left portion panel of the fourth image (labeled Silymarin 40 μg/ml).
   - **Allegation 6:** Misrepresented the data in figures 3c and 4c (Paper 6) in that there are artifacts present that suggest that images of some bands may have been cut and pasted from other figures.
   - **Allegation 8:** Misrepresented the data in figures 3E and 5B (Paper 8) in that both figures appear to use the same β-actin blot to represent different experimental conditions.
   - **Allegation 9:** Misrepresented the data in figure 5 (Paper 9) in that the bands used to represent different experimental conditions are the same, i.e., the bands labeled P16INK4a "Ac-Histone H3" and "MBD1" are the same; the bands labeled P16INK4a "Ac-Histone H4 Input" and "MBD1Input" and "HDAC1 Input" and RASSF1A "HDAC1Input" appear to be identical.
   - **Allegation 10:** Misrepresented the data in figure 5 (Paper 10) in that the two panels labeled "0.5% GSPs" appear to represent overlapping parts of the same image, even though they are labeled to represent different cell lines (A549 or H1299).
   - **Allegation 11:** Misrepresented the data in figure 2 (Paper 11) in that the panels labeled "10 uM Honokiol" appear to contain portions of the same image in both the MCF-7 and the 4T1 panels.

- **Allegation 12:** Misrepresented the data in figure 4 (Paper 12) in that the same images appear to represent different experimental conditions, i.e., Control A is the same as GTPs+UVB B and UVB alone B is the same as GTPS+UVB A.
- **Allegation 13:** Misrepresented the data as the same beta actin images in Figures 5B and 5D (Paper 5) are attributed to different experimental conditions.
- **Allegation 15:** Misrepresented the data in 1A (Paper 8) as it appears to be identical to Figure 2A in Paper 2.
- **Allegation 18:** Misrepresented the data in Figure 4 (Paper 13) as two images appear to be identical and from the same tissue section. They appear to be rotated and cropped differently so as to represent different mouse strains.
- **Allegation 21:** Misrepresented data as beta actin blots appear to be identical in Figures 6B and 7A (Paper 15) and are attributed to different experimental conditions.
- **Allegation 22:** Misrepresented data as panels in Figure 5B (Paper 16) for vimentin treatment of cells contain images that partially overlap those of panels for fibronectin-treated cells, thus the same images are attributed to different experimental conditions.
- **Allegation 23:** Misrepresented the data in Panel D of figure 1 (Paper 4) in that the figure labelled "EGCG Concentration 20 μg/ml" appears to be identical to Figure 1 Panel D "A549 cells" and "GSPs concentration 40 μg/ml" (Paper 17).
- **Allegation 24:** Misrepresented the data in Panel D of figure 1 (Paper 4) in that the figure labelled "EGCG Concentration 40 μg/ml" appears to be identical to Figure 1 Panel D "H1299 cells" and "GSPs concentration 60 μg/ml" (Paper 17).
- **Allegation 25:** Misrepresented data in panels in Figure 3A and 3B (Paper 18). The image shown in Panel A in Figure 3A (control) appears to be an adjacent slice to Panel C in Figure 3B (EGCG+UVB), based on the morphology of the slice presented in the image.
- **Allegation 26:** Misrepresented data in panels in Figure 3A and 3B of Paper 18. Panel C in Figure 3A (EGCG+UVB) appears to be an adjacent slice to Panel A in Figure 3B (Control), based on the morphology of the slice presented in the image.
- **Allegation 27:** Misrepresented the data in panel b of figure 2 (Paper 19) in that the beta-actin bands appear to be identical to the center four beta-actin bands in Figure 4, panel C (also Paper 19), labelled "IL-12 KO".
- **Allegation 28:** Misrepresented the data in Figures 2A (panel labelled "UV 1/2h" and "IL-12 KO treated with EGCG") and 3A (panel labelled "UV alone") in Paper 20. These two figures appear to be overlapping sections of the same image, based on the morphology of the cells included in the slice.
- **Allegation 29:** Misrepresented the data in Figure 1, Panels B and C (Paper 21). The second lanes from the left in each panel appear to be identical.
- **Allegation 30:** Misrepresented the data in Figure 4, Panels A and C (Paper 22). The image for WT mice exposed to UVB for ½ hr and treated with EGCG appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr. The image for IL-12 KO mice exposed to UVB for ½ hour appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr and treated with EGCG. The image WT mice exposed to UVB for 48 hours and treated with EGCG appears to be identical to that for IL-12 KO mice controls treated with EGCG.

However, the VISN Director did not concur with the Investigation Committee as to the level of intent; she determined that the research misconduct was committed recklessly and not intentionally.

3. The Network Director also determined that the following corrective actions should be implemented:

    - Each paper for which a research misconduct finding was made should be retracted.

4. A notice is being sent concurrently to the Respondent, notifying him of the findings and corrective actions, and his opportunity to appeal. If the Respondent files an appeal within 30 days of receiving said notice, the appeal shall be considered in accordance with VHA Handbook 1058.02 §25.

5. If an appeal is not filed by the requisite deadline, this research misconduct case shall be closed at that time.

6. The Network Director's findings of research misconduct apply only to VA's case against the Respondent. Because this case falls under the concurrent jurisdiction of the University of Alabama at Birmingham, that institution may make a separate adjudication, take separate corrective actions, and offer a separate opportunity for appeal.

7. If you have any questions about this matter, please contact me by telephone at 202-632-8369 or email at VHACOOROResearchMisconductProgram@va.gov.

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Shara Kabak, Ph.D.
Research Misconduct Officer, ORO

Attachment: VISN Adjudication Memorandum (March 8, 2017)

cc: Network Director, Southeast Network, VISN 7 (10N7)

VA HEALTH CARE | Defining EXCELLENCE in the 21st Century

Memorandum

Date: March 8, 2017

From: Director, VA Southeast Network/VISN 7 (10N7)

Subj: Adjudication of Birmingham VAMC Research Misconduct Case

To: Research Misconduct Officer, Office of Research Oversight (10R)

1. On December 28, 2017, I received a copy of the Investigation Report, dated October 28, 2016, that was issued jointly by the University of Alabama Birmingham and the Birmingham VA Medical Center Investigation Committee charged with investigating allegations of research misconduct made against Dr. Santosh K. Katiyar (hereafter, Respondent), who holds an appointment at Birmingham VA Medical Center. I am also in receipt of the memorandum, dated November 16, 2016, from the Director of Birmingham VA Medical Center certifying completion of the research misconduct investigation.

2. In accordance with VHA Handbook 1058.02 ("Research Misconduct") §24, I have reviewed the Investigation Report, the facility Director's certification memorandum, and supporting documents. Based on consultation from the VA Office of Research Oversight and with the information provided, I have completed adjudication of this case to the best of my ability.

3. I concur with the recommended findings and corrective actions of the Investigation Committee and VA facility Director that pertain to those allegations over which VA has jurisdiction. ***I do not concur*** with the level of intent determined by the Investigation Committee that indicates intentional fabrication and/or falsification.

4. Based on my review of the case I recommend that the findings include recklessness by willful disregard for ensuring accurate representation of the research record on the part of the principal investigator/respondent. I concur with the corrective actions.

5. Therefore, it is my determination, with respect to those allegations that the Department of Veterans Affairs (VA) has jurisdiction or joint jurisdiction over, that:
    a. The preponderance of the evidence demonstrates that the Respondent committed the following acts of research misconduct recklessly:
        i. Act of alleged research misconduct 1,3,4,6,8,9,10,11,12,13,15,18,21,22,23,24,25,26,27,28, 29,30

6. If you have any questions about this matter, please contact me at your earliest convenience.

LESLIE B. WIGGINS

cc: Director, Birmingham VA Medical Center (521/00)

CONFIDENTIAL

DIO 5038 INVESTIGATION REPORT

Submitted on October 28, 2016 to

(b)(6)

UAB (b)(6)

&

Kathy Martin, MA
Research Integrity Officer
Birmingham VA Medical Center

(b)(6)

Department of Neurobiology

J. D. Allen Cooper, MD
Birmingham VA Medical Center and
Professor, Department of Medicine

(b)(6)

(b)(6) Department of Medicine

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Department of Cell, Developmental and Integrative Biology

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1. Background

Allegations of possible research misconduct were raised against Dr. Santosh K. Katiyar. Dr. Katiyar joined the UAB faculty on January 1, 2001 as a Research Assistant Professor and is currently a Professor in the Department of Dermatology. Dr. Katiyar's investigations are focused on identifying natural compounds that can prevent or reduce the progression of chemically-induced or UV-radiation induced cancers. His educational background and experience are provided in detail in his curriculum vitae (Appendix 1).

There are 30 allegations of possible research misconduct that have been evaluated and that are described in detail below. The allegations concern falsification and/or fabrication of images and/or data that have been published in 22 separate journal articles. The initial allegations were raised by *PLoS One* Consulting Editor, Ms. Iratxe Puebla, in an email to (b)(6) on October 1, 2012. At that time, (b)(6) was serving as the (b)(6) UAB School of Medicine. In this email, concerns were raised about a potential duplication of bands in Figure 2 of *PLoS One, 2011, 6(11): e27444* with images found in two other publications from Dr. Katiyar's group: *Pharm Res. 2010 Jun;27(6):1092-102* and *Mol Cancer Ther. 2010 Mar;9(3):569-80*. *PLoS One* had contacted Dr. Katiyar (corresponding author) and his Department Chair (b)(6) (b)(6) for an explanation of this duplication. As a result of information received from Dr. Katiyar and (b)(6), *PLoS One* issued a correction to the *PLoS One* article. After the correction was published, concerns about other images in this article were raised to *PLoS One* by a reader. *PLoS One* contacted Dr. Katiyar and requested original images and data for some of the figures in this article. Dr. Katiyar was able to provide some but not all of the requested materials. While this was viewed by the journal editor as "mostly satisfactory", there was a remaining concern about the lack of adequate record keeping by Dr. Katiyar. *PLoS One* also carried out an evaluation of publications by Dr. Katiyar and identified irregularities (Allegations 1-4 in this report) in images published in three other *PLoS One* manuscripts (identified as Papers 1-3) and a 2011 *Complementary and Alternative Medicine paper* (referred to as Paper 5). In the email to (b)(6) (b)(6), Ms. Puebla requested that UAB evaluate the concerns that *PLoS One* identified.

In May 2012, *Carcinogenesis* published a retraction notice for an unrelated paper by Dr. Katiyar (referred to as Paper 7 in this report). The publication of this retraction was noticed by the blog site *Retraction Watch*. Comments posted in response to the *Retraction Watch* article identified other potential images of concern in additional papers. In August 2012, *Science Fraud*, another blog site, posted images and concerns related to Papers 1-3 and identified concerns. These are referred to as Allegations 5-12 and Papers 4, and 6-12.

As a result of the concerns described above, and in accordance with UAB's *Policy for the Maintenance of High Ethical Standards for Research and Other Scholarly Activities* (Appendix 2), an assessment was conducted by (b)(6) They examined the figures that were identified in the three sets of complaints. As a result of this examination, they assessed each allegation to be specific and sufficiently credible to warrant an inquiry into possible research misconduct.

An Inquiry Committee was charged on September 10, 2013 by (b)(6) School of Medicine). The Inquiry Committee reviewed the

twelve publications in which figures of concern had been identified (Papers 1-12) and evaluated the twelve allegations that arose from those concerns (Allegations 1-12). During the course of their work, the Inquiry Committee identified five additional problems with images published in Papers 5, 7, 8, 11, and 12 (Allegations 13-17). They also identified problems in three new publications (Allegations 18-21 in Papers 13-15). In its final report, the Inquiry Committee determined that 20 of the 21 allegations were credible. Allegation 2 was dismissed. The final report was submitted to UAB Senior Vice President (b)(6) [redacted]. He agreed with the recommendations put forth by the Inquiry Committee and forwarded their report to UAB (b)(6) [redacted] for approval. The report was approved by (b)(6) [redacted] on April 15, 2014.

UAB convened this Investigation Committee following a recommendation to do so by the Inquiry Committee. The Office of Research Integrity was notified via a letter dated April 30, 2014 and concurred, by letter dated May 5, 2014, that this was an appropriate action. UAB has requested several extensions of the deadline for completing the investigation – the current deadline is November 21, 2016. This document comprises the Investigation Committee's report.

2. PHS Support

The publications in question were based on work that cites support provided by several PHS awards and other funding sources. The cited PHS support included awards to

(i) Dr. Katiyar: R01 AT002536, R01 CA140197, R03 CA094593, R03 CA105368, R03 ES011421, and R21 CA140832;
(ii) Dr. Elmets: R01 CA079820 and P30 AR050948; and
(iii) Dr. Tollefsbol: R01 CA129415.

Dr. Katiyar also received support from the Purdue/UAB Botanical Center for Age-Related Diseases, the Cancer Research Foundation of America, and the Cancer Research and Prevention Foundation and various Merit Review Awards from the Veterans Administration (awarded to Elmets and Katiyar). Acknowledgement was also made to VA Award 18-103-02 (Elmets). In addition, Dr. Katiyar received award 1 I01 BX001410 01 from the VA and there was an Interagency Personnel Agreement in place between the Birmingham VA and UAB to support Dr. Tripti Singh. The work was conducted in a UAB facility constructed with support to UAB from NIH under award numbered C06 RR015490 (Gerrity, PI). During the period of time when papers of concern were published (2003-2012), Dr. Katiyar served as the PI or Contact PI on the following PHS-awards, in addition to those cited above:

R03 CA089738: Prevention of Photocarcinogenesis by Antioxidant
R03 AI054289: Genetic Analysis of Echinocandin Sensitivity

3. Allegations

An assessment of the Allegations 1-12 of possible research misconduct that arose from figures published in Papers 1-12 was undertaken. All allegations (1-12) were found to be credible, and in accordance with UAB's *Policy for Maintaining High Ethical Standards in Research and Other Activities*, an Inquiry Committee was convened and charged. The Inquiry Committee submitted their report on March 28, 2014. In this report, they described the expansion of their charge to 21 allegations. They found 20 of 21 allegations to be credible. Allegation 2 was deemed to not be research misconduct and was dismissed (see Appendix 4, *Inquiry Committee Report,* page 19). They recommended that the concerns move forward to an investigation. The allegations reviewed by the Investigation Committee, and the original source identifying the concern, are listed below.

3A Allegations arising from *PLoS One* concerns

As described above, in an email sent to (b)(6) of the School of Medicine, Ms. Iratxe Puebla, a Consulting Editor at *PLoS One*, identified the journal's concerns regarding images in three *PLoS One* papers (Papers 1-3) published by Dr. Katiyar and various coauthors, referred to as Allegations 1-4 and involving Papers 1-3 and 5.

Allegation 1: Dr. Katiyar and/or his co-author(s) may have misrepresented the cell line used in Figure 1A (Paper 1). The article states that the data represents the FaDu cell line. However, the figure appears to be very similar to, or the same as, Figure 1A in a *BMC Complementary and Alternative Medicine* article (Paper 5) that is referred to as the A431 line.

> Paper 1: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasiveness of human HNSCC cells by targeting EGFR and reversing the epithelial-to-mesenchymal transition.* PLoS One, 2012. **7**(1): p. e31093.
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> Paper 5: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.

(b)(6)

Allegation 3: Dr. Katiyar and/or his co-author(s) may have misrepresented data in Figure 5D (Paper 2) in that the second panel (labeled "0.1") and the third panel (labeled "1.0") appear to be identical.

Paper 2: Singh, T. and S.K. Katiyar, *Green tea catechins reduce invasive potential of human melanoma cells by targeting COX-2, PGE2 receptors and epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(10): p. e25224.

Allegation 4: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 3) in that the lower right portion of panel E (labeled Silymarin 10 µg/ml)) appears identical to the top-left portion panel of the fourth image (labeled Silymarin 40 µg/ml).

Paper 3: Vaid, M., et al., *Silymarin targets beta-catenin signaling in blocking migration/invasion of human melanoma cells.* PLoS One, 2011. **6**(7): p. e23000.

3B Allegations arising from *Retraction Watch* and *Science Fraud* concerns

In addition to the questions raised by *PLoS One*, additional concerns were raised regarding other papers published by Dr. Katiyar and his coworkers. A blog post by *Retraction Watch* about a retracted 2004 *Carcinogenesis* paper (referred to as Paper 7) elicited comments and identified additional papers published by Dr. Katiyar and his coauthors that contained figures with questionable data, including blots and micrographs. In response to the *Retraction Watch* post, another website, *Science Fraud*, posted images from these publications as well as others and raised additional concerns. The additional concerns from both blog sites are referred to as Allegations 5-12 (described below) and included eight more papers (Papers 4, 6-12).

(b)(6)

[redacted]

Allegation 6: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figures 3c and 4c (Paper 6) in that there are artifacts present that suggest that images of some bands may have been cut and pasted from other figures.

Paper 6: Vayalil, P.K., C.A. Elmets, and S.K. Katiyar, *Treatment of green tea polyphenols in hydrophilic cream prevents UVB-induced oxidation of lipids and proteins, depletion of antioxidant enzymes and phosphorylation of MAPK proteins in SKH-1 hairless mouse skin.* Carcinogenesis, 2003. **24**(5): p. 927-36.

(b)(6)

[redacted]

Allegation 8: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figures 3E and 5B (Paper 8) in that both figures appear to use the same β-actin blot to represent different experimental conditions.

> Paper 8: Singh, T., et al., *Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2, prostaglandin E(2) and prostaglandin E(2) receptors.* Carcinogenesis, 2011. **32**(1): p. 86-92.

Allegation 9: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 9) in that the bands used to represent different experimental conditions are the same, i.e., the bands labeled P16INK4a "Ac-Histone H3" and "MBD1" are the same; the bands labeled P16INK4a "Ac-Histone H4 Input" and "MBD1Input" and "HDAC1 Input" and RASSF1A "HDAC1Input" appear to be identical.

> Paper 9: Nandakumar, V., et al., *Aberrant DNA hypermethylation patterns lead to transcriptional silencing of tumor suppressor genes in UVB-exposed skin and UVB-induced skin tumors of mice.* Carcinogenesis, 2011. **32**(4): p. 597-604.

Allegation 10: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 10) in that the two panels labeled "0.5% GSPs" appear to represent overlapping parts of the same image, even though they are labeled to represent different cell lines (A549 or H1299).

> Paper 10: Akhtar, S., et al., *Grape seed proanthocyanidins inhibit the growth of human non-small cell lung cancer xenografts by targeting insulin-like growth factor binding protein-3, tumor cell proliferation, and angiogenic factors.* Clin Cancer Res, 2009. **15**(3): p. 821-31.

Allegation 11: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 2 (Paper 11) in that the panels labeled "10 uM Honokiol" appear to contain portions of the same image in both the MCF-7 and the 4T1 panels.

> Paper 11: Singh, T. and S.K. Katiyar, *Honokiol, a phytochemical from Magnolia spp., inhibits breast cancer cell migration by targeting nitric oxide and cyclooxygenase-2.* Int J Oncol, 2011. **38**(3): p. 769-76.

Allegation 12: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 4 (Paper 12) in that the same images appear to represent different experimental conditions, i.e., Control A is the same as GTPs+UVB B andUVB alone B is the same as GTPS+UVB A.

> Paper 12: Mantena, S.K., et al., *Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activation of cytotoxic T cells and inhibition of angiogenesis in tumors.* J Nutr, 2005. **135**(12): p. 2871-7.

3C Allegations arising from Inquiry Committee work

During the course of their work, the Inquiry Committee found other images of concern in both papers noted above as well as four additional papers (Papers 13-16). These concerns are referred to as Allegations 13-21 and are described below.

Allegation 13: Dr. Katiyar and/or his co-author(s) may have misrepresented the data as the same beta actin images in Figures 5B and 5D (Paper 5) are attributed to different experimental conditions.

> Paper 5: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.

(b)(6)

Allegation 15: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in 1A (Paper 8) as it appears to be identical to Figure 2A in Paper 2.

> Paper 8: Singh, T., et al., *Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2, prostaglandin E(2) and prostaglandin E(2) receptors.* Carcinogenesis, 2011. **32**(1): p. 86-92.
>
> Paper 2: Singh, T. and S.K. Katiyar, *Green tea catechins reduce invasive potential of human melanoma cells by targeting COX-2, PGE2 receptors and epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(10): p. e25224.

(b)(6)

Allegation 18: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Figure 4 (Paper 13) as two images appear to be identical and from the same tissue section. They appear to be rotated and cropped differently so as to represent different mouse strains.

> Paper 13: Meeran, S.M., et al., *Interleukin-12 deficiency is permissive for angiogenesis in UV radiation-induced skin tumors.* Cancer Res, 2007. **67**(8): p. 3785-93.

Allegation 19: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Figure 5 (Paper 13) as beta actin blots from Fig. 3D and Fig. 5B appear to be identical and represent different experimental conditions.

> Paper 13: Meeran, S.M., et al., *Interleukin-12 deficiency is permissive for angiogenesis in UV radiation-induced skin tumors.* Cancer Res, 2007. **67**(8): p. 3785-93.

(b)(6)

[redacted]

Allegation 21: Dr. Katiyar and/or his co-author(s) may have misrepresented data as beta actin blots appear to be identical in Figures 6B and 7A (Paper 15) and are attributed to different experimental conditions.

> Paper 15: Mantena, S.K., S.D. Sharma, and S.K. Katiyar, *Berberine inhibits growth, induces G1 arrest and apoptosis in human epidermoid carcinoma A431 cells by regulating Cdki-Cdk-cyclin cascade, disruption of mitochondrial membrane potential and cleavage of caspase 3 and PARP.* Carcinogenesis, 2006. **27**(10): p. 2018-27.

3D Allegations arising from Investigation Committee work

An Investigation Committee was formed and charged on September 16, 2014. In the course of our work, we identified additional images of concern in some publications reviewed earlier as well as problematic images in six additional publications (Papers 17-22). This led to nine additional allegations (Allegations 22-30, described below) being added to the scope of our charge.

Allegation 22: Dr. Katiyar and/or his co-author(s) may have misrepresented data as panels in Figure 5B (Paper 16) for vimentin treatment of cells contain images that partially overlap those of panels for fibronectin-treated cells, thus the same images are attributed to different experimental conditions.

> Paper 16: Vaid, M., T. Singh, and S.K. Katiyar, *Grape seed proanthocyanidins inhibit melanoma cell invasiveness by reduction of PGE2 synthesis and reversal of epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(6): p. e21539.

Allegation 23: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Panel D of figure 1 (Paper 4) in that the figure labelled "EGCG Concentration 20 µg/ml" appears to be identical to Figure 1 Panel D "A549 cells" and "GSPs concentration 40 µg/ml" (Paper 17).

> Paper 4: Biochemical and Biophysical Research Communications, Volume 375, Issue 1, 10 October 2008, Pages 162-167; *EGCG inhibits mammary cancer cell migration through inhibition of nitric oxide synthase and guanylate cyclase*, Punathil T, Tollefsbol TO, and Katiyar SK
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> Paper 17: Molecular Carcinogenesis, 2009, 48:232-242; *Inhibition of Non-small Cell Lung Cancer Cell Migration by Grape Seed Proanthocyanidins Is Medicated Through the Inhibition of Nitric Oxide, Guanylate Cyclase, and ERK1/2*, Punathil, T, and Katiyar, SK.

Allegation 24: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Panel D of figure 1 (Paper 4) in that the figure labelled "EGCG Concentration 40 µg/ml" appears to be identical to Figure 1 Panel D "H1299 cells" and "GSPs concentration 60 µg/ml" (Paper 17).

> Paper 4: Punathil, T., T.O. Tollefsbol, and S.K. Katiyar, *EGCG inhibits mammary cancer cell migration through inhibition of nitric oxide synthase and guanylate cyclase.* Biochem Biophys Res Commun, 2008. **375**(1): p. 162-7.
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> Paper 17: Punathil, T. and S.K. Katiyar, *Inhibition of non-small cell lung cancer cell migration by grape seed proanthocyanidins is mediated through the inhibition of nitric oxide, guanylate cyclase, and ERK1/2.* Mol Carcinog, 2009. **48**(3): p. 232-42.

Allegation 25: Dr. Katiyar and/or his co-author(s) may have misrepresented data in panels in Figure 3A and 3B (Paper 18). The image shown in Panel A in Figure 3A (control) appears to be an adjacent slice to Panel C in Figure 3B (EGCG+UVB), based on the morphology of the slice presented in the image.

> Paper 18: Mantena, S.K., A.M. Roy, and S.K. Katiyar, *Epigallocatechin-3-gallate inhibits photocarcinogenesis through inhibition of angiogenic factors and activation of CD8+ T cells in tumors.* Photochem Photobiol, 2005. **81**(5): p. 1174-9.

Allegation 26: Dr. Katiyar and/or his co-author(s) misrepresented data in panels in Figure 3A and 3B of Paper 18. Panel C in Figure 3A (EGCG+UVB) appears to be an adjacent slice to Panel A in Figure 3B (Control), based on the morphology of the slice presented in the image.

> Paper 18: Mantena, S.K., A.M. Roy, and S.K. Katiyar, *Epigallocatechin-3-gallate inhibits photocarcinogenesis through inhibition of angiogenic factors and activation of CD8+ T cells in tumors.* Photochem Photobiol, 2005. **81**(5): p. 1174-9.

Allegation 27. Dr. Katiyar and/or his co-author(s) may have misrepresented the data in panel b of figure 2 (Paper 19) in that the beta-actin bands appear to be identical to the center four beta-actin bands in Figure 4, panel C (also Paper 19), labelled "IL-12 KO".

> Paper 19: Meeran, S.M., T. Punathil, and S.K. Katiyar, *IL-12 deficiency exacerbates inflammatory responses in UV-irradiated skin and skin tumors.* J Invest Dermatol, 2008. **128**(11): p. 2716-27.

Allegation 28: Dr. Katiyar and/or his co-authors may have misrepresented the data in Figures 2A (panel labelled "UV 1/2h" and "IL-12 KO treated with EGCG") and 3A (panel labelled "UV alone") in Paper 20. These two figures appear to be overlapping sections of the same image, based on the morphology of the cells included in the slice.

> Paper 20: Meeran, S.M., S.K. Mantena, and S.K. Katiyar, *Prevention of ultraviolet radiation-induced immunosuppression by (-)-epigallocatechin-3-gallate in mice is mediated through interleukin 12-dependent DNA repair.* Clin Cancer Res, 2006. **12**(7 Pt 1): p. 2272-80.

Allegation 29: Dr. Katiyar and/or his co-authors may have misrepresented the data in Figure 1, Panels B and C (Paper 21). The second lanes from the left in each panel appear to be identical.

> Paper 21: Vayalil, P.K., et al., *Green tea polyphenols prevent ultraviolet light-induced oxidative damage and matrix metalloproteinases expression in mouse skin.* J Invest Dermatol, 2004. **122**(6): p. 1480-7.

Allegation 30: Dr. Katiyar and/or his co-authors may have misrepresented the data in Figure 4, Panels A and C (Paper 22). The image for WT mice exposed to UVB for ½ hr and treated with EGCG appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr. The image for IL-12 KO mice exposed to UVB for ½ hour appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr and treated with EGCG. The image WT mice exposed to UVB for 48 hours and treated with EGCG appears to be identical to that for IL-12 KO mice controls treated with EGCG.

> Paper 22: Meeran, S.M., et al., *(-)-Epigallocatechin-3-gallate prevents photocarcinogenesis in mice through interleukin-12-dependent DNA repair.* Cancer Res, 2006. **66**(10): p. 5512-20.

4 Policy and Process

4A Policy

At UAB, the process to review and address allegations of research misconduct is conducted in accordance with UAB's Policy, titled *Policy Concerning the Maintenance of High Ethical Standards of Research and Other Scholarly Activities* dated January 27, 1997 and the *Policy of the Public Health Service regarding Research Misconduct found in 42 CFR Parts 50 and 93*. A copy of UAB's Policy and the PHS Policy are attached as Appendices 2 and 3, respectively.

Research misconduct is defined by the UAB Policy as "fabrication, falsification, plagiarism, or other practices which seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research." UAB has adopted the federal definition of fabrication, falsification, and plagiarism (F/F/P). Fabrication is "making up data or results and recording or reporting them," falsification is "manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record", and plagiarism is "appropriation of another person's ideas, processes, results, or words, without giving appropriate credit".

A timeline of the major milestones in this case is presented at the end of this section (Table 1 – Timeline of Major Events). A summary of each of the phases of the case is provided below. Because the Assessment Process and Inquiry Process are described in detail in Appendix 4, they are briefly summarized below.

4B Assessment Process

An initial assessment of the allegations was conducted by the Office of the Vice-President for Research and Economic Development. This assessment identified that the criteria warranting an inquiry had been met, including, but not limited to, identifying that the allegations were sufficiently credible and specific so that potential evidence of research misconduct may be identified. Accordingly, an Inquiry Committee was formed to conduct an initial review of the evidence to determine whether if there is a reasonable basis for concluding that the allegations have substance.

4C Inquiry Committee Process

The Inquiry Committee was charged on September 9, 2013. Because some of the allegations of concern were in publications that acknowledged research support from the Department of Veterans Administration, the Inquiry Committee included an individual from the VA. Thus, the work of the Inquiry Committee was a joint UAB/VA effort. The Inquiry Committee interviewed three individuals who were currently working in Dr. Katiyar's laboratory, one individual who had worked with Dr. Katiyar previously, and Dr. Katiyar. Based on the evidence examined and the interviews conducted, the Inquiry Committee recommended the matter proceed to an investigation. The Inquiry Committee determined that Allegation 2 was not research misconduct, but was a potential copyright issue. Thus, Allegation 2 was dismissed and was not considered further. A final report from the Inquiry Committee that included Dr. Katiyar's response to a draft report and the Inquiry Committee's response was submitted and approved by both (b)(6) [redacted], School of Medicine) and (b)(6) [redacted]

(b)(6)) (see Appendix 4). (b)(6) at ORI was sent a copy of the report and notified of the institutional recommendation of this matter proceeding to an investigation. (b)(6) (b)(6) responded and accepted the recommendation.

4D Investigation Committee Process

On September 16, 2014, Provost Lucas charged the Investigation Committee. The Investigation Committee included (b)(6) (Professor, Department of Neurobiology), (b)(6) (b)(6) (Professor, Department of Medicine), (b)(6) (Professor, Department of Pharmacology & Toxicology), (b)(6) (Professor, Department of Medicine), and (b)(6) (b)(6) (Department of Cell, Developmental, & Integrative Biology). Because Dr. Katiyar is a joint UAB and VA investigator, and with agreement from the VA, Dr. J. Allen Cooper served on the Investigation Committee and represented the VA's interests. Each agreed to maintain confidentiality and to serve on the committee. The Investigation Committee selected (b)(6) as the Chair. The Investigation Committee met multiple times. During these meetings, the Investigation Committee reviewed the allegations, and examined the publications and images of concern. They also met with members of the Inquiry Committee and reviewed the Inquiry Committee's final report (see Appendix 4). The Investigation Committee examined other publications of Dr. Katiyar. From this evaluation, the scope of the investigation was expanded to include nine additional allegations (Allegations 22-30) and six additional publications (Papers 17-22). Dr. Katiyar was notified about the new allegations and afforded an opportunity to provide a response. The Investigation Committee interviewed Dr. Katiyar, six other individuals who were co-authors on the publications, and reviewed the relevant laboratory notebooks. Prior to Dr. Katiyar's interview on June 17, 2015, (b)(6) who was serving as the RIO at the time, asked Dr. Katiyar to respond in writing to each of the allegations (Allegations 1-29), bring forward any evidence that would affirm the experiments of concern, and to describe how the figures and publications were constructed and reviewed. Dr. Katiyar provided a written response that was reviewed by the Investigation Committee during the course of their evaluation of each allegation. At the request of the Investigation Committee, (b)(6) , the current RIO, compiled an analysis of each of the original figures of concern as well as the additional images of concern identified by individual committee members (Appendix 5). This analysis was reviewed in working sessions with the full committee. The Investigation Committee reached unanimous agreement on the findings and the responsible party for each allegation of research misconduct. During the writing of the Investigation Committee report, an additional allegation of research misconduct arose. Similar to many of the other allegations, the new allegation (Allegation 30) concerned re-use of images in a composite figure, with different images that appeared identical to but attributed to different experimental conditions. Dr. Katiyar was asked to respond in writing to the allegation and to provide any materials that indicated how this experiment was performed. Dr. Katiyar provided his response to the Investigation Committee on June 8, 2016. The Investigation Committee reviewed the response and considered it in this report. A draft report was made available to the respondent, Dr. Katiyar, in accordance with UAB Policy and he was provided a thirty (30) day opportunity to respond in writing. The Investigation Committee considered Dr. Katiyar's comments (see Appendix 6) in the final version of the report.

Table 1 – Timeline of Major Events

Date	Event
(b)(6) [redacted]	
2012-08-27	Mr. Ivan Oransky posted an article on Retraction Watch about published articles authored by Dr. Santosh K. Katiyar.
2012-08-30	Science Fraud – Highlighting Misconduct in Life Sciences Research – a web blog with an anonymous writer, posted images of the questioned figures from the Retraction Site post.
ASSESSMENT	
2012-10-01	Letter from Ms. Iratxe Puebla (Consulting Editor, *PLoS One*) to (b)(6) [redacted] (UAB, School of Medicine) relaying concerns about duplication of bands in a paper, the correction received, additional concerns, and then an evaluation of 8 publications, 3 of which had additional concerns.
2012-10-15	Then current RIO (b)(6) [redacted] (incoming RIO) submitted an assessment letter to (b)(6) [redacted] and recommended an inquiry panel be convened. There were 12 allegations, three from the *PLoS One* letter and 8 additional allegations first identified by *Retraction Watch* and *Science Fraud*.
SEQUESTRATION	
2012-12-28	Final meeting with IT to discuss computer data sequestration plan. RIO (b)(6) [redacted] (b)(6) [redacted] (UAB IT Security)
2013-03-21	Then current RIO (b)(6) [redacted] met with the Department of Dermatology (b)(6) [redacted] to tell him that an inquiry would be conducted and to get his help with data sequestration and storage.
2013-04-18	Briefing prior to actual sequestration ((b)(6) [redacted], legal, Kathy Martin from VA).
2013-04-23	Brief meeting with Dr. Katiyar, and lab notebooks, films, and slides were sequestered and stored. Computers were sequestered and copies of hard drives were made.
INQUIRY	
2013-09-10	The Inquiry Committee was charged by (b)(6) [redacted], School of Medicine). The committee requested that Dr. Katiyar provide copies of any other research publications that were supported by the VA, information about the participants in each of the papers named in the allegations and how they were supported.
2013-09-20	Dr. Katiyar complied with the request from September 10, 2013
2013-10-03	2nd Inquiry Committee meeting – discussed the publications, allegations, and their analysis to date. Requested additional supporting data from Dr. Katiyar through RIO Engler
2013-10-10	Dr. Katiyar responded that he could not find the requested data and images.
2013-10-11-	3rd Inquiry Committee meeting – prepared for interviews and identification of 9 additional allegations (13-21)
2013-10-21	Interviews of Ms. Tripti Singh, Dr. Mudit Vaid, Dr. Ram Prasad, Dr. Praveen Vayalil, and Dr. Katiyar.

Date	Event
2014-02-07	Initial Inquiry Report submitted to Dr. Katiyar for response. The report called for an investigation of research misconduct.
2014-03-07	Dr. Katiyar's response to the Initial Inquiry Report was received.
2014-03-28	Initial Inquiry Committee Report was submitted to (b)(6) [redacted], School of Medicine) and Ms. Kathy Martin, MA (Research Integrity Officer, Research and Development, Birmingham VA).
2014-04-15	Initial Inquiry Committee Report submitted by (b)(6) [redacted] indicating agreement with initiating an Investigation.
2014-04-30	UAB notified ORI by letter of the acceptance of the Inquiry Committee report with a recommendation to move to the investigation phase.
2014-05-05	ORI notified UAB by letter that they accepted the report and acknowledged UAB proceed with an investigation.
INVESTIGATION	
2014-09-16	Investigation Committee Charged
2014-10-16	Committee meeting – discussion on process, Chair, materials to review
2014-11-04	Committee meeting – other participants were the initial Inquiry Committee panel. Discussion of their findings, other materials needed, SharePoint site for view and uploading their work products.
2014-11-18	Committee meeting –Assignments made for reviewing allegations 1-12
2014-12-17	Committee meeting – review of allegations 1-12, demo of potential discussion board section on SharePoint
2015-02-17	Committee meeting to review interview list and formulate potential questions
2015-04-06	Committee interview of Dr. Trygve Tollefsbol and Dr. Eben Rosenthal– collaborators
2015-04-16	Committee interview of Dr. Nandakumar (phone), Dr. Vayalil (in person) and (b)(6) [redacted] (in person)
2015-04-28	Committee Interview of (b)(6) [redacted] of Dermatology)
2015-05-12	Committee meeting to discuss additional allegations found (allegations 22-29) and to discuss initial thoughts on whether allegations constitute F/F/P, intent, knowingly, or reckless standards.
2015-05-13	Allegations sent in writing to Dr. Katiyar by RIO (b)(6) [redacted]. Interviewed scheduled with Dr. Katiyar for May 28, 2015.
2015-05-14	Notice of cancellation of interview of Dr. Katiyar distributed to Committee
2015-06-15	Email response received by RIO Engler from Dr. Katiyar about allegations.
2015-06-17	Committee Interview of Dr. Katiyar
2015-08-10	Extension granted by ORI
2015-10-28	Clarification letter received from Dr. Katiyar in response to his interview on June 17, 2015
2015-11-03	Extension granted by ORI
2016-02-02	Extension granted by ORI
2016-02-12	Interview transcripts finalized
2016-03-02	Committee meeting to review report format, SharePoint files, and allegation summary from 05/2015, writing assignments

Date	Event
2016-03-11	(b)(6) identified a new concern as potential Allegation 30. This was forwarded to RIO (b)(6)
2016-03-23	Investigation Committee meeting to review first drafts of allegation reports. The committee agreed on a format and worked together on Allegation 1.
2016-04-18	RIO (b)(6) updated (b)(6) , phoned in), (b)(6)), and (b)(6) (b)(6) (VPRED). (b)(6) , University Counsel, was present. A more detailed review occurred June 24th, 2016
2016-04-20	Investigation Committee meeting to review the second drafts of allegation reports. The committee identified 25 instances of research misconduct (intentional falsification and/or fabrication) and 4 instances of questionable research practices. The committee recommends retraction of 20 of 22 publications. One of the two remaining papers (Paper 7) had been previously retracted. The committee also recommends corrections to the remaining publication (Paper 14).
2016-04-20	RIO (b)(6) updated (b)(6) (Chief University Counsel) on the case. (b)(6) agreed that there not be any additional draw down on Dr. Katiyar's current NIH grant.
2016-05-09	RIO (b)(6) spoke to (b)(6) (UAB Media Relations) alerting him to a probable finding of esearch misconduct. (b)(6) agreed to watch for UAB publicity highlighting Dr. Katiyar's work.
2016-05-09	RIO (b)(6) requested extension from ORI to finalize the report.
2016-05-10	(b)(6) (ORI) granted an extension until August 31, 2016
2016-05-11	RIO Bounelis send a letter to Dr. Katiyar informing him of the new allegation and requesting a response from him (due May 24, 2016). Dr. Katiyar responded that he needed more time and the deadline was extended to June 8, 2016.
2016-06-08	Dr. Katiyar submitted a response to Allegation 30.
2016-06-24	RIO (b)(6) , and (b)(6) (b)(6) , and SOM Sr Associate Dean to update on case.
2016-06-27	Investigation Committee met to finalize draft report.
2016-06-29	Draft Investigation Report sent to UAB Legal Counsel and BVAMC for review.
2016-08-08	Update meeting with RIO (b)(6)
2016-08-12	Investigation committee finalized draft report.
2016-08-15	Draft investigation report sent to Dr. Katiyar for 30 day response. Dr. Katiyar requested two additional weeks due to health concern.
2016-08-17	ORI granted extension until November 21, 2016
2016-09-30	Comments from Dr. Katiyar received.
2016-10-03	Investigation Committee meeting to finalize report
2016-10-28	Report finalized
2016-11-01	Signed report submitted to (b)(6) and Ms. Kathy Martin

5. Research Records and Evidence

Hard-copy records were sequestered by personnel from the Office of the Vice President for Research and Economic Development, School of Medicine Dean's Office, and the Office of University Compliance during the inquiry and investigation processes. All sequestered records were securely maintained by the Office of the Vice President for Research and Economic Development. These items were inventoried, Bates-numbered, and maintained in a secure room with restricted access in Volker Hall (see Other Attachments, *7. Sequestered Evidence*). Digital records were secured by members of UAB's IT department. Dr. Katiyar was provided supervised access to all hard-copy records and was provided digital copies of all data recovered from digital tapes and hard-drives.

6. Statement of Findings

Based on the preponderance of the evidence examined, the interviews conducted, and the responses from the respondent, the Investigation Committee found twenty-five (25) of the thirty (30) allegations to constitute scientific misconduct. One allegation was dismissed, and four allegations were determined to be questionable research practices. Twenty (20) of twenty-two (22) publications are recommended for retraction. Dr. Katiyar is the corresponding author on each of the twenty-two (22) publications. One of the remaining two publications, Paper 7, has previously been retracted. The Investigation Committee recommends that the other publication, Paper 14, be corrected with results from new experiments performed under supervision.

The following summary table provide a list of the allegations, papers of concern, sources of support, finding of misconduct, and recommendations (Table 2). A description of the evaluation of each allegation is provided after these tables.

Table 2 - Summary of Findings

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 1: Dr. Katiyar and/or his co-author(s) may have misrepresented the cell line used in Figure 1A (Paper 1). The article states that the data represents the FaDu cell line. However, the figure appears to be very similar to, or the same as, Figure 1A in a *BMC Complementary and Alternative Medicine* article (Paper 5) that is referred to as the A431 line.	**Paper 1:** Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasiveness of human HNSCC cells by targeting EGFR and reversing the epithelial-to-mesenchymal transition.* PLoS One, 2012. **7**(1): p. e31093. **Paper 5:** Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.	**Paper 1** • VA Merit Review Award (Katiyar) **Paper 5** • VA Merit Review Award (Katiyar) • R01 CA140197 (Katiyar, Hu) • R21 CA140832 (Katiyar). • NHEK were obtained from the P30 AR050948 (Elmets) Papers 1 and 5 list VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Papers 1 & 5
Allegation 2: Figure 7 in the *PLoS One* publication (Paper 1) seems to be a modification of Figure 6 in the *BMC Complementary and Alternative Medicine* article (Paper 5); however, the *BMC* article has not been cited or mentioned as the origin of the figure.	**Paper 1:** Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasiveness of human HNSCC cells by targeting EGFR and reversing the epithelial-to-mesenchymal transition.* PLoS One, 2012. **7**(1): p. e31093. **Paper 5:** Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.	**Paper 1** • VA Merit Review Award (Katiyar) **Paper 5** • VA Merit Review Award (Katiyar) • R01 CA140197 (Katiyar, Hu) • R21 CA140832 (Katiyar). • NHEK were obtained from the P30 AR050948 (Elmets) Papers 1 and 5 list VA affiliation.	Questionable research practice – perhaps a copyright issue	DISMISSED

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 3: Dr. Katiyar and/or his co-author(s) may have misrepresented data in Figure 5D (Paper 2) in that the second panel (labeled "0.1") and the third panel (labeled "1.0") appear to be identical.	**Paper 2:** Singh, T. and S.K. Katiyar, *Green tea catechins reduce invasive potential of human melanoma cells by targeting COX-2, PGE2 receptors and epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(10): p. e25224.	• R01 AT002536 (Katiyar) • VA Merit Review Award (Katiyar) Paper 2 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 2
Allegation 4: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 3) in that the lower right portion of panel E (labeled Silymarin 10 µg/ml)) appears identical to the top-left portion panel of the fourth image (labeled Silymarin 40 µg/ml).	**Paper 3:** Vaid, M., et al., *Silymarin targets beta-catenin signaling in blocking migration/invasion of human melanoma cells.* PLoS One, 2011. **6**(7): p. e23000.	• VA Merit Review Award (Katiyar) Paper 3 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 3
(b)(6) [redacted]				
Allegation 6: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figures 3c and 4c (Paper 6) in that there are artifacts present that suggest that images of some bands may have been cut and pasted from other figures.	**Paper 6:** Vayalil, P.K., C.A. Elmets, and S.K. Katiyar, *Treatment of green tea polyphenols in hydrophilic cream prevents UVB-induced oxidation of lipids and proteins, depletion of antioxidant enzymes and phosphorylation of MAPK proteins in SKH-1 hairless mouse skin.* Carcinogenesis, 2003. **24**(5): p. 927-36.	• R03 CA94593 (Katiyar) • R03 ES011421 (Katiyar) • Cancer Research Foundation of America • Purdue/UAB Botanical Center for Age-Related Diseases (S.K.K.) • VA (Elmets).	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 6

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
(b)(6) [redacted]				
Allegation 8: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figures 3E and 5B (Paper 8) in that both figures appear to use the same β-actin blot to represent different experimental conditions.	**Paper 8:** Singh, T., et al., *Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2, prostaglandin E(2) and prostaglandin E(2) receptors.* Carcinogenesis, 2011. **32**(1): p. 86-92.	• VA Merit Review Award (Katiyar) Paper 8 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Journal needs to be alerted. A correction needs to be issued. Experiments should either be repeated under supervision or replicate experiments identified. If a correction is not issued, the paper should be retracted. The paper should be retracted because of Allegation 15.

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 9: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 9) in that the bands used to represent different experimental conditions are the same, i.e., the bands labeled P16INK4a "Ac-Histone H3" and "MBD1" are the same; the bands labeled P16INK4a "Ac-Histone H4 Input" and "MBD1Input" and "HDAC1 Input" and RASSF1A "HDAC1Input" appear to be identical.	**Paper 9:** Nandakumar, V., et al., *Aberrant DNA hypermethylation patterns lead to transcriptional silencing of tumor suppressor genes in UVB-exposed skin and UVB-induced skin tumors of mice.* Carcinogenesis, 2011. **32**(4): p. 597-604.	• R21 CA140832 (Katiyar) • VA Merit Review Award (Katiyar) Paper 9 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 9
Allegation 10: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 10) in that the two panels labeled "0.5% GSPs" appear to represent overlapping parts of the same image, even though they are labeled to represent different cell lines (A549 or H1299).	**Paper 10**: Akhtar, S., et al., *Grape seed proanthocyanidins inhibit the growth of human non-small cell lung cancer xenografts by targeting insulin-like growth factor binding protein-3, tumor cell proliferation, and angiogenic factors.* Clin Cancer Res, 2009. **15**(3): p. 821-31.	No support cited. Paper 10 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 10
Allegation 11: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 2 (Paper 11) in that the panels labeled "10 uM Honokiol" appear to contain portions of the same image in both the MCF-7 and the 4T1 panels.	**Paper 11:** Singh, T. and S.K. Katiyar, *Honokiol, a phytochemical from Magnolia spp., inhibits breast cancer cell migration by targeting nitric oxide and cyclooxygenase-2.* Int J Oncol, 2011. **38**(3): p. 769-76.	• VA Merit Review Award (Katiyar) Paper 11 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 11

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 12: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 4 (Paper 12) in that the same images appear to represent different experimental conditions, i.e., Control A is the same as GTPs+UVB B andUVB alone B is the same as GTPS+UVB A.	**Paper 12:** Mantena, S.K., et al., *Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activation of cytotoxic T cells and inhibition of angiogenesis in tumors.* J Nutr, 2005. **135**(12): p. 2871-7.	• R03 CA105368 (Katiyar) • R01 CA079820 (Elmets) • VA Merit Review Award (Katiyar) • VA Merit Review Award (Elmets) • P30 AR050948 (Elmets) • C06 RR015490 (Gerrity) Paper 12 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 12
Allegation 13: Dr. Katiyar and/or his co-author(s) may have misrepresented the data as the same beta actin images in Figures 5B and 5D (Paper 5) are attributed to different experimental conditions.	**Paper 5:** Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.	• VA Merit Review Award (Katiyar) • R01 CA140197 (Katiyar, Hu) • R21 CA140832 (Katiyar). • NHEK were obtained from the P30 AR050948 (Elmets) Paper 5 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 5
(b)(6) [redacted]				

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 15: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in 1A (Paper 8) as it appears to be identical to Figure 2A in Paper 2.	**Paper 8:** Singh, T., et al., *Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2, prostaglandin E(2) and prostaglandin E(2) receptors.* Carcinogenesis, 2011. **32**(1): p. 86-92. **Paper 2:** Singh, T. and S.K. Katiyar, *Green tea catechins reduce invasive potential of human melanoma cells by targeting COX-2, PGE2 receptors and epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(10): p. e25224.	**Paper 8** • VA Merit Review Award (Katiyar) • R01 AT002536 (Katiyar) **Paper 2** • VA Merit Review Award (Katiyar) • Papers 2 and 8 list a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Papers 2 & 8
Allegation 16: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 2A (0 ug/ml honokiol with 4T1 cells) (Paper 11), which appears to be identical to Figure 5C (0 µg/ml CAPE) with 4T1 cells (also Paper 11), thus representing different experimental conditions.	**Paper 11:** Singh, T. and S.K. Katiyar, *Honokiol, a phytochemical from Magnolia spp., inhibits breast cancer cell migration by targeting nitric oxide and cyclooxygenase-2.* Int J Oncol, 2011. **38**(3): p. 769-76.	• VA Merit Review Award (Katiyar) Paper 11 lists a VA affiliation.	Questionable research practice	Retraction because of Allegation 11.
Allegation 17: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 3C (Paper 12) as beta actin bands (MMP-9 experiment and the beta actin bands, figure 5A (VEGF experiment) appear to be identical and represent different experimental conditions.	**Paper 12:** Mantena, S.K., et al., *Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activation of cytotoxic T cells and inhibition of angiogenesis in tumors.* J Nutr, 2005. **135**(12): p. 2871-7.	• R03 CA105368 (Katiyar) • R01 CA079820 (Elmets) • VA Merit Review Award (Katiyar) • VA Merit Review Award (Elmets) • P30 AR050948 (Elmets) • C06 RR015490 (Gerrity) Paper 12 lists a VA affiliation.	Questionable research practice	No corrective action for this allegation. Retraction of Paper 12 because of Allegation 12.

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 18: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Figure 4 (Paper 13) as two images appear to be identical and from the same tissue section. They appear to be rotated and cropped differently so as to represent different mouse strains.	**Paper 13:** Meeran, S.M., et al., *Interleukin-12 deficiency is permissive for angiogenesis in UV radiation-induced skin tumors.* Cancer Res, 2007. **67**(8): p. 3785-93.	• VA Merit Review Award (Katiyar) • R01 AT002536 (Katiyar) • P30 AR050948 (Elmets) Paper 13 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 13
Allegation 19: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Figure 5 (Paper 13) as beta actin blots from Fig. 3D and Fig. 5B appear to be identical and represent different experimental conditions.	**Paper 13:** Meeran, S.M., et al., *Interleukin-12 deficiency is permissive for angiogenesis in UV radiation-induced skin tumors.* Cancer Res, 2007. **67**(8): p. 3785-93.	• VA Merit Review Award (Katiyar) • R01 AT002536 (Katiyar) • P30 AR050948 (Elmets) Paper 13 lists a VA affiliation.	Questionable research practice	No corrective action for this allegation. Retraction of Paper 13 based on Allegation 18.
(b)(6) [redacted]				

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 21: Dr. Katiyar and/or his co-author(s) may have misrepresented data as beta actin blots appear to be identical in Figures 6B and 7A (Paper 15) and are attributed to different experimental conditions.	**Paper 15:** Mantena, S.K., S.D. Sharma, and S.K. Katiyar, *Berberine inhibits growth, induces G1 arrest and apoptosis in human epidermoid carcinoma A431 cells by regulating Cdki-Cdk-cyclin cascade, disruption of mitochondrial membrane potential and cleavage of caspase 3 and PARP.* Carcinogenesis, 2006. **27**(10): p. 2018-27.	• VA Merit Review Award (Katiyar) • P30 AR050948 (Elmets) Paper 15 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 15
Allegation 22: Dr. Katiyar and/or his co-author(s) may have misrepresented data as panels in Figure 5B (Paper 16) for vimentin treatment of cells contain images that partially overlap those of panels for fibronectin-treated cells, thus the same images are attributed to different experimental conditions.	**Paper 16:** Vaid, M., T. Singh, and S.K. Katiyar, *Grape seed proanthocyanidins inhibit melanoma cell invasiveness by reduction of PGE2 synthesis and reversal of epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(6): p. e21539.	• VA Merit Review Award (Katiyar) Paper 16 lists a VA affiliation.	Intentional fabrication and/or falsification	Retraction of Paper 16
Allegation 23: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Panel D of figure 1 (Paper 4) in that the figure labelled "EGCG Concentration 20 µg/ml" appears to be identical to Figure 1 Panel D "A549 cells" and "GSPs concentration 40 µg/ml" (Paper 17).	**Paper 4:** Biochemical and Biophysical Research Communications, Volume 375, Issue 1, 10 October 2008, Pages 162-167; *EGCG inhibits mammary cancer cell migration through inhibition of nitric oxide synthase and guanylate cyclase*, Punathil T, Tollefsbol TO, and Katiyar SK **Paper 17:** Molecular Carcinogenesis, 2009, 48:232-242; *Inhibition of Non-small Cell Lung Cancer Cell Migration by Grape Seed Proanthocyanidins Is Medicated Through the Inhibition of Nitric Oxide, Guanylate Cyclase, and ERK1/2*, Punathil, T, and Katiyar, SK.	**Paper 4** • R01 CA129415 (Tollefsbol) **Paper 17** • None noted Paper 17 lists VA affiliation	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Papers 4 & 17

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 24: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Panel D of figure 1 (Paper 4) in that the figure labelled "EGCG Concentration 40 µg/ml" appears to be identical to Figure 1 Panel D "H1299 cells" and "GSPs concentration 60 µg/ml" (Paper 17).	**Paper 4:** Punathil, T., T.O. Tollefsbol, and S.K. Katiyar, *EGCG inhibits mammary cancer cell migration through inhibition of nitric oxide synthase and guanylate cyclase.* Biochem Biophys Res Commun, 2008. **375**(1): p. 162-7. **Paper 17:** Punathil, T. and S.K. Katiyar, *Inhibition of non-small cell lung cancer cell migration by grape seed proanthocyanidins is mediated through the inhibition of nitric oxide, guanylate cyclase, and ERK1/2.* Mol Carcinog, 2009. **48**(3): p. 232-42.	**Paper 4** • R01 CA129415 (Tollefsbol) **Paper 17** None noted Paper 17 lists VA affiliation	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Papers 4 & 17
Allegation 25: Dr. Katiyar and/or his co-author(s) may have misrepresented data in panels in Figure 3A and 3B (Paper 18). The image shown in Panel A in Figure 3A (control) appears to be an adjacent slice to Panel C in Figure 3B (EGCG+UVB), based on the morphology of the slice presented in the image.	**Paper 18:** Mantena, S.K., A.M. Roy, and S.K. Katiyar, *Epigallocatechin-3-gallate inhibits photocarcinogenesis through inhibition of angiogenic factors and activation of CD8+ T cells in tumors.* Photochem Photobiol, 2005. **81**(5): p. 1174-9.	• R03 CA105368 (Katiyar) • VA Merit Review Award (Katiyar) • P30 AR050948 (Elmets,) Paper 18 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 18
Allegation 26: Dr. Katiyar and/or his co-author(s) misrepresented data in panels in Figure 3A and 3B of Paper 18. Panel C in Figure 3A (EGCG+UVB) appears to be an adjacent slice to Panel A in Figure 3B (Control), based on the morphology of the slice presented in the image.	**Paper 18:** Mantena, S.K., A.M. Roy, and S.K. Katiyar, *Epigallocatechin-3-gallate inhibits photocarcinogenesis through inhibition of angiogenic factors and activation of CD8+ T cells in tumors.* Photochem Photobiol, 2005. **81**(5): p. 1174-9.	• R03 CA105368 (Katiyar) • VA Merit Review Award (Katiyar) • P30 AR050948 (Elmets) Paper 18 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 18

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 27: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in panel b of figure 2 (Paper 19) in that the beta-Actin bands appear to be identical to the center four beta-actin bands in Figure 4, panel C (also Paper 19), labelled "IL-12 KO".	**Paper 19:** Meeran, S.M., T. Punathil, and S.K. Katiyar, *IL-12 deficiency exacerbates inflammatory responses in UV-irradiated skin and skin tumors.* J Invest Dermatol, 2008. **128**(11): p. 2716-27.	• R01 AT002536 (Katiyar) • VA Merit Review Award (Katiyar) Paper 19 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 19
Allegation 28: Dr. Katiyar and/or his co-authors may have misrepresented the data in Figures 2A (panel labelled "UV 1/2h" and "IL-12 KO treated with EGCG") and 3A (panel labelled "UV alone") in Paper 20. These two figures appear to be overlapping sections of the same image, based on the morphology of the cells included in the slice.	**Paper 20:** Meeran, S.M., S.K. Mantena, and S.K. Katiyar, *Prevention of ultraviolet radiation-induced immunosuppression by (-)-epigallocatechin-3-gallate in mice is mediated through interleukin 12-dependent DNA repair.* Clin Cancer Res, 2006. **12**(7 Pt 1): p. 2272-80.	• VA Merit Review Award (Katiyar) • R01 AT002536 (Katiyar) Paper 20 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 20
Allegation 29: Dr. Katiyar and/or his co-authors may have misrepresented the data in Figure 1, Panels B and C (Paper 21). The second lanes from the left in each panel appear to be identical.	**Paper 21:** Vayalil, P.K., et al., *Green tea polyphenols prevent ultraviolet light-induced oxidative damage and matrix metalloproteinases expression in mouse skin.* J Invest Dermatol, 2004. **122**(6): p. 1480-7.	• R03 ES011421 (Katiyar) • R03 CA094593 (Katiyar) • Purdue/UAB Botanical Center for Age-Related Diseases (S.K.K.) • R01 CA079820 (Elmets) • Veterans Administration (18-103-02, Elmets)	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 21

NOTE: Allegations from papers that cite funding or author affiliations from: 1) PHS are blue 2) VA are yellow, and 3) PHS & VA are green

Allegation	Paper Number & Reference	Cited Funding (Principal Investigator)	Finding	Recommendation
Allegation 30: Dr. Katiyar and/or his co-authors may have misrepresented the data in Figure 4, Panels A and C (Paper 22). The image for WT mice exposed to UVB for ½ hr and treated with EGCG appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr. The image for IL-12 KO mice exposed to UVB for ½ hour appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr and treated with EGCG. The image WT mice exposed to UVB for 48 hours and treated with EGCG appears to be identical to that for IL-12 KO mice controls treated with EGCG.	**Paper 22:** Meeran, S.M., et al., *(-)-Epigallocatechin-3-gallate prevents photocarcinogenesis in mice through interleukin-12-dependent DNA repair*. Cancer Res, 2006. **66**(10): p. 5512-20.	• C06 RR015490 (Gerrity) • VA Merit Review Award (Katiyar) • R01 AT002536 (Katiyar) • P30 AR050948 (Elmets) Paper 22 lists a VA affiliation.	Intentional fabrication and/or falsification by Dr. Santosh K. Katiyar	Retraction of Paper 22

Allegation 1

Dr. Katiyar and/or his co-author(s) may have misrepresented the cell line used in Figure 1A (Paper 1). The article states that the data represents the FaDu cell line. However, the figure appears to be very similar to, or the same as, Figure 1A in a BMC Complementary and Alternative Medicine article (Paper 5) that is referred to as the A431 line.

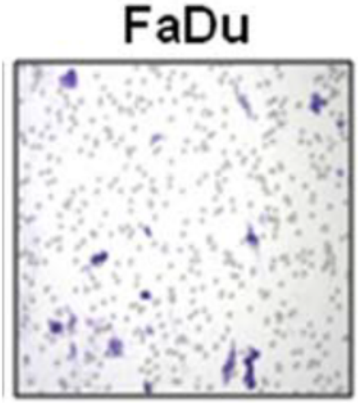
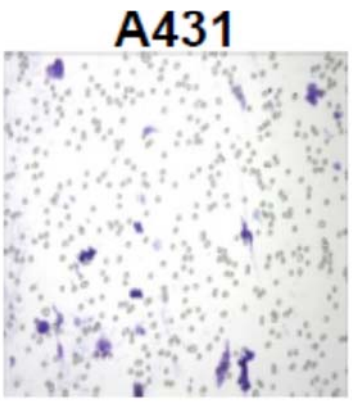
> Paper 1: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasiveness of human HNSCC cells by targeting EGFR and reversing the epithelial-to-mesenchymal transition.* PLoS One, 2012. **7**(1): p. e31093.
>
> Paper 5: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The committee closely examined Figure 1A in the *PLoS One* (referred to as Paper 1) and Figure 1A in the *BMC Complementary and Alternative Medicine* (referred to as Paper 5) articles as well as the analysis performed by the Inquiry Committee (see *Initial Inquiry Committee Report,* Appendix 4, page 59). The pattern of stained and unstained cells in the panels from Figure 1A in Papers 1 and 5 was identical. One image was labelled as being the FaDu cell line and the other was labeled as the A431 cell line. It is the judgement of the committee members that the identical cell pattern originated from a single image that was replicated in two papers. The panels of concern from figures are shown below and the analysis is presented in Appendix 5.

The committee interviewed Dr. Katiyar on June 17, 2015 and questioned him directly about the source of this discrepancy. Dr. Katiyar stated that the co-author "said maybe I confused because the number of migrating cell in FaDu and A431 were almost equal so maybe I'm confused in putting these cells just the same again in same panel." (see transcript *FINAL – Dr. Katiyar 061715,* page 67). Dr. Katiyar blamed his coauthor for the duplication of the images. In advance of the June 17, 2015 interview, Dr. Katiyar provided a written response to some of the allegations and images from a replicated experiment that contained five images of migration pattern of the FaDu cell line (see *2015-06-15 Response to Allegations from Dr. Katiyar*). The committee observed that two of the five images appeared to be identical in this update. When questioned about this new duplication, Dr. Katiyar again blamed his lab personnel (see transcript *FINAL – Dr. Katiyar 061715,* page 69-70). Careful examination of the figures during preparation should have prevented this. Dr. Katiyar provided follow-up correspondence to clarify when the repeat experiment was performed. In this correspondence (see *2015-10-28 Clarification letter from Dr. Katiyar*), he states that the repeat experiment was performed prior to October 21, 2013. He also stated that since November of 2013, he had introduced new oversight procedures that included review by his Department Chair, Dr. Craig Elmets. Dr. Elmets confirmed this when he was interviewed by the investigation committee (see Transcript *FINAL - Dr. Elmets 042815,* page 9).

Dr. Katiyar was not able to provide an explanation for how a single image could have been labelled as two different cell lines. Nor did he provide explanation for why the FaDu cell portion of the experiment was repeated, but the A431 comparison was not. Furthermore, Dr. Katiyar explained that the quantitation based on these images was generated from multiple microscopic fields of a single experiment. Based on the expertise of the committee, the quantitative results are not valid unless the experiments are fully replicated and multiple membranes for each condition are analyzed. Dr. Katiyar did not provide any other data to the investigation committee to validate this experiment.

Paper 1 – Figure 1A	Paper 5 – Figure 1A
Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasiveness of human HNSCC cells by targeting EGFR and reversing the epithelial-to-mesenchymal transition.* PLoS One, 2012. **7**(1): p. e31093.	Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.
	

Dr. Katiyar was the senior author on both publications, and was responsible for the preparation of the figures, the submission of the manuscripts to the journals, and for revisions to manuscripts before they were published. This is evidenced by the published contributions of the authors in both articles. The published contribution of Dr. Katiyar's (SKK) role in Paper 5, is "SKK is a principal investigator of the study, has designed the study, provided all supervision on daily basis, data analysis and write the final draft of the manuscript.". In Paper 1, the published contributions of Dr. Katiyar (SKK) and his co-authors were "Conceived and designed the experiments: QS RP SKK. Performed the experiments: QS RP. Analyzed the data: SKK ER RP. Contributed reagents/materials/analysis tools: SKK ER. Wrote the paper: SKK."

(c) Cited Support - There was no acknowledgement of PHS support in Paper 1. PHS support acknowledged in Paper 5 includes R01 CA140197 (Katiyar, Hu) and R21 CA140832 (Katiyar). In Paper 5, NHEK were acknowledged as being obtained from the P30 AR050948 supported UAB Skin Center (Elmets). Both Papers 1 and 5 acknowledged a VA Merit Award to Dr. Katiyar.

(d) Recommendation - The Investigation Committee recommends that both Papers 1 and 5 be retracted. Retraction is indicated because the images used were the basis for quantitative results, there is a lack of original raw data, and the replicate experiments provided by Dr. Katiyar were judged as incomplete and inadequate to support the quantitative data in both publications.

(e) Responsible Individual - The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 2

Figure 7 in the *PLoS One* publication (Paper 1) seems to be a modification of Figure 6 in the *BMC Complementary and Alternative Medicine* article (Paper 5); however, the *BMC* article has not been cited or mentioned as the origin of the figure.

> Paper 1: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasiveness of human HNSCC cells by targeting EGFR and reversing the epithelial-to-mesenchymal transition.* PLoS One, 2012. **7**(1): p. e31093.
>
> Paper 5: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.

(a) Misconduct Finding - This allegation was dismissed by the Inquiry Committee and was not considered further by the Investigation Committee.

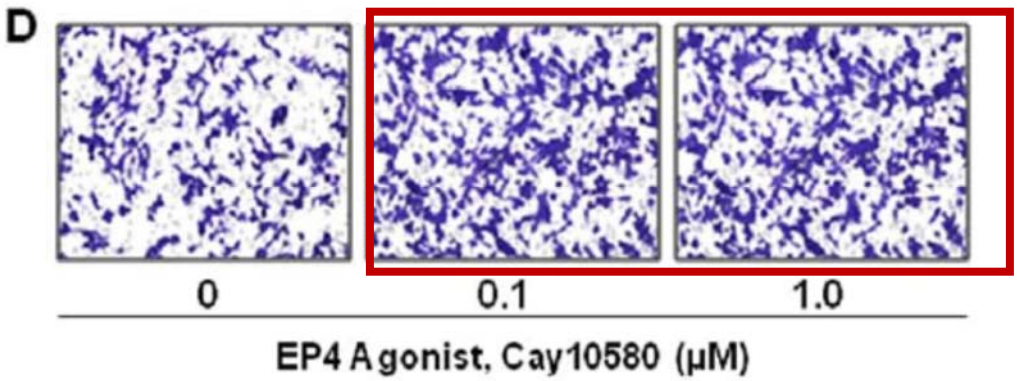
Allegation 3

Dr. Katiyar and/or his co-author(s) may have misrepresented data in Figure 5D of Paper 2 in that the second panel (labeled "0.1") and the third panel (labeled "1.0") appear to be identical.

> Paper 2: Singh, T. and S.K. Katiyar, *Green tea catechins reduce invasive potential of human melanoma cells by targeting COX-2, PGE2 receptors and epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(10): p. e25224.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee closely examined the second panel (labeled "0.1") and the third panel (labeled "1.0") of Figure 5D in the *PLoS One* article (referred to as Paper 2) as well as the analysis performed by the Inquiry Committee (see *Initial Inquiry Committee Report*, Appendix 2, page 60). The staining was examined at high magnification and after pseudo-coloring. The staining pattern in the two panels was identical. It is the judgement of the committee that the sections judged to be identical came from a single original image that was subsequently attributed to different experimental conditions. The panels of concern from the figures are shown below outlined in red. Further analysis is shown in Appendix 5.



The Investigation Committee interviewed Dr. Katiyar on June 17, 2015 and questioned him directly concerning how this discrepancy occurred. Dr. Katiyar blamed the co-author and said "she did mistake, maybe confused or whatever -- mainly confusion" (see transcript *Final-Dr. Katiyar 061715*, page 86). Dr. Katiyar was questioned further about how images are selected for inclusion in the manuscript and who makes the decisions on how those figures are actually put together. Dr. Katiyar stated that he is responsible for putting together the final manuscript and submitting it to the journal. Dr. Katiyar stated that in this paper he did not compare the figures with the original data, he believed that the panels were fine, and he did not catch the error (see transcript *Final-Dr. Katiyar 061715*, pages 87-88). The committee reviewed the interview of Dr. Singh by the Initial Inquiry Committee on 10/20/2013. When questioned concerning the generation of figures, Dr. Singh stated lab members "originally make a very rough draft of the figure. Then it goes to Dr. Katiyar. He will check it. …if I'm putting like an Image A, and if he feels that if you put it as an Image B that will make more clear sense of that paper, he will do some adjustments like changing the numbers or changing the sequence." (see transcript Appendix 4,

Initial Inquiry Committee Dr. Singh 10202013, pg.32). When asked who makes the final figures, Dr. Singh responded final figures are decided by Dr. Katiyar only. The Initial Inquiry Committee also asked who wrote the figure legends. Dr. Singh answered that "we write in the beginning…initially we write the first draft, but very final draft that's written by Dr. Katiyar, that is written and edited by Dr. Katiyar himself" (see transcript Appendix 4, *Initial Inquiry Committee Dr. Singh 10202013, pg.32*). Dr. Katiyar did not provide any other explanation as to how the duplication occurred.

The Investigation Committee questioned Dr. Katiyar concerning quantification of the data and if the results were significant. Dr. Katiyar stated that the experiments were repeated, but he did not supply either additional information about statistical evaluation of the new data (see transcript *Final-Dr. Katiyar 061715*, pages 89) or to validate the experiment.

(c) PHS Support - Paper 2 acknowledged the following support: R01 AT002536 (Katiyar) and a VA Merit Review Award (Katiyar).

(d) Recommendation - The committee recommends that Paper 2 be retracted from the published scientific literature. Retraction is recommended because the images were used for quantitation, there is a lack of original raw data, and new supportive data was judged inadequate to support the quantitation.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

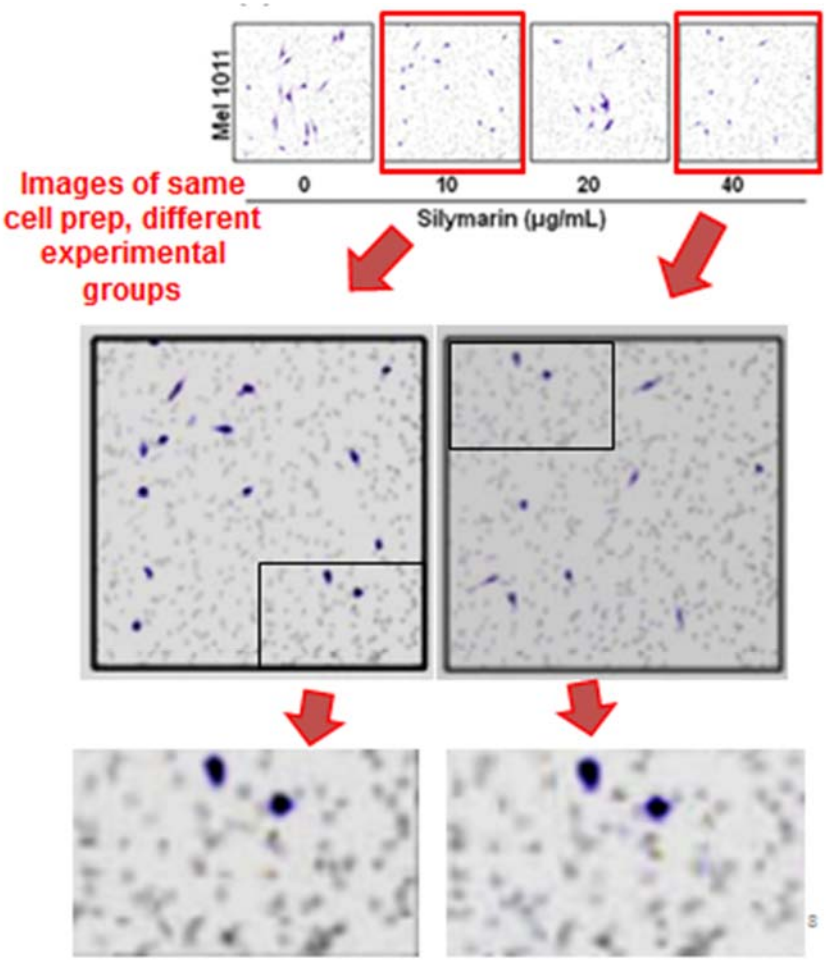
Allegation 4

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 3) in that the lower right portion of panel E (labeled Silymarin 10 µg/ml)) appears identical to the top-left portion panel of the fourth image (labeled Silymarin 40 µg/ml).

> Paper 3: Vaid, M., et al., *Silymarin targets beta-catenin signaling in blocking migration/invasion of human melanoma cells.* PLoS One, 2011. **6**(7): p. e23000.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee closely examined the panels in Fig. 5 of the *PLoS One* paper (referred to as Paper 3) as well as the analysis of the Inquiry Committee (see Initial Inquiry Report, Appendix 2, pages 63-64). Panels labeled Silymarin 10 µg/ml and Silymarin 40 µg/ml)) were judged to be identical. The panels of concern are shown below and the analysis is presented in Appendix 5.



The Investigation Committee interviewed Dr. Katiyar on June 17, 2015. Dr. Katiyar was questioned about how images containing parts that appeared identical could have been used to represent different experimental conditions. Dr. Katiyar stated that the first author, Dr. Vaid, was

responsible for the figure and stated that Dr. Vaid had repeated the whole experiment (see transcript *FINAL- Dr. Katiyar 061715*, page 100). No results supporting this claim were supplied. Dr. Vaid was interviewed by both the Inquiry Committee and the Investigation Committee. He was consistent in his description of how images were chosen to construct a composite image. In the Inquiry Committee transcript, he described that he would provide four examples for each condition (control or treatment) and that in the early part of his employment with Dr. Katiyar, Dr. Katiyar would select the data for the figure for publication (see transcript, *Vaid, Mudit 10-21-13, pages 16-23*). During the Investigation Committee interview, he repeated this description of the process (see *FINAL - Dr. Vaid 042815, pages 11-13*). The authorship contributions for Paper 3 were reviewed. Dr. Katiyar is listed as the sole individual who wrote this paper (Paper 3, page 9).

(c) Cited Support – No PHS support is acknowledged in Paper 3. A VA Merit Review Award to Dr. Katiyar is acknowledged as supporting this work.

(d) Recommendation - The Investigation Committee recommends that Paper 3 be retracted. Retraction is indicated because the images in question were the basis for quantitative results, there is a lack of original data, and no replicate experiments were provided by Dr. Katiyar.

(e) Responsible Individual - The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 5

(b)(6)

[redacted]

(b)(6)

[redacted]

(b)(6)

[redacted]

Allegation 6

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figures 3c and 4c (Paper 6) in that there are artifacts present that suggest that images of some bands may have been cut and pasted from other figures

> Paper 6: Vayalil, P.K., C.A. Elmets, and S.K. Katiyar, *Treatment of green tea polyphenols in hydrophilic cream prevents UVB-induced oxidation of lipids and proteins, depletion of antioxidant enzymes and phosphorylation of MAPK proteins in SKH-1 hairless mouse skin.* Carcinogenesis, 2003. **24**(5): p. 927-36.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee closely examined Fig. 3C and Fig. 4C in the *Carcinogenesis* paper (referred to as Paper 6) as well as the analysis performed by the Inquiry Committee (see Appendix 2 *Initial Inquiry Committee Report*, Appendix 2, pages 70-72). The panels of concern from Figures 3C and 4C are shown below and the Investigation Analysis is found in Appendix 5.

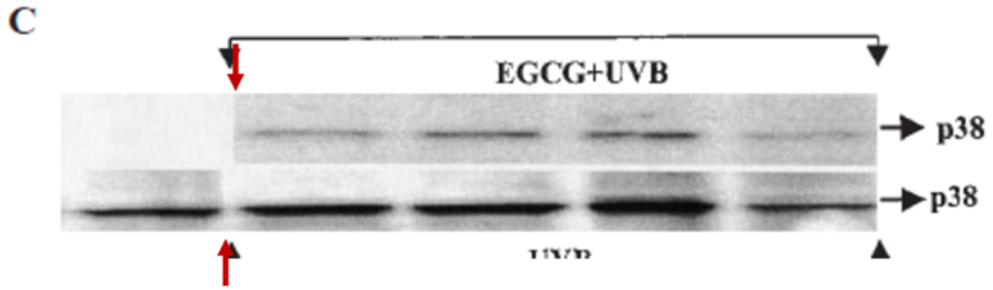


Figure 3C. This is an enlarged view of the original panel. The red arrows indicate obvious splice marks.

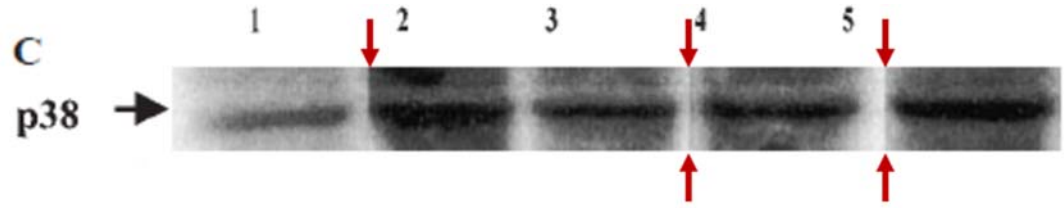


Figure 4C. This is an enlarged view of the original panel. The red arrows indicate obvious splice marks.

Splice artifacts are clearly present in both figures and demonstrate intentional manipulation.

The Investigation Committee interviewed Dr. Katiyar on June 17, 2015 and questioned him directly about these figures. With respect to Fig. 3C, Dr. Katiyar states that the pasted image (top left corner) was not meant to represent a data point in the accompanying graph (see transcript *FINAL-Dr. Katiyar 061715*, page 116-117). He does not comment on the spliced image in the bottom left corner which was used for data analysis. With respect to Fig. 4C, Dr. Katiyar acknowledges that

the image has been manipulated but does not provide an explanation (see transcript *FINAL-Dr. Katiyar 061715,* page 119).

Based on the expertise of the Investigation Committee, the quantitative results are not valid unless the experiments are fully replicated and blots for each experimental treatment are analyzed. Dr. Katiyar voluntarily provided a replicate set of data to the investigation committee to validate this experiment (see *2015-06-15 Response to allegations from Dr. Katiyar,* pages 10-12). These data lacked appropriate oversight and were not densitometrically analyzed to determine the relative intensity of bands to loading controls and to background staining. In addition, only one replicate was provided for Figure 4C and it did not seem to replicate the density of bands in the published figure. Without evidence of the quantitation, the data as published are not credible. Whether or not these new experiments replicated the findings of the figures in question, they are not relevant to the allegation of research misconduct.

As the senior author on this publication, Dr. Katiyar was responsible for the preparation of the figures, the submission of the manuscript to the journal, and for manuscript revisions prior to publication. This is evidenced by the listing of Dr. Katiyar as the Corresponding Author in the published article. In addition, Dr. Vayalil (see *FINAL - Dr. Vayalil 041615,* pages 18-30), describes that he, Dr. Vayalil, cut and pasted images together for lab meeting presentation purposes for Dr. Katiyar, but did not expect to see these in publications. Consistent with testimony from others in the laboratory, Dr. Vayalil described that the final figure decision, final writing, submitting, and revising the manuscript was Dr. Katiyar's.

(c) Cited Support – Paper 6 acknowledges PHS support from R03 CA94593 (Katiyar) and R03 ES011421 (Katiyar). Support was also acknowledged from the VA to Dr. Elmets, from the Cancer Research Foundation of America (Katiyar), and from the Purdue/UAB Botanical Center for Age-Related Diseases (Katiyar.).

(d) Recommendation - The Investigation Committee recommends that Paper 6 be retracted from the published scientific literature. Retraction is indicated because the images used formed the basis for quantitative results. Further, the splice artifacts show that the images were intentionally manipulated. There was a lack of original data to support the published figures. Replicate experiments provided by Dr. Katiyar were judged as incomplete and inadequate to support the quantitative data in the publication.

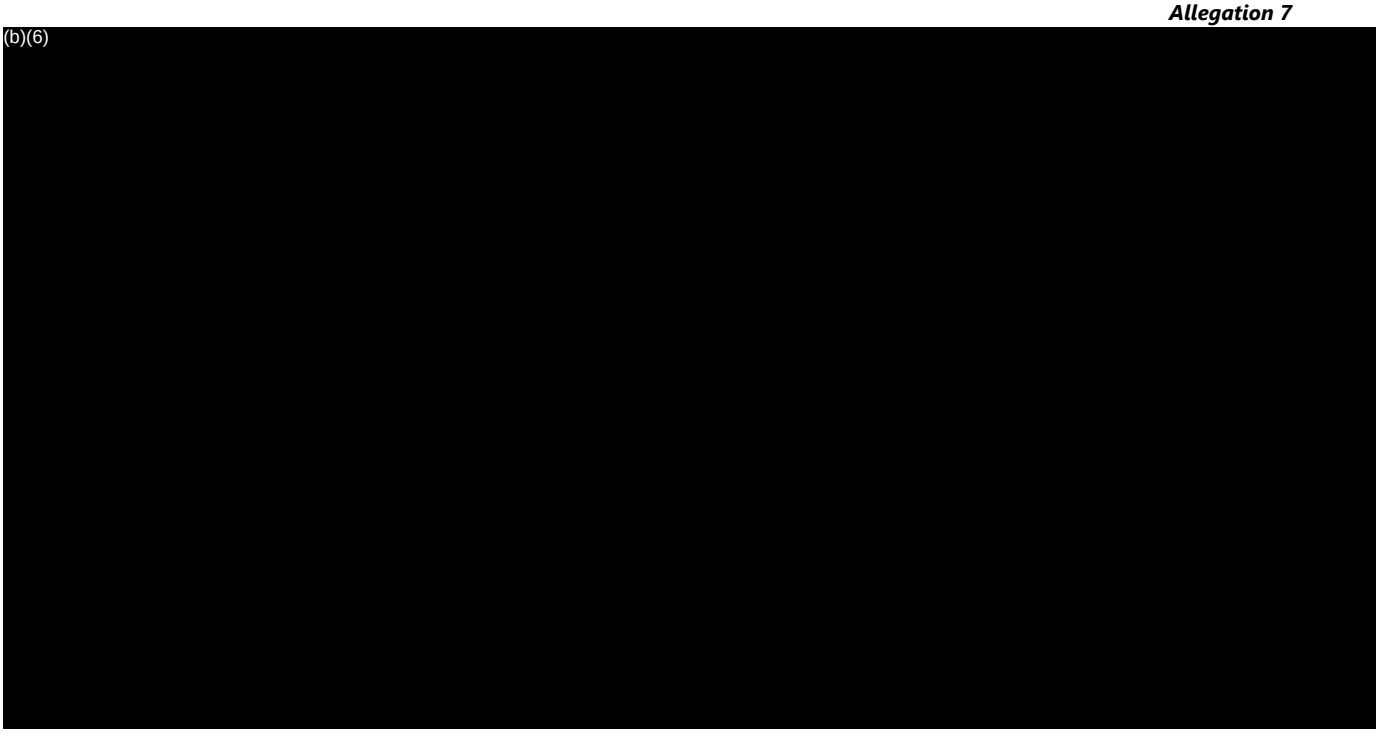
(e) Responsible Individual - The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 7

(b)(6)

[redacted]

(b)(6)



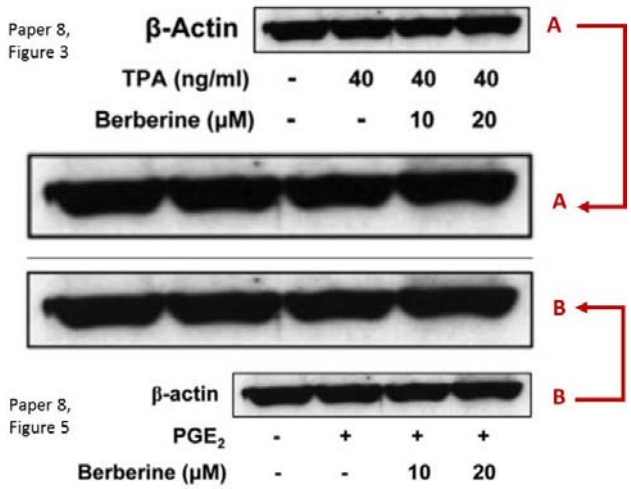
Allegation 8

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figures 3E and 5B (Paper 8) in that both figures appear to use the same β-actin blot to represent different experimental conditions.

> Paper 8: Singh, T., et al., *Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2, prostaglandin E(2) and prostaglandin E(2) receptors.* Carcinogenesis, 2011. **32**(1): p. 86-92.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee closely examined the data in figures 3A and 5B in the Carcinogenesis paper (Paper 8). The pattern of staining for the actin bands in figures 3A and 5B were judged to be identical. The panels of concern from figures 3A and 5B are shown below and further analysis is shown in Appendix 5.



The Investigation Committee agrees that the same β-actin blot was used to represent different experimental conditions. It is stated in the methods section of Paper 8 that "To verify equal protein loading, the membrane was stripped and reprobed with an anti-β actin antibody."

The Investigation Committee interviewed Dr. Katiyar on June 17, 2015 and questioned him directly about the source of this discrepancy. Dr. Katiyar stated that it was a mistake on the part of the first author. Dr. Katiyar also stated that "first author repeated all of these experiments to verify that beta actin is -- that the loading is fine in each lane" (see transcript *FINAL – Dr. Katiyar 061715*, page 124). Dr. Katiyar was questioned as the whether he had the original films for these experiments and he responded that he did not due to the poor storing ability of the laboratory.

In his response to a request from the Investigation Committee in advance of his interview (see *2015-06-15 Response to Allegations from Dr. Katiyar*, page 15), Dr. Katiyar states that Figure 3C is correct and he provides an after-the-fact replicate experiment for Figure 5 carried out in A375 melanoma cells. In Figure 5, unequal loading is obvious when comparing the two rows of beta-actin stained controls, thus invalidating the replicate experiment. While this experiment might

speak to the scientific veracity of the data, it was not relevant to the allegation. The Investigation Committee reviewed the transcript of the interview with Tripti Singh (see transcript *Singh, Tripti 10-21-13* pages 34-35) and by the Inquiry Committee. In this interview, she stated that Dr. Katiyar made the final decisions for which images were chosen for publication, and he writes the final manuscript for publication. She also stated that the images of concern in Paper 11 were prepared before she joined the lab and finalized by Dr. Katiyar (see transcript *Singh, Tripti 10-21-13* pages 45-46). She also states that the files on the laboratory computers are accessible to the lab members, including Dr. Katiyar, but that final figures for publication were on Dr. Katiyar's computer only (see transcript *Singh, Tripti 10-21-13* page 74). Her statements about manuscript preparation were consistent with other members of Dr. Katiyar's laboratory

(c) Cited Support – Paper 8 does not cite any PHS Support. However, a VA Merit Award to Dr. Katiyar is acknowledged.

(d) Recommendation – The misconduct is significant but it is not clear if it affects the conclusions of the paper. The Investigation Committee recommends that the journal *Carcinogenesis* be alerted. For the experiment to stand, a correction needs to be issued that includes data from replicated experiments. The Investigation Committee recommends that experiments should either be repeated under supervision or that valid, replicate experiments be identified. If a correction is not issued or if experimental findings are not validated with a high level of scientific rigor, the paper should be retracted.

(e) Responsible Individual - The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 9

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 9) in that the bands used to represent different experimental conditions are the same, i.e., the bands labeled P16INK4a "Ac-Histone H3" and "MBD1" are the same; the bands labeled P16INK4a "Ac-Histone H4 Input" and "MBD1Input" and "HDAC1 Input" and RASSF1A "HDAC1Input" appear to be identical.

> Paper 9: Nandakumar, V., et al., *Aberrant DNA hypermethylation patterns lead to transcriptional silencing of tumor suppressor genes in UVB-exposed skin and UVB-induced skin tumors of mice.* Carcinogenesis, 2011. **32**(4): p. 597-604.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee closely examined Figure 5 in the 2011 *Carcinogenesis* manuscript (referred to as Paper 9), as well as the analysis performed by the Inquiry Committee (see Appendix 4 - *Initial Inquiry Committee Report*, Appendix 2, pages 79-80. In addition, the authors of this manuscript were interview by the Investigation Committee. In particular, Dr. Katiyar was unable to provide an explanation for how these results were falsified and clearly admitted that there were "so many errors in the figure *(5)*"(see transcript *FINAL - Dr. Katiyar 061715*, page 131, line 10). While Dr. Katiyar claims that the results were replicated by Dr. Vaid (see transcript *FINAL - Dr. Katiyar 061715*, page 131, line 13), no independent results are available to verify the purported findings of this Figure. It is the judgement of the Investigation Committee that there are identical ChIP based banding patterns highlighted by colored boxes in the analysis of the published figure (Figure 5). This demonstrates that pairs (or groups of 3) bands were copied and pasted (and sometimes flipped) to create different figure elements that are purported to represent different experimental conditions. When questioned about the duplications, Dr. Katiyar blamed the first author (who was a graduate student in his lab at the time these experiments were performed (transcript *FINAL – Dr. Katiyar 061715*, pages 130-131). However, careful examination of the figures during preparation should have prevented this duplication of data. In addition, the papers first author, V. Nandakumar, indicated in her interview that "he (Dr. Katiyar) would normally tell me what to do, and -- he would tell me what experiment to do and, like how -- he would give me the big picture, like this is what we are looking for, and he would ask me to do the experiment." (see transcript *FINAL - Dr.Nandakumar 041615*, page 10, line 2-6) and that "Dr Katiyar arranged it *(Figure 5)*" (see transcript *FINAL - Dr.Nandakumar 041615*, page 13, line 5). The panels of concern from Figure 5 and the analysis of figure 5 are shown below and they are also presented in Appendix 5.

Dr. Katiyar was the senior author on this publication as evidenced by the attribution of corresponding author to Dr. Katiyar in the final publication. In addition, both the testimony of Dr. Nandakumar and Dr. Vaid were consistent in their descriptions of manuscript preparations: Dr. Katiyar prepared the figures; wrote the manuscript, and submitted the manuscript with minimal involvement of either of them (see transcripts *FINAL - Dr. Vaid 042815* pages 13-16 and *FINAL - Dr.Nandakumar 041615*, pages 15-21).

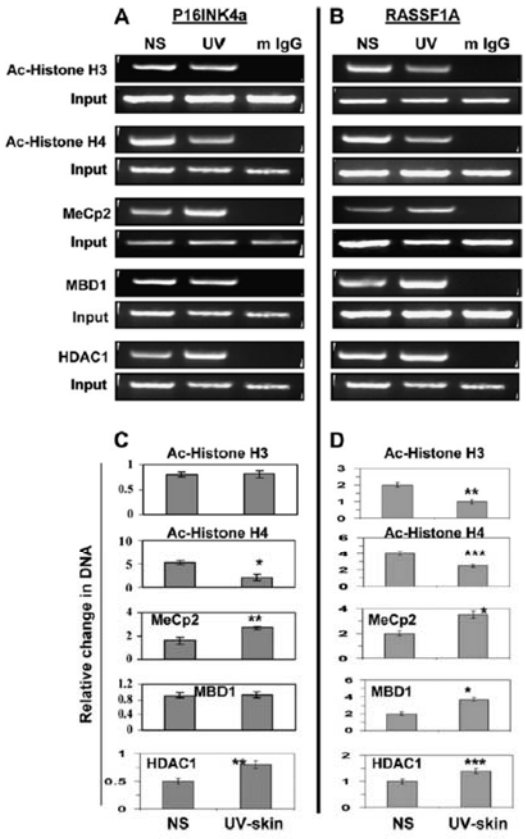
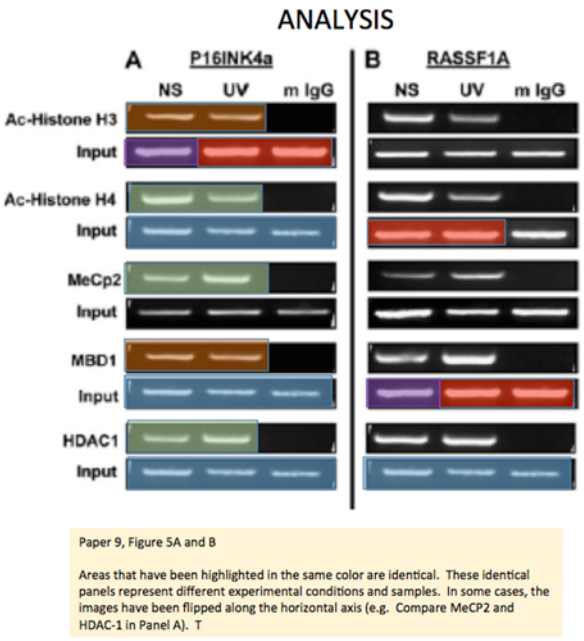


Fig. 5. Modifications in histones and methyl-binding proteins are associated with the DNA hypermethylation of the p16^{INK4a} and *RASSF1A* promoters in UVB-exposed epidermal skin after 24 weeks. (A) Chip analyses of Ac-histone H3, Ac-histone H4, MeCp2, MBD1 and HDAC1 in the p16^{INK4a} and (B) *RASSF1A* promoter regions. The panels show the PCR amplification product of the ChIP-purified DNA using the specific antibodies. Samples incubated with mouse IgG served as negative controls. (C and D) Quantification by real-time PCR using the same experimental procedures, antibodies and primers. Data were normalized to input samples and are presented as relative change in DNA and expressed in terms of mean values ± SD ($n = 3$, epidermal skin or tumor samples were used from three different mice per group). Significant difference versus non-UVB-exposed epidermal skin (normal skin) samples, $^{***}P < 0.05$, $^{**}P < 0.01$, $^{*}P < 0.001$.



Paper 9, Figure 5A and B

Areas that have been highlighted in the same color are identical. These identical panels represent different experimental conditions and samples. In some cases, the images have been flipped along the horizontal axis (e.g. Compare MeCP2 and HDAC-1 in Panel A). T

(c) Cited Support – Paper 9 acknowledges R21 CA140832 (Katiyar) as PHS support for this study. In addition, there is acknowledgement of VA Merit Review Award to Dr. Katiyar.

(d) Recommendation – The Investigation Committee recommends that Paper 9 be retracted from the published scientific literature. Retraction is indicated because there are multiple instances of falsification and/or fabrication in Figure 5, there is a lack or original data to support the original Figure, and there are no complete replicate experiments to validate the original findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

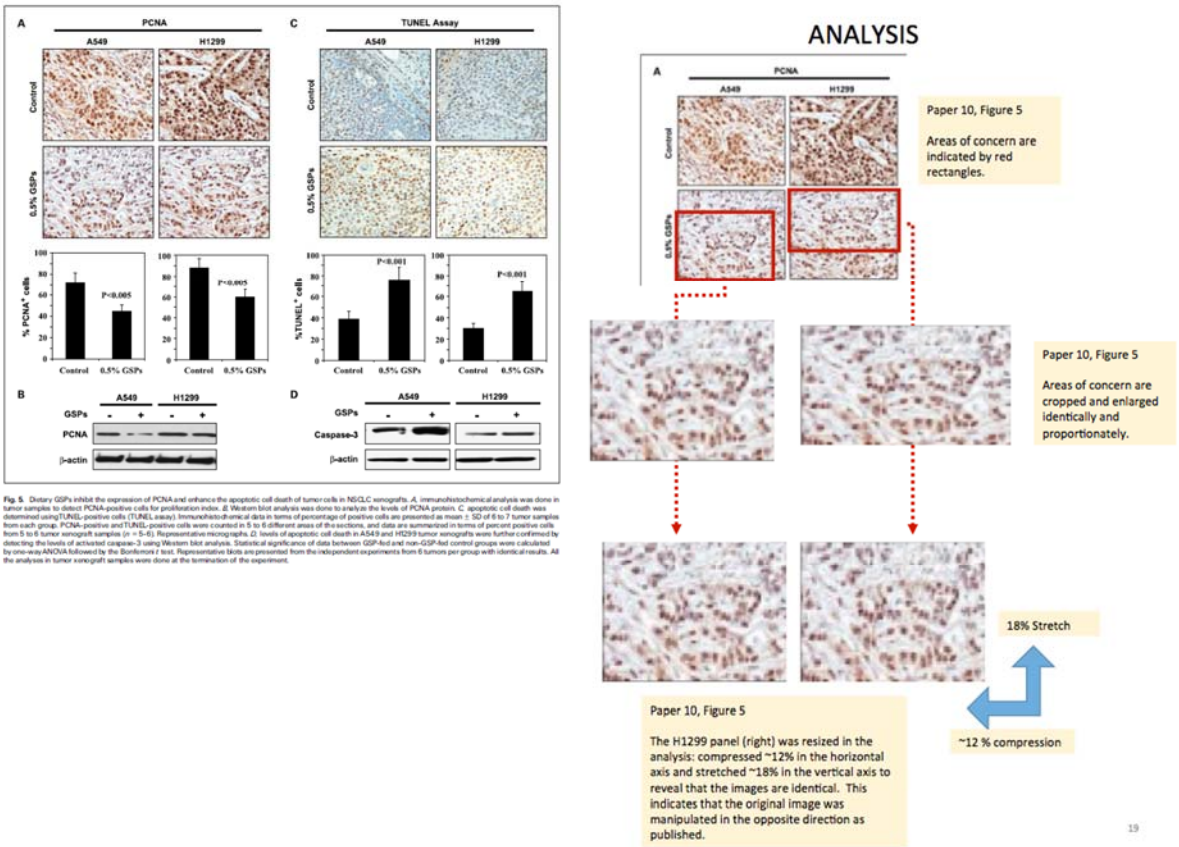
Allegation 10

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 5 (Paper 10) in that the two panels labeled "0.5% GSPs" appear to represent overlapping parts of the same image, even though they are labeled to represent different cell lines (A549 or H1299).

> Paper 10: Akhtar, S., et al., *Grape seed proanthocyanidins inhibit the growth of human non-small cell lung cancer xenografts by targeting insulin-like growth factor binding protein-3, tumor cell proliferation, and angiogenic factors*. Clin Cancer Res, 2009. **15**(3): p. 821-31.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee closely examined Figure 5 in the 2009 Clinical Cancer Research manuscript (referred to as Paper 10), as well as the analysis performed by the Inquiry Committee (see Appendix 4 - *Initial Inquiry Committee Report*, Appendix 2, pages 81-82). In addition, Dr. Katiyar was interview by the committee. The research misconduct found in Figure 5A is the result of falsification and/or fabrication of data through the reuse and manipulation of immunochemical stain images and attribution of these copied and manipulated images to two different cell lines.



Analysis of the images in Figure 5A representing PCNA staining of the A549 and H1299 cell lines treated with 0.5% grape seed proanthocyanidins (GSPs) indicates that the images are clearly

from the same slide. Focusing on the portion of the 0.5% GSPs treated images highlighted by the red boxes (see Analysis below), it is evident that an identical pattern of stained cells is apparent in the 2 images. Further, the manipulation of the aspect ratio of the image is consistent with an intentional manipulation of the image through reckless disregard of scientific practices. In Dr. Katiyar's interview, he acknowledged, "There is a mistake clearly" (see transcript *FINAL - Dr. Katiyar 061715*, page 132, line 12) in this figure. Dr. Katiyar further blames the students who performed the experiments and went on to indicate, "I will again emphasize that when they do these staining, I observe – look at them under microscope" (transcript *FINAL - Dr. Katiyar 061715*, page 133, lines 10-12). Dr. Katiyar claims in his interview that this experiment was replicated (see transcript *FINAL – Dr. Katiyar 061715*, page134-135) but during questioning admitted that only a single experiment was performed in this replication. Based on the expertise of the Investigation Committee, the quantitative results are not valid unless the experiments are fully replicated and multiple images for each condition are analyzed. Although, Dr. Katiyar did provide one replicate experiment in a written response that was submitted to the Investigation Committee in advance of his interview (see *2015-06-15 Response to Allegations from Dr. Katiyar*, page 17), it was not viewed as credible since it was performed without oversight and did not address the allegation. In addition, the immunohistochemical staining looks very different from what was published, and the quantitation for each of the control samples and the treated samples also is substantially different from what was published. However, Dr. Katiyar states in this response that the new resultant immunohistochemical data confirm the prior findings. In the expert opinion of the Investigation Committee, this is not the case. In order to confirm the published finding, the experiment must be replicated several times and yield near-identical results. Based on Dr. Katiyar's response, the Investigation Committee is not convinced that independent sets of data to substantiate the images nor the quantitation that is derived from the images exist. Dr. Katiyar was the senior author on this publication and was responsible for the preparation of the figures, the submission of the manuscripts to the journal, and for revisions to the manuscript before publication. In the transcript of his interview with the Inquiry Committee, he states (see transcript *Katiyar, Santosh 10-21-13*, pages 26-34) that he oversaw all experiments in the laboratory, checked on progress multiple times a day, that he led a weekly lab meeting to review results, that he designed the experiments, that he selected and collected the final images for publication, that he wrote the final version of manuscripts for submission, and that he wrote any revisions. He also described that his laboratory personnel brought him images to review and sometimes wrote the initial draft of the manuscript. This is consistent with the publication practice described by laboratory staff.

(c) Cited Support – Paper 10 does not cite any source of PHS or other support.

(d) Recommendation – The Investigation Committee recommends that Paper 10 be retracted from the published scientific literature. Retraction is indicated because the images used were the basis for quantitative results, the replicate experiment provided by Dr. Katiyar was judged as incomplete and inadequate to support the quantitative data in this publication, and the lack of raw data to support the original figures.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 11

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 2 (Paper 11) in that the panels labeled "10 uM Honokiol" appear to contain portions of the same image in both the MCF-7 and the 4T1 panels.

> Paper 11: Singh, T. and S.K. Katiyar, *Honokiol, a phytochemical from Magnolia spp., inhibits breast cancer cell migration by targeting nitric oxide and cyclooxygenase-2.* Int J Oncol, 2011. **38**(3): p. 769-76.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee examined Figure 2 in Paper 11 as well as the analysis performed by the Inquiry Committee (see Appendix 4 - *Initial Inquiry Committee Report*, Appendix 2, pages 83-85).

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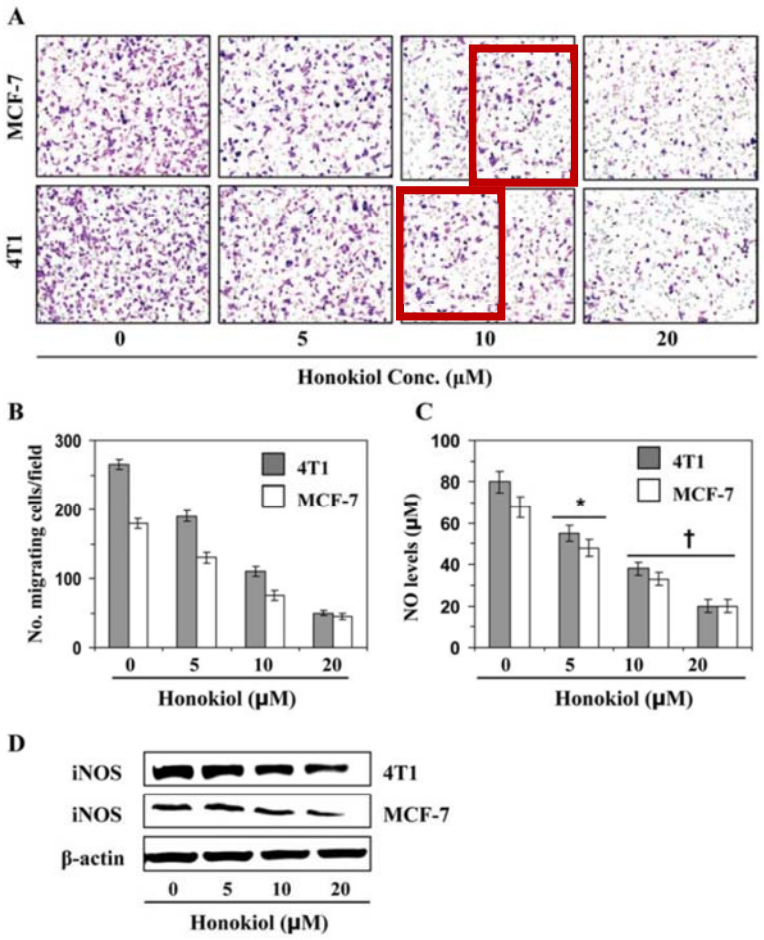
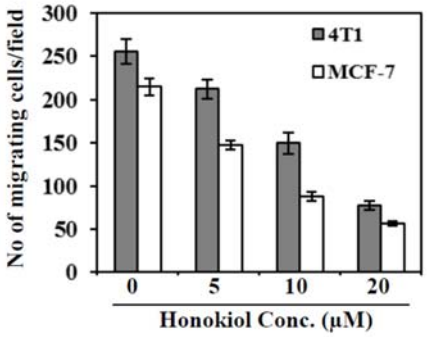


Figure 2. Treatment of breast cancer cells with honokiol inhibits the migration of cells. (A) Treatment of human breast cancer cells MCF-7 and mouse mammary carcinoma cells 4T1 with honokiol inhibits the migration of cells in a dose-dependent manner. (B) The number of migrating cells was counted in each group and the results are expressed as the mean number of migratory cells ± SD/microscopic field. (C) Effect of honokiol on the levels of NO. The levels of NO were determined in cell supernatants using the Nitric Oxide Assay Kit, and data are shown as the means ± SD from three independent experiments. Significant inhibition by honokiol versus non-honokiol-treated controls, *P<0.05; †P<0.001. (D) The levels of iNOS expression were determined in cell lysates from MCF-7 and 4T1 cells by Western blot analysis.

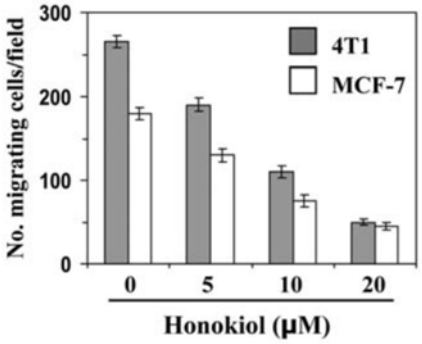
A detailed analysis of Figure 2 clearly shows that overlapping elements of the same photomicrograph as used in the presentation of experimental results purported to be derived from two different cell lines. The regions outlined in red in the analysis clearly shows identical cell patterns in the field of view. The research misconduct found in Figure 2 is the result of falsification of data through the reuse of immunochemical stain images representing treatment of MCF-7 and 4T1 cells with 10 μM Honokiol. A large portion of the same image, with slight variation in the image compression, is present for both cell lines.

This finding is based on detailed analysis of the figure in question and on the interview with Dr. Katiyar. Dr. Katiyar did not dispute the allegation (see transcript *FINAL– Dr. Katiyar 061715,* pages 136) but claimed that (b)(6) [redacted], who left the lab prior to final preparation of the manuscript, performed these experiments. Because of the misrepresentation of the data in panel A, the quantitation of the results presented in panels B and C is also suspect because the quantitation is derived from images including those in panel A. Dr. Katiyar did provide a replicate experiment in his written response to the Investigation Committee prior to his interview (see *2015-06-15 Response to Allegations from Dr. Katiyar,* Page 18). The replicated experiment included both images and quantitation that he states confirms the original findings. However, at closer examination there were differences in the quantitative results when the new experiment and the published data were compared, even for those conditions that were part of this allegation. For example, the MCF-7, 0 Honokiol controls in the published data have a migrating cell/field value of ~175 whereas the repeated experiment with the same condition appears to have a value of ~210. Because of these differences, Dr. Katiyar's response was viewed as insufficient to validate the original findings and they did not address the allegation of research misconduct.

Replicate Experiment



Experiment Published in Paper 11



Of further note, not knowing the whereabouts of this author, Dr. Katiyar used the results and did not include (b)(6) [redacted] as an author (see transcript *FINAL – Dr. Katiyar 061715*, page 136). He also did not acknowledge the contributions of this individual in the manuscript. The use of data from an individual not acknowledged in the final publication is not consistent with acceptable standard scientific publication practices.

In addition, the transcript of the interview with Dr. Singh by the Inquiry Committee was reviewed. In this interview, she was very clear in stating that draft figures for publication were

submitted to Dr. Katiyar, that he requested and made changes to the figures, and that the decision on what was submitted as a final figure for publication was Dr. Katiyar's only (see transcript *Singh, Tripti 10-21-13,* page 32). This is consistent with statements made by other laboratory personnel as to the publication practice in the laboratory and with statements made by Dr. Katiyar during his interview with the Inquiry Committee (see transcript Katiyar, Santosh 10-21-13, pages 26-34).

(c) Cited Support – Paper 11 acknowledges a VA Merit Review Award to Dr. Katiyar.

(d) Recommendation – The Investigation Committee recommends that Paper 11 be retracted from the published scientific literature due to the reckless disregard of acceptable scientific practices in the preparation of this figure, the lack of raw data to confirm findings, and the acknowledged use of data without proper authorship citation.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 12

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 4 (Paper 12) in that the same images appear to represent different experimental conditions, i.e., Control A is the same as GTPs+UVB B and UVB alone B is the same as GTPS+UVB A

> Paper 12: Mantena, S.K., et al., *Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activation of cytotoxic T cells and inhibition of angiogenesis in tumors.* J Nutr, 2005. **135**(12): p. 2871-7.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - Two sets of images contained in Figure 4 of Paper 12 show overlapping/serial tissue sections from the skin but are listed as being obtained from separate mice under different treatment paradigms.

The first part of the allegation involves the panel in the top left of Figure 4 and the bottom right of Figure 4 (green boxes below). The top left panel is labeled as a tissue section from a control treated mouse that was stained with an antibody against CD31. In the bottom right panel the sections were from mice were treated with GTPs followed by UVB and stained with CD8. The nuclei are also stained in these section to visualize the cells. Based on the pattern of cells identified by the nuclear stain in each panel there is extensive overlap. This was confirmed by overlaying the two panels. Since the treatments in these experiments occurred through the mouse's drinking water it is not possible to have the same or serial sections that are treated differently.

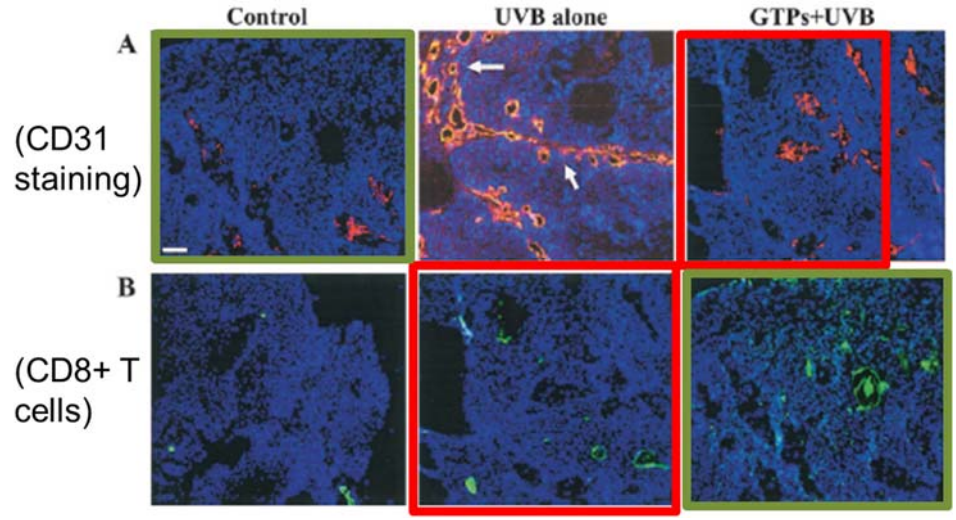


Figure 4A from Journal of Nutrition, Volume 135, Issue 12, December 2005, Pages 2871-2877; "Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activation of cytotoxic T cells and inhibition of angiogenesis in tumors"

The second irregularity in Figure 4 involves the top right panel and the bottom middle panel (red boxes below). The top right panel is labeled as showing a section from mice being treated with GTPs +UVB. This section is labeled as being stained with CD31 and a nuclear dye. The second panel in the bottom middle of the figure is a section from UVB alone treated mice. This section was stained with CD8 and the nuclear dye. A comparison of these the images using the nuclear dye shows that the entire top right panel is contained within the bottom middle panel. For this to occur the top right panel was compressed roughly 20% relative to the middle panel on its lateral sides. The resizing of the figure argues for intent to falsify the data.

In the Investigation Committee's collective expert opinion, there is no reasonable explanation for how these irregularities in Figure 4A could have occurred other than through intentional falsification and fabrication.

In response to the committee (see *2015-06-15 Response to Allegations from Dr. Katiyar*, p. 34), Dr. Katiyar indicated that figure 4 was assembled by SK Mantena (first author). Dr. Mantena left the lab in ~2006 and Dr. Katiyar was not able to contact him/her regarding this matter and thus Dr. Mantena was not available to comment. Dr. Katiyar was the senior author on this publication and was responsible for the preparation of the figures, the submission of the manuscripts to the journal, and for revisions to the manuscript before publication. In the transcript of his interview with the Inquiry Committee, he states (see transcript *Katiyar, Santosh 10-21-13*, pages 26-34) that he oversaw all experiments in the laboratory, checked on progress multiple times a day, that he led a weekly lab meeting to review results, that he designed the experiments, that he selected and collected the final images for publication, that he wrote the final version of manuscripts for submission, and that he wrote any revisions. He also described that his laboratory personnel brought him images to review and sometimes wrote the initial draft of the manuscript. This is consistent with the publication practice described by laboratory staff.

(c) Cited Support – Paper 12 cites the following PHS support: R03 CA105368 (Katiyar), R01 CA079820 (Elmets) and P30 AR050948 (Elmets). In addition, PHS Award C06 RR015490 (Gerrity) supported the facility where the work took place. Other support includes VA Merit Review Awards to both Dr. Elmets and Dr. Katiyar.

(d) Recommendation - Investigation Committee recommends that Paper 12 be retracted from the published scientific literature. The data in Figure 4 are important for the overall conclusions of Paper 12 that GTPs inhibits UV induced skin tumors. Retraction is warranted because of the extent of the falsification of the data, its importance to the conclusion made in the manuscript, and the lack of raw data to confirm the published findings.

(e) Responsible Individual - The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 13

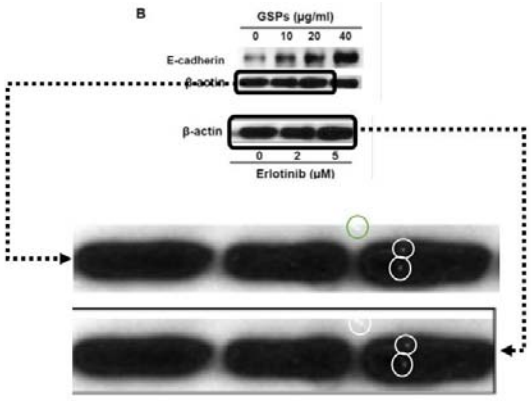
Dr. Katiyar and/or his co-author(s) may have misrepresented the data as the same beta actin images in Figures 5B and 5D (Paper 5) are attributed to different experimental conditions.

> Paper 5: Sun, Q., et al., *Grape seed proanthocyanidins inhibit the invasive potential of head and neck cutaneous squamous cell carcinoma cells by targeting EGFR expression and epithelial-to-mesenchymal transition.* BMC Complement Altern Med, 2011. **11**: p. 134.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee closely examined the data presented in Fig. 5B and 5D in the BMC Complementary and Alternative Medicine paper (referred to as Paper 5) as well as the analysis performed by the Inquiry Committee (see Appendix 4 - *Initial Inquiry Committee Report, Appendix 2,* page 67-68). The relevant portions of the figure were reviewed at high magnification. The panels of concern from the figures are shown below and further analysis is presented in Appendix 5.

The Investigation Committee felt that the beta actin bands in Figure 5B and 5D were identical. The image in Fig. 5B had also been cropped for use in Fig. 5D where one lane was removed. The same band is attributed to the 0 mg/ml group in the GSPs study in Fig. 5B and to the 0 uM Erlotinib group in Fig. 5D, which is not possible.



Paper 5, Figure 5

Areas of concern (green rectangles) are shown. The upper panel is from SCC13 cells treated at various concentrations of GSPs . In another experiment, SCC13 cells (bottom panel) were treated with Erlotinib at 3 different concentrations. The beta-actin controls for each of these experiments are identical, even though the treatments are different.

Identical artifacts (indicated by white ovals) support that these images are identical.

The Investigation Committee interviewed Dr. Katiyar on June 17, 2015 and questioned him directly concerning the source of this discrepancy. Dr. Katiyar explained that one membrane can be restriped and re-probed several times. In this way, seven to eight western blots can be generated. Dr. Katiyar stated that the original beta actin band is acceptable for use with these blots (see transcript *FINAL-Dr. Katiyar 06172015,* pages 16-17). The reuse of the actin bands was not described in the Methods section. When questioned about describing this approach in the Methods section, Dr. Katiyar stated that "not in every…somewhere I pointed this out in paper. Not in every paper." (see transcript *FINAL-Dr. Katiyar 06172015* page 129). Dr. Katiyar did not provide an explanation for how the actin band was attributed to different experimental conditions. Nor did he include any explanation for this irregularity in his response to the Investigation Committee request in advance of his June 17, 2015 interview (see *2015-06-15 Response to Allegations from Dr. Katiyar*).

Dr. Katiyar was the senior author on this publication and was responsible for the preparation of the figures, the submission of the manuscripts to the journal, and for revisions to the manuscript before publication. In the transcript of his interview with the Inquiry Committee, he states (see transcript *Katiyar, Santosh 10-21-13,* pages 26-34) that he oversaw all experiments in the

laboratory, checked on progress multiple times a day, that he led a weekly lab meeting to review results, that he designed the experiments, that he selected and collected the final images for publication, that he wrote the final version of the manuscript for submission, and that he wrote any revisions. He also described that his laboratory personnel brought him images to review and sometimes wrote the initial draft of the manuscript. This is consistent with the publication practice described by laboratory staff.

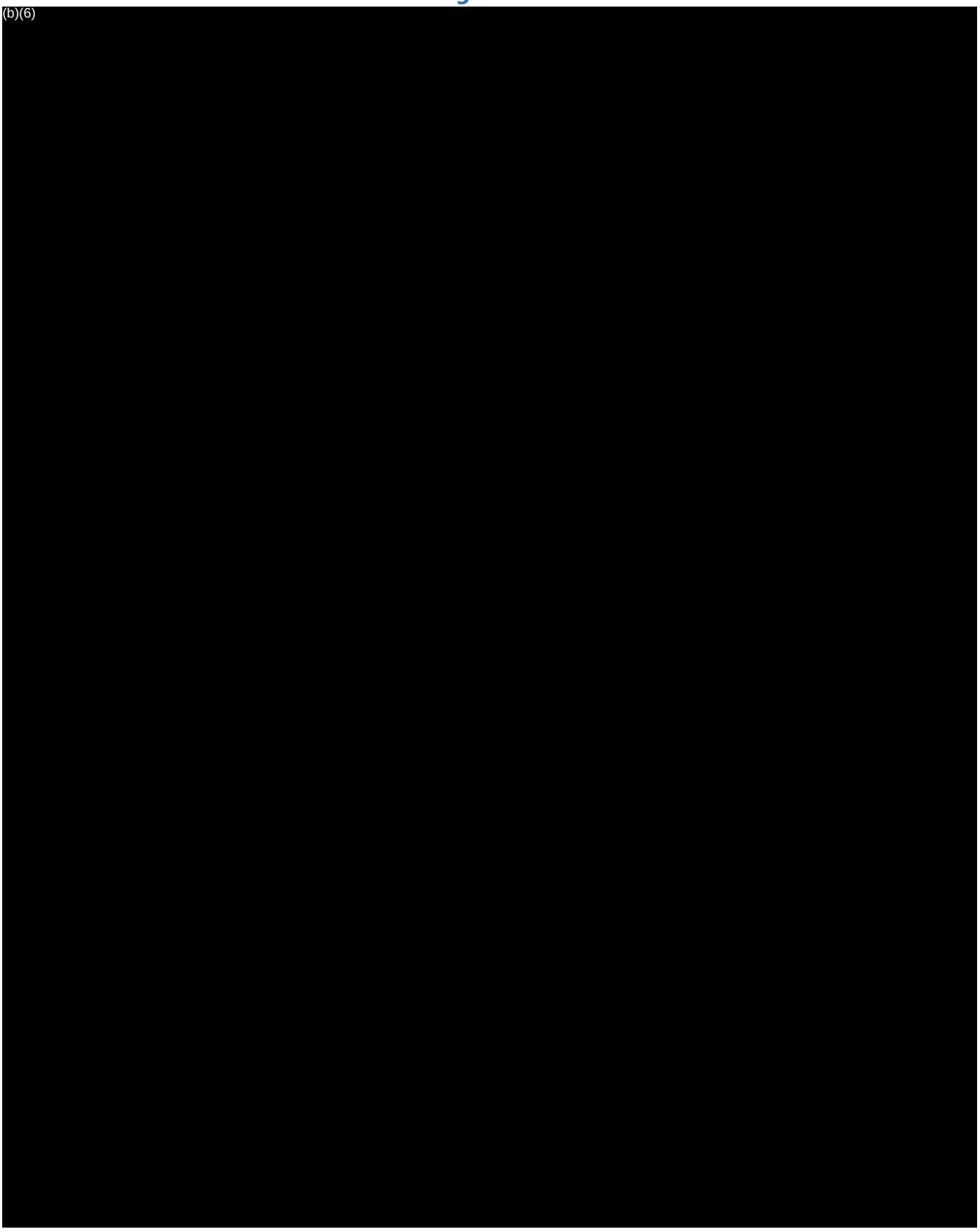
(c) Cited Support – Sources of support cited for Paper 5 are VA Merit Review Award (Katiyar), R01 CA140197 (Katiyar, Hu), and R21 CA140832 (Katiyar). In addition, NHEK were obtained from the P30 AR050948 (Elmets).

(d) Recommendation – The Investigation Committee recommends that Paper 5 be retracted from the published scientific literature. Retraction is warranted because of the lack or original data, the intentional fabrication and/or falsification of the b-actin bands to represent different experimental conditions, and the lack of replicate experimental data to validate the published findings.

(e) Responsible Individual - The Investigation Committee agrees that Dr. Katiyar is responsible for the misconduct.

Allegation 14

(b)(6)



(b)(6)

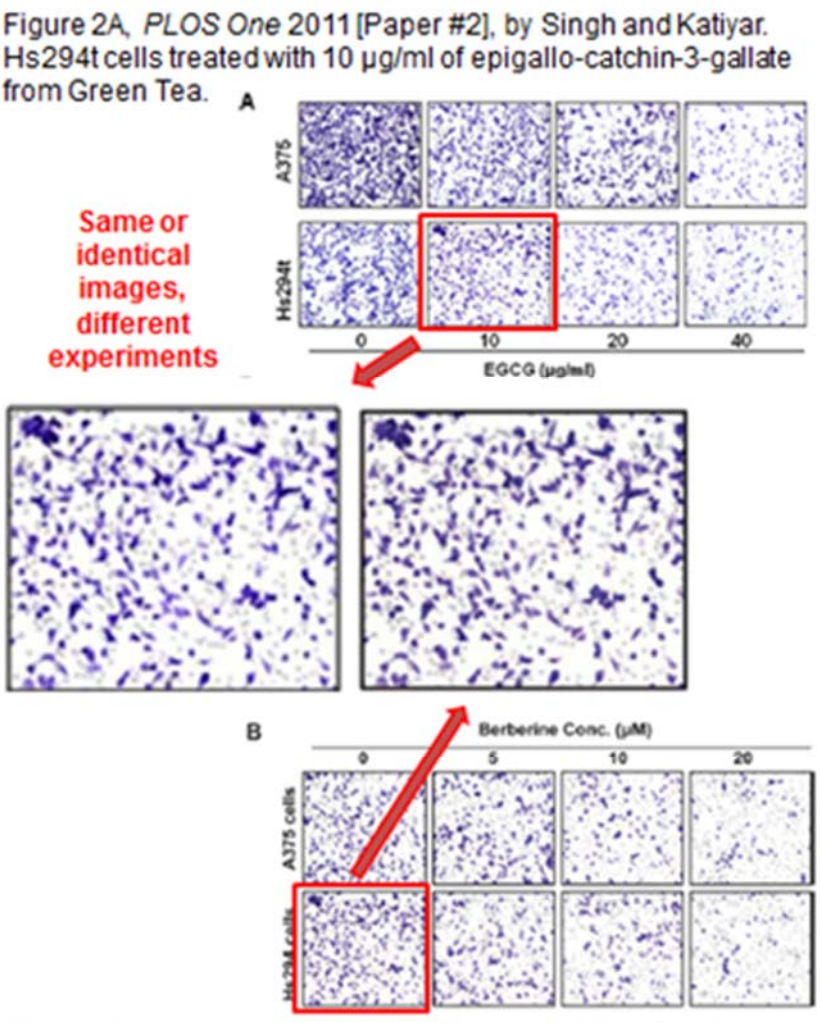
Allegation 15

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in 1A (Paper 8) as it appears to be identical to Figure 2A in Paper 2.

> Paper 8: Singh, T., et al., *Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2, prostaglandin E(2) and prostaglandin E(2) receptors.* Carcinogenesis, 2011. **32**(1): p. 86-92.
>
> Paper 2: Singh, T. and S.K. Katiyar, *Green tea catechins reduce invasive potential of human melanoma cells by targeting COX-2, PGE2 receptors and epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(10): p. e25224.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee closely examined Fig. 2A in the *PLoS One* paper (referred to as Paper 2) and Fig. 1A in the *Carcinogenesis* paper (referred to as Paper 8). Figure 2A of Paper 2 contains a photomicrograph of Hs2894t cells treated with 10 ug/ml of epigallo-catchin-3-gallate, an extract of Green Tea. Figure 1B of Paper 8 presents a photomicrograph with a label indicating it is from control Hs294t cells receiving 0 uM Berberine. Examination of the two panels at high magnification indicated that the same micrograph was used in each figure but labeled as belonging to different experimental groups, as shown below and in the analysis of figures (see Appendix 5).



The committee interviewed Dr. Katiyar on June 17, 2015 and questioned him about Allegation 15. Dr. Katiyar was questioned concerning how the identical image was used

in two publications. Dr. Katiyar stated that he asked the other authors about the duplication and they said they had no clear answer. Dr. Katiyar further stated that prior to publication he had not gone back and checked the original data (see transcript *FINAL-Dr. Katiyar 061715*, Page 95-96). This is inconsistent with his testimony to the Inquiry Committee. In the transcript of his interview with the Inquiry Committee, he states (see transcript *Katiyar, Santosh 10-21-13*, pages 26-34) that he oversaw all experiments in the laboratory, checked on progress multiple times a day, that he led a weekly lab meeting to review results, that he designed the experiments, that he selected and collected the final images for publication, that he wrote the final version of the manuscript for submission, and that he wrote any revisions. He also described that his laboratory personnel brought him images to review and sometimes wrote the initial draft of the manuscript. This is consistent with the publication practice described by laboratory staff. Dr. Katiyar did not provide further information explaining this research misconduct in his clarification letter of October 28, 2015 (see *2015-10-28 Clarification letter from Dr. Katiyar*) and in his requested response to the allegations (see *2015-06-15 Response to Allegations from Dr. Katiyar*, page 28).

(c) Cited Support – Paper 2 acknowledges R01 AT002536 and a VA Merit Review Award to Dr. Katiyar. Paper 8 acknowledges a VA Merit Review Award to Dr. Katiyar.

(d) Recommendation - The Investigation Committee recommends that both Papers 2 and 8 be retracted. Retractions are indicated since the images were the basis for the quantitative results, the lack of original data to support the published findings, and the lack of satisfactory replicative experiments to validate the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 16

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 2A (0 ug/ml honokiol with 4T1 cells) (Paper 11), which appears to be identical to Figure 5C (0 µg/ml CAPE) with 4T1 cells (also Paper 11), thus representing different experimental conditions.

Paper 11: Singh, T. and S.K. Katiyar, Honokiol, a phytochemical from Magnolia spp., inhibits breast cancer cell migration by targeting nitric oxide and cyclooxygenase-2. Int J Oncol, 2011. **38**(3): p. 769-76.

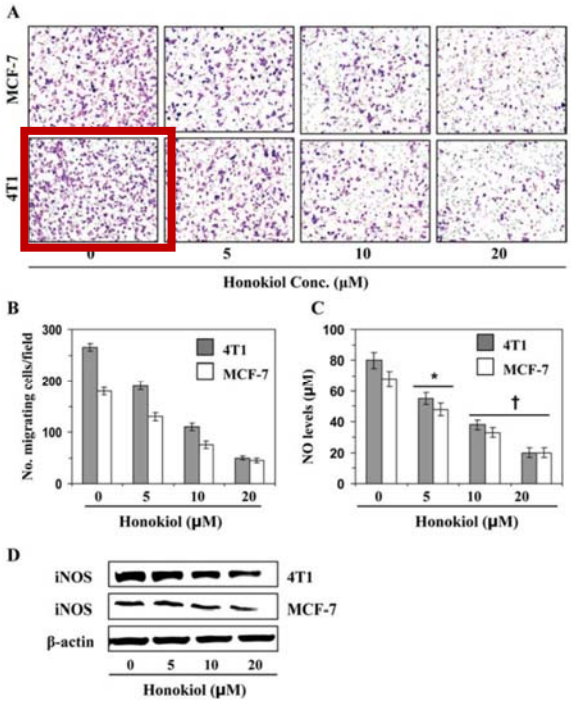


Figure 2. Treatment of breast cancer cells with honokiol inhibits the migration of cells. (A) Treatment of human breast cancer cells MCF-7 and mouse mammary carcinoma cells 4T1 with honokiol inhibits the migration of cells in a dose-dependent manner. (B) The number of migrating cells was counted in each group and the results are expressed as the mean number of migratory cells ± SD/microscopic field. (C) Effect of honokiol on the levels of NO. The levels of NO were determined in cell supernatants using the Nitric Oxide Assay Kit, and data are shown as the means ± SD from three independent experiments. Significant inhibition by honokiol versus non-honokiol-treated controls, *P<0.05; †P<0.001. (D) The levels of iNOS expression were determined in cell lysates from MCF-7 and 4T1 cells by Western blot analysis.

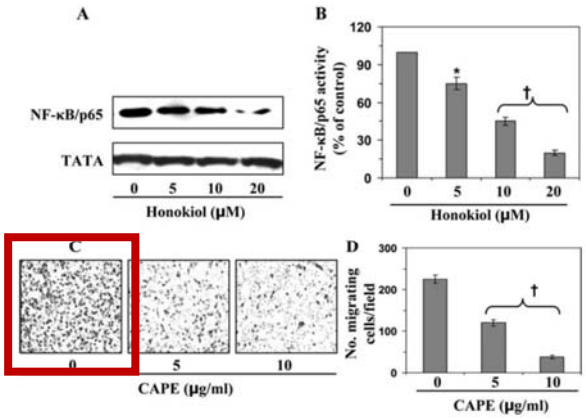


Figure 5. Treatment of 4T1 cells with honokiol decreases the activation or translocation of NF-κB/p65 to the nucleus. (A) After 24-h treatment with various concentrations of honokiol the cells were harvested and nuclear fractions were prepared and levels of NF-κB/p65 were analyzed by Western blot analysis. A representative blot is shown from three independent experiments with identical observations. (B) The activity of NF-κB/p65 in the nuclear fraction of cells after treatment with or without honokiol for 24 h was measured using the NF-κB/p65-specific activity assay kit, n=3. Activity of NF-κB is expressed in terms of the percentage of the control (non-honokiol-treated) group. Significant decrease versus the control, *P<0.05 and †P<0.001. (C) Treatment of cells with caffeic acid phenethyl ester (CAPE), an inhibitor of NF-κB, for 24 h inhibits cell migration. (D) Data on cell migration capacity are summarized as the mean number of migratory cells ± SD/microscopic field, n=3. Significant inhibition versus the non-CAPE-treated cells: †P<0.001.

(a) Misconduct Finding – The Investigation Committee agrees that Allegation 16 does not rise to the level of research misconduct based on the evidence reviewed.

(b) Evidence Reviewed - Analysis of the micrograph images in Figures 2A and 5C in Paper 11 reveal identical patterns of cells that is only possible through the reuse of the same image. However, the two experimental conditions in these figures are quite distinct with subsequent panels in Figure 2A representing cells treated with increasing concentrations of honokiol, while the subsequent panels of Figure 5C represent cells treated with increasing

concentrations of CAPE. Because the leftmost panels in each figure panel represents the negative control (i.e. no active agent in the experiment), it is possible that both experiments (treatment of 4T1 cells with honokiol and treatment of 4T1 cells with CAPE) were performed at the same time. However, the Investigation Committee did not see or hear convincing explanations to suggest that these experiments were actually performed simultaneously (transcript *FINAL – Dr. Katiyar 061715*, pages 137-138). While the presentation of the same result in Figure 2A and 5C is not consistent with best practices in the laboratory, data presentation nonetheless does not rise to the level of misconduct.

(c) Cited Support - Paper 11 acknowledges a VA Merit Review Award to Dr. Katiyar.

(d) Recommendation – The Investigation Committee does not recommend any action for Paper 11 based solely on our evaluation of Allegation 16. However, based on the findings of Allegation 11, the Investigation Committee recommends that Paper 11 be retracted from the published scientific literature.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the content of the manuscript

Allegation 17

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in figure 3C as beta actin bands (MMP-9 experiment and the beta actin bands in Paper 12, figure 5A (VEGF experiment) appear to be identical and represent different experimental conditions

> Paper 12: Mantena, S.K., et al., *Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activ tion of cytotoxic T cells and inhibition of angiogenesis in tumors.* J Nutr, 2005. **135**(12): p. 2871-7.

(a) Misconduct Finding - The Investigation Committee believes that the re-use of beta actin bands in multiple figures represents questionable research practice, but that it may not rise to the level of research misconduct.

(b) Evidence Reviewed - The data in question involve the beta-actin loading controls on two western blots shown in Figure 3C and in Figure 5A in Paper 12. In both cases mice were treated with Green Tea polyphenols with and without UVB treatment. Figure 3C provides data that show GTPs inhibits the induced expression of MMP9 following UVB treatment. Figure 5 provides data that that GTPs inhibit UVB induced expression of VEGF. The same beta-actin loading control was used for these two specific samples. This was confirmed by high magnification comparison of the images and overlapping of the images (see below). In generally accepted scientific practice, separate loading controls and staining for beta actin would be performed for each experiment. However, if the experiments were done at the same time, on the same blots, and from the same samples, the comparison to the same beta actin panel might be reasonable. However, in the expert judgement of the Investigation Committee, the experiment as published would have been more credible if different corresponding beta actin panels would have been presented, or if the methods section of the publication had described that the same loading controls were used would be okay but in the committee's opinion would be poor scientific practice.

FIGURE 3 Oral administration of GTPs to mice inhibits enhanced expression of MMP-2 and MMP-9 in UVB-induced skin tumors while increasing the expression of TIMP1. Epidermal skin samples from age-matched control mice that were not UVB-irradiated were included in this assay. The MMP-2 protein expression was determined by Western blotting (*Panel A*) and its activity was assessed by gelatinolytic zymography (*Panel B*). Similarly, the expression of MMP-9 was determined by Western blot analysis (*Panel C*), and activity by gelatinolytic zymography (*Panel D*); TIMP1 expression was examined by Western blot analysis (*Panel E*). Representative examples of blots are shown from 3 sets of experiments. One set of experiment included the control, UVB, and GTPsUVB groups. The samples in each set were prepared by pooling the skin or tumors from 6 different mice that showed identical results each time, *n* 3. Asterisks indicate different from UVB alone, **P* 0.05, ***P* 0.005.

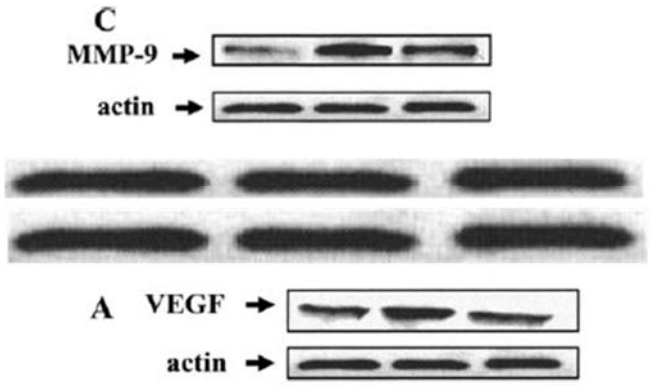


FIGURE 5 Oral administration of GTPs in mice inhibits UVB induced expression of VEGF (*Panel A*) and PCNA (*Panel B*) while increasing the activation of caspase-3 (*Panel C*). Activation of caspase-3 is indicated by its cleavage. The band intensities relative to -actin are shown under each blot. Epidermal skin lysates from the control group were included in this assay. Representative examples of blots are shown from 3 sets of experiments conducted. One set of experiment includes control, UVB, and GTPsUVB groups. The samples in each set were prepared by pooling the skin or tumors from 6 different mice that showed identical results each time, *n* 3. *Different from UVB alone group, *P* 0.005

(c) Cited Support - Paper 12 cites the following PHS support: R03 CA105368 (Katiyar), R01 CA079820 (Elmets) and P30 AR050948 (Elmets). In addition, PHS Award C06 RR015490 (Gerrity) supported the facility where the work took place. Other support includes VA Merit Review Awards to both Dr. Elmets and Dr. Katiyar.

(d) Recommendation – The Investigation Committee recommends that at a minimum and on the basis of Allegation 17 only, a clarification be provided to Int. J. Oncol., that describes that the beta actin loading controls are from a single experiment in Paper 12. However, following our

evaluation of Allegation 12, the Investigation Committee recommends that Paper 12 be retracted from the published scientific literature.

(e) Responsible Individual - On its own, it is difficult to assign direct blame to anyone person for the misleading portrayal of the data. Ultimately, Dr. Katiyar was responsible reviewing the data and figures in the manuscript prior to submission and in the final proof. Due to similarities between most western blot loading controls, it could easy be missed. However, it should be noted that the practice of reusing loading controls occurred in other manuscripts. Because this re-use occurred more than once, the Investigation Committee concludes that this is reckless scientific conduct on the part of Dr. Katiyar and that he is ultimately responsible.

Allegation 18

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Figure 4 (Paper 13) as two images appear to be identical and from the same tissue section. They appear to be rotated and cropped differently so as to represent different mouse strains.

> Paper 13: Meeran, S.M., et al., *Interleukin-12 deficiency is permissive for angiogenesis in UV radiation-induced skin tumors.* Cancer Res, 2007. **67**(8): p. 3785-93.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The two images in question are shown in the top panels of figure 4. The conclusion from the figure is that in IL-12KO mice UVB treatment induces higher levels of expression of CD31. The figures in question are labeled as control (non-UVB treated). The left panel is from wild mice while the right panel is from the IL-12KO mice. However, analysis of this figure at higher magnification (see below) reveal that they are captured from the same tissue section. While the images are both non UVB treated, they are supposed to be derived from different mice with different genotypes. Our analysis show that the images are rotated, cropped, and at a different exposure so as to represent different images. It is the opinion of the committee that there is no credible explanation as to how this would occur other than through intentional falsification or falsification of the data.

In a response to the committee on June 15 2015 (see *2015-06-15 Response to Allegations from Dr. Katiyar*, page 35), Dr. Katiyar indicated that the first author, Syed M. Meeran, was responsible for assembling the final figure; however, he was unable to contact him to figure out how the mistake was made. Based on interviews of former and current research personnel, Dr. Katiyar plays a role in assembly of the final figures and is also primarily responsible for the final review of the manuscript prior to submission for publication and was solely responsible for revisions required by the journal reviewers. Paper 13 was revised before publication. No replicate experiments were provided by

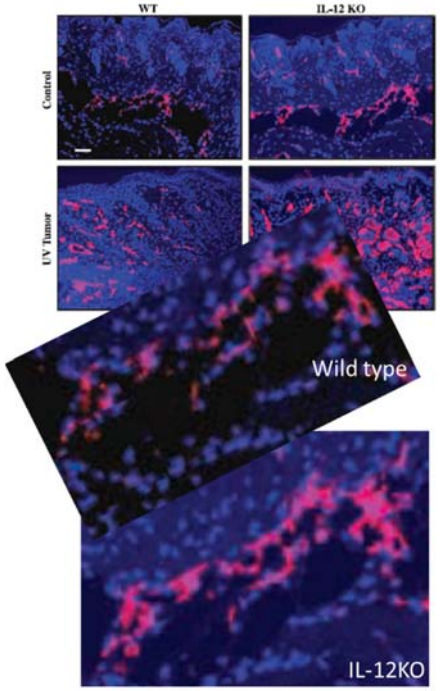


Figure 4. UVB exposure induces higher expression of CD31 in skin tumors. The expression level of CD31 in UVB-induced tumors was greater in IL-12 KO mice (right) compared with their WT counterparts (left). Samples of tumors and age-matched normal mouse skin were used for CD31 fluorescence staining. Representative examples of micrographs of staining for CD31 from WT (left) and IL-12 KO (right) mice from experiments conducted in skin or tumor samples from at least six mice which showed identical patterns. CD31-positive staining is indicated by red fluorescence. Bar = 50 Am.

Dr. Katiyar in response to the request from the Investigation Committee (see *2015-06-15 Response to Allegations from Dr. Katiyar*) and no original data to support the published findings were brought forward.

(c) Cited Support – Paper 13 acknowledges PHS support including R01 AT002536 (Katiyar) and P30 AR050948 (Elmets). Other acknowledged support includes a VA Merit Review Award (Katiyar).

(d) Recommendation –The Investigation Committee recommends that Paper 13 be retracted from the published scientific literature. Investigation is indicated because of the absence of original data, the lack of replicate experiments to verify the published findings, and because the images of concern are important to the conclusions of the publication.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

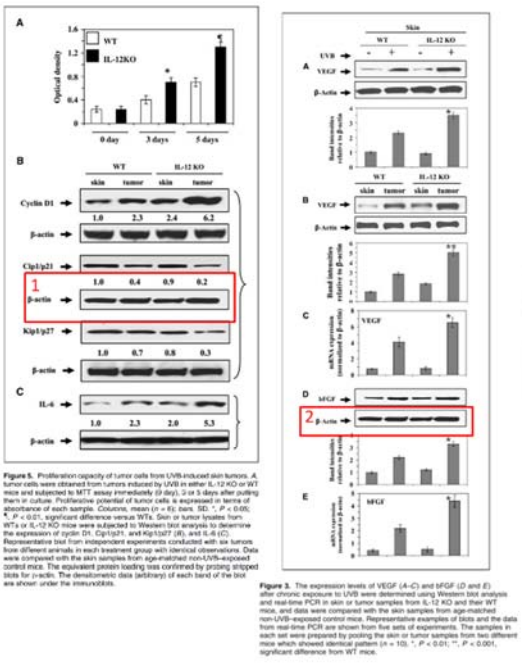
Allegation 19

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Figure 5 (Paper 13) as beta actin blots from Fig. 3D and Fig. 5B appear to be identical and represent different experimental conditions.

> Paper 13: Meeran, S.M., et al., *Interleukin-12 deficiency is permissive for angiogenesis in UV radiation-induced skin tumors.* Cancer Res, 2007. **67**(8): p. 3785-93.

(a) Misconduct Finding – Based on the evaluation of Allegation 19, the Investigation Committee agrees that the discrepancies noted arise from questionable research practices and are not research misconduct.

(b) Evidence Reviewed - Questionable images are found in Figure 3D and Figure 5B of Paper 13. Figure 3D shows expression of bFGF in wild type and IL-12 KO skin and tumors that were or were not treated with UVB. Similarly, Figure 5 analyzes Cip1 and Kip1 in WT and IL-12KO skin and tumors. The images in question are loading controls for western blot analysis of bFGF, Cip1, and Kip1. Based on high magnification analysis of the images (see *Appendix 5*), it is clear that



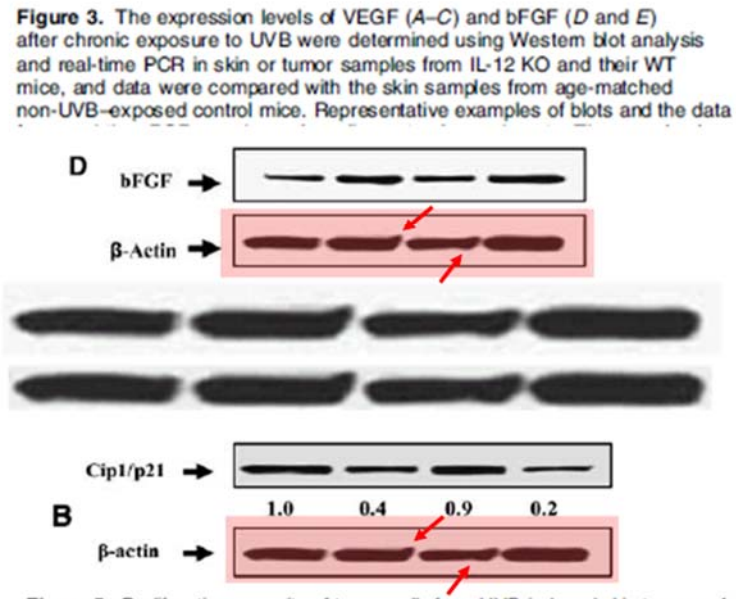


Figure 3. The expression levels of VEGF (*A–C*) and bFGF (*D* and *E*) after chronic exposure to UVB were determined using Western blot analysis and real-time PCR in skin or tumor samples from IL-12 KO and their WT mice, and data were compared with the skin samples from age-matched non-UVB–exposed control mice. Representative examples of blots and the data

Figure 5. Proliferation capacity of tumor cells from UVB-induced skin tumors. *A*, tumor cells were obtained from tumors induced by UVB in either IL-12 KO or WT mice and subjected to MTT assay immediately (0 day), 3 or 5 days after putting them in culture. Proliferative potential of tumor cells is expressed in terms of

these are identical images. While not explicitly stated in the manuscript, Dr. Katiyar's response (see *2015-06-15 Response to Allegations from Dr. Katiyar*, page 35) to the Investigation Committee was that these samples were all collected at the identical time under the same conditions and on the same western blot membrane. It is unclear as to why other loading controls are shown for other genes within these figures if these analyses were done on the same samples under identical treatments. Dr. Katiyar's response did not address this inconsistency.

(c) Cited Support – Paper 13 acknowledges PHS support including R01 AT002536 (Katiyar) and P30 AR050948 (Elmets). Other acknowledged support includes a VA Merit Review Award (Katiyar).

(d) Recommendation – Based on the evaluation of Figures 3 and 5 in Paper 13 only, the Investigation Committee does not recommend any corrective action for the publication. However, based on the evaluation of Allegation 18, the Investigation Committee recommends that Paper 13 be retracted from the published scientific literature.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the content of this publication.

Allegation 20

(b)(6)

[redacted]

(b)(6)

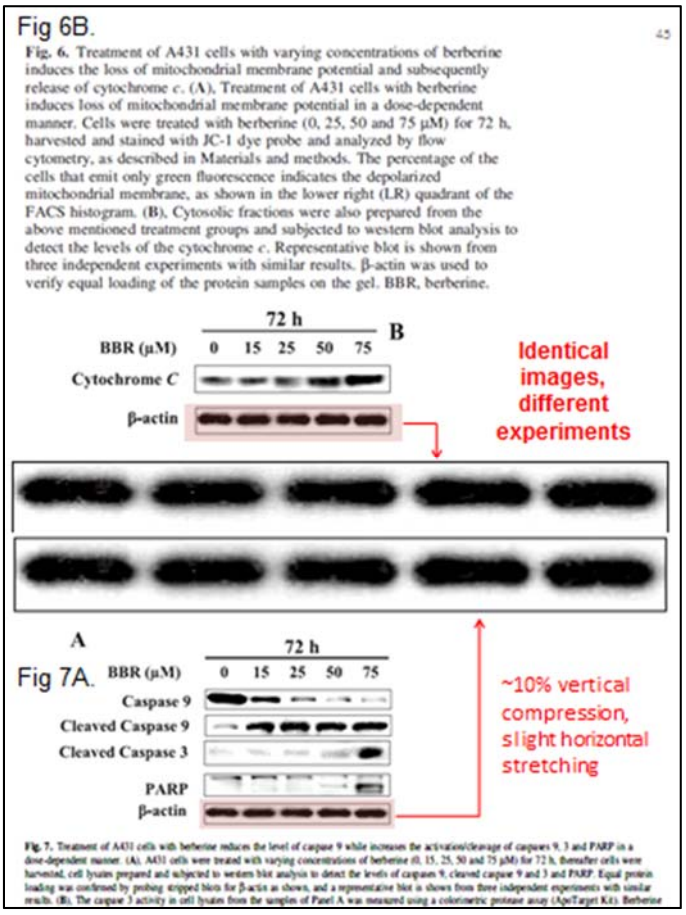
Allegation 21

Dr. Katiyar and/or his co-author(s) may have misrepresented data as beta actin blots appear to be identical in Figures 6B and 7A (Paper 15) and are attributed to different experimental conditions.

> Paper 15: Mantena, S.K., S.D. Sharma, and S.K. Katiyar, *Berberine inhibits growth, induces G1 arrest and apoptosis in human epidermoid carcinoma A431 cells by regulating Cdki-Cdk-cyclin cascade, disruption of mitochondrial membrane potential and cleavage of caspase 3 and PARP.* Carcinogenesis, 2006. **27**(10): p. 2018-27.

(a) Misconduct Finding – Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee reviewed Paper 15 and Figures 6 and 7. Figures 6B and 7A represent A431 cells treated with various concentrations of berberine for 72 hours. In Figure 6B, cytosolic fractions were prepared from the cells, proteins were separated by SDS-PAGE, and levels assessed by immunoblotting. Figure 6B was immunoblotted for cytochrome C. The membrane was stripped then re-probed to assess ß-actin levels to control for differences in loading. Figure 7A, cell lysates (not cytosols) were prepared from the cells and immunoblotted for Caspase 9, cleaved Caspace 9, cleaved Caspace 3, and PARP. Again the membrane was, stripped then re-probed for ß-actin. The same ß-actin blot was used for both figures, although the A431 cell preparations were different. Also, the width of the bands in both figures strongly suggest they are from different membranes. The committee considers these to be reckless disregard for good laboratory practices.



The membranes or data associated with the generation of Figures 6B and 7A were not made available to the committee, nor were any replicate experiments available. The legends state that Figure 6B used **cytosol** prepared from A431 cells treated with berberine for 72 hr. The legend for figure 7A states that **cell lysates** were prepared from A431 cells treated with berberine for 72 hr. If cytosols and cell lysastes were actually prepared, this would result in two different cellular fractions and require two different ß-actin blots as appropriate controls. When questioned, about this Dr. Katiyar claimed that the immunoblots in both Figures 6B

and 7A are from the same membrane so the ß-actin is representative of 5 different immunoblot procedures (see transcript *FINAL - Dr. Katiyar 061715,* page 143). In his written response (see *2015-06-15 Response to Allegations from Dr. Katiyar,* page 36) he provides another explanation as to how the blots were cut and probed individually. Neither explanation is consistent with the description of tissue preparation in the Methods text and figure legends. The approach described in the text would require the membrane to be cut into six strips specific for each protein being immunoblotted. The molecular weights of the proteins or membrane cutting or processing are not included in the text. In addition, the width of the lanes as presented in Paper 15 vary between the strips in both Figures 6B and 7A indicating they are likely derived from different membranes rather than from the same lanes on the same membrane.

Based on interviews of former and current research personnel, Dr. Katiyar plays a role in assembly of the final figures and is also primarily responsible for the final review of the manuscript prior to submission for publication and was solely responsible for revisions required by the journal reviewers. In the transcript of Dr. Katiyar's interview with the Inquiry Committee, he states (see transcript *Katiyar, Santosh 10-21-13,* pages 26-34) that he oversaw all experiments in the laboratory, checked on progress multiple times a day, that he led a weekly lab meeting to review results, that he designed the experiments, that he selected and collected the final images for publication, that he wrote the final version of the manuscript for submission, and that he wrote any revisions. He also described that his laboratory personnel brought him images to review and sometimes wrote the initial draft of the manuscript.

(c) Cited Support – Paper 15 acknowledges P30 AR050948 (Elmets) as well as a VA Merit Review Award (Katiyar)

(d) Recommendation - The Investigation Committee recommends that Paper 15 be retracted. Retraction is indicated because the beta actin came from different cellular fractions and could not be used as valid loading controls, the lack of original data to support the published findings, and the lack of satisfactory replicative experiments to validate the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

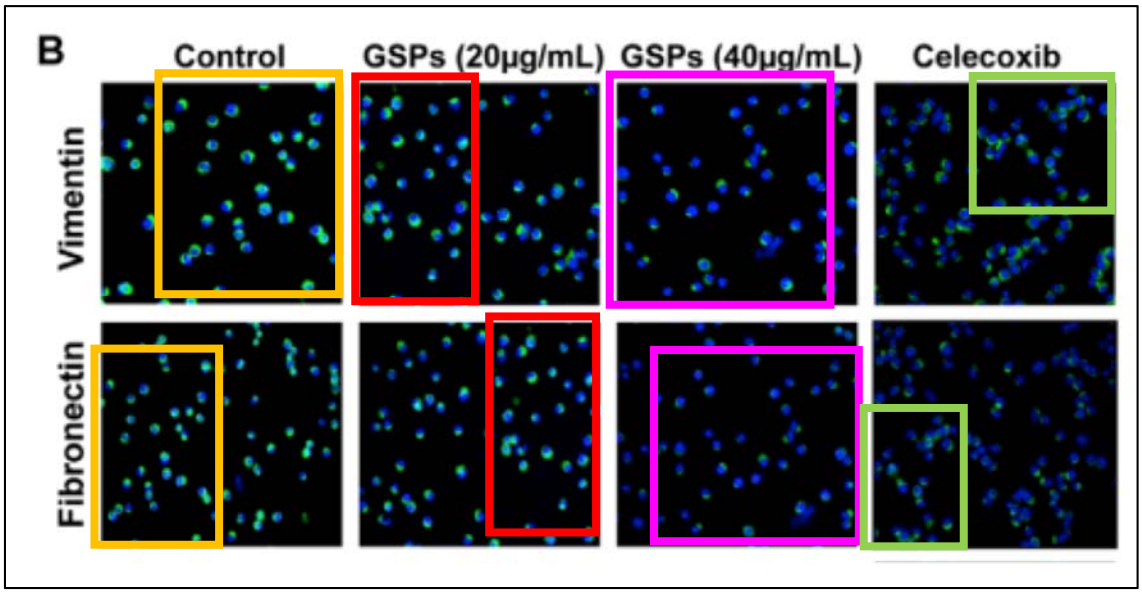
Allegation 22

Dr. Katiyar and/or his co-author(s) may have misrepresented data in that the panels in Figure 5B (Paper 16) for Vimentin treatment of cells contain images that partially overlap that of panels for fibronectin-treated cells; however, the same images are attributed to different experimental conditions.

> Paper 16: Vaid, M., T. Singh, and S.K. Katiyar, *Grape seed proanthocyanidins inhibit melanoma cell invasiveness by reduction of PGE2 synthesis and reversal of epithelial-to-mesenchymal transition.* PLoS One, 2011. **6**(6): p. e21539.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee carefully reviewed Figure 5B in Paper 16. As shown below, the same panel is presented in Paper 16 and represent both vimentin and fibronection expression levels via immunofluorescence in A375 cells treated with grapeseed polyphenols (GSPs). A portion of the panel representing vimentin results is identical to a part of the panel representing fibronectin results. The same photo of cells is being used to represent two different immunofluorescence results. The different colored boxes identify identical groups of cells that are designated as coming from different treatment groups. A detailed analysis is provided in Appendix 5.



The use of the same cell photo to represent two different immunofluorescence procedures is scientific fabrication. The panels representing the fibronectin and vimentin immunofluorescence contain cell patterns that show approximately 50% overlap that is identical indicating they are derived from a common larger photo. The photos were then manipulated by resizing for apparent presentation purposes. The committee recognizes that there were multiple cases of manipulation within the panels and with the resizing these manipulations appear intentional. Although figure 5A shows a biochemical analysis of the efficiency of the grapeseed polyphenols changing the

expression of epithelial-mesenchymal tissue markers, the confusion with the cell identification raises serious questions about this data. Any quantitative data presented in the paper will be based on questionable cell treatments.

The Investigation Committee separately interviewed both Dr. Vaid, the first author for Paper 16, and Dr. Katiyar, the corresponding author. When questioned about the construction of the manuscript, Dr. Vaid stated that he had little input into figure or manuscript preparation and was only informed of manuscript submission after the fact (see transcript *FINAL – Dr. Vaid 042815,* pages 10-15). Dr. Vaid stated he did not read or review the manuscripts before submission. He also claimed that Dr. Katiyar was primarily responsible for manuscript preparation, writing, final figure preparation and submission as well as response to the initial manuscript review. In contrast, when questioned about the source of this discrepancy, Dr. Katiyar recognized that there was a mistake but blamed others (see transcript *FINAL – Dr. Katiyar 061715,* page 146). In the authorship contributions of Paper 16, Dr. Katiyar, with Dr. Vaid and Ms. Sing, is listed as responsible for conceiving and designing the experiments and analyzing the data. Dr. Katiyar is attributed as solely responsible for contributing the reagents/materials/analysis tools, and writing the paper.

(c) Cited Support – Paper 16 cites a VA Merit Review Award (Katiyar) as supporting this work.

(d) Recommendation – The Investigation Committee recommends that Paper 16 be retracted from the published scientific literature. Retraction is indicated because of intentional resizing and re-use of immunofluorescence photographs to represent different experiments, the lack of original data, and the lack of replicate experiments to validate the published findings,

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 23

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Panel D of figure 1 in that the figure labelled "EGCG Concentration 20 µg/ml" (Paper 4) appears to be identical to Figure 1 Panel D "A549 cells" and "GSPs concentration 40 µg/ml" of Paper 17.

> Paper 4: Biochemical and Biophysical Research Communications, Volume 375, Issue 1, 10 October 2008, Pages 162-167; "EGCG inhibits mammary cancer cell migration through inhibition of nitric oxide synthase and guanylate cyclase", Punathil T, Tollefsbol TO, and Katiyar SK
>
> Paper 17: Molecular Carcinogenesis, 2009, 48:232-242; "Inhibition of Non-small Cell Lung Cancer Cell Migration by Grape Seed Proanthocyanidins Is Medicated Through the Inhibition of Nitric Oxide, Guanylate Cyclase, and ERK1/2", Punathil, T, and Katiyar, SK.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee carefully reviewed Figure 1 in Paper 4 and Figure 1 in Paper 17. The same picture of treated cells in culture has been replicated in two separate papers and is proposed to represent different cell lines and different treatment conditions. In the manuscript designated Paper 4, Figure 1, panel D shows 4T1 cells treated with EGCG at a concentration of 20 µg/ml. In the paper designated Paper 17, the same image in Figure 1, panel D is used to represent A549 cells treated with GSPs. The picture in question in the two papers is identical and is attributed to different cell types and treatment conditions. The original prints are not available according to Dr. Katiyar since they were lost in a computer malfunction. The use of the same cell pictures in different papers a year apart is most likely the result of intentional misrepresentation of the data. Dr. Katiyar attests this is due to mistakes by the first author, Dr. Punathil, who is first author on both papers. Dr. Punathil, has returned to India and was not available and could not be contacted or located. Dr. Katiyar was also responsible for manuscript preparation, writing and submission as well as response to review. Research staff during the period in question were responsible only for generation of preliminary data and not involved in manuscript preparation, editing and submission as well as revision of manuscripts.

Figure 1D, Paper 4
(4T1 cells, 20 µg/ml EGCG)

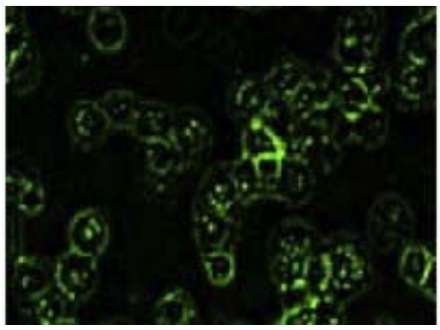
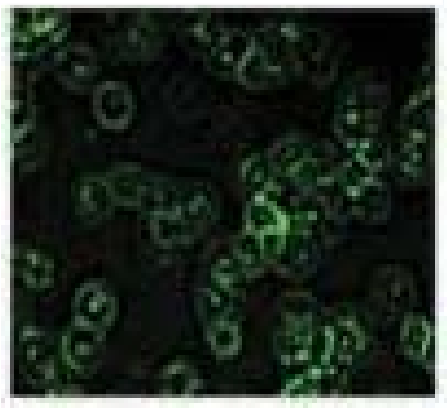


Figure 1D, Paper 17
(A549 cells 40 mg/ml GSPs)



Dr. Katiyar provided a response to the allegation in advance of his interview by the Investigation Committee on June 17, 2015. In his response, he states that the experiments presented in Paper 4 were repeated under his supervision. However,

he did not provide evidence of these replicate experiments, nor did he address the experiments in Paper 17 (see *2015-06-15 Response to Allegations from Dr. Katiyar*, pages 8 and 29). Dr. Katiyar acknowledges the error in his interview, but puts the blame squarely on Dr. Punathil (see transcript, *FINAL – Dr. Katiyar 06172015*, page 111). However, he also states that while Dr. Punathil compiled the figures, that he (Dr. Katiyar) finalized the paper (see transcript, *FINAL – Dr. Katiyar 06172015*, pages 113-114). As noted above for many other allegations, following interviews with the senior staff in Dr. Katiyar's laboratory as well as Dr. Katiyar, the primary responsibility for manuscript and figure selection resides with Dr. Katiyar. In fact, in Dr. Katiyar's interview with the Inquiry Committee (see transcript *Katiyar, Santosh 10-21-13*, pages 26-34) he described his detailed involvement with planning and overseeing all experiments, regularly reviewing results, selecting and finalizing images for publication, writing the final manuscript for submission, and revising as necessary.

(c) Cited Support – Paper 4 acknowledges support from R01 CA129415 (Tollefsbol). Paper 17 does not acknowledge any support.

(d) Recommendation - The Investigation Committee recommends that both Papers 4 and 17 should be retracted from the published scientific literature. Retraction is warranted because of the unavailability of original data, the validity of the quantitative data based on the images of concern, and the lack of replicate experiments to affirm the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 24

Dr. Katiyar and/or his co-author(s) may have misrepresented the data in Panel D of Figure 1 in that the figure labelled "EGCG Concentration 40 µg/ml" appears to be identical to Figure 1 Panel D "H1299 cells" and "GSPs concentration 60 µg/ml" of Paper 17.

> Paper 4: Punathil, T., T.O. Tollefsbol, and S.K. Katiyar, *EGCG inhibits mammary cancer cell migration through inhibition of nitric oxide synthase and guanylate cyclase.* Biochem Biophys Res Commun, 2008. **375**(1): p. 162-7.
>
> Paper 17: Punathil, T. and S.K. Katiyar, *Inhibition of non-small cell lung cancer cell migration by grape seed proanthocyanidins is mediated through the inhibition of nitric oxide, guanylate cyclase, and ERK1/2.* Mol Carcinog, 2009. **48**(3): p. 232-42.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee carefully reviewed Figure 1 in Paper 4 and Figure 1 in Paper 17. In the judgement of the Investigation Committee, the same photograph of treated cells in culture has been replicated in two separate papers. However, these images are labelled in the publication as representing two different cell lines and two different experimental treatment conditions. In Paper 4, Figure 1, panel D shows 4T1 cells treated with EGCG concentration of 40 µg/ml. In the paper designated Paper 17, the same image in Figure 1, panel D is used to represent A549 cells treated with GSP concentration (60 µg/ml). An analysis is provided below and in Appendix 5. The use of the same image to represent different cells and treatments is not acceptable. In order to understand the source of this discrepancy, Dr. Katiyar was asked for both a written response and was interviewed by the Investigation Committee. The original prints are not available according to Dr. Katiyar. The use of the same cell pictures in different papers published a year apart is most likely the result of intentional misrepresentation of the data. Dr. Katiyar attests this is due to mistakes by the first author, Dr. Punathil, who is first author on both papers (see transcript, *FINAL – Dr. Katiyar 06172015*, pages 113-114). Dr. Punathil, has returned to India and could not be located or

Figure 1D, Paper 17
(H299 cells 60 ug/ml GSPs)

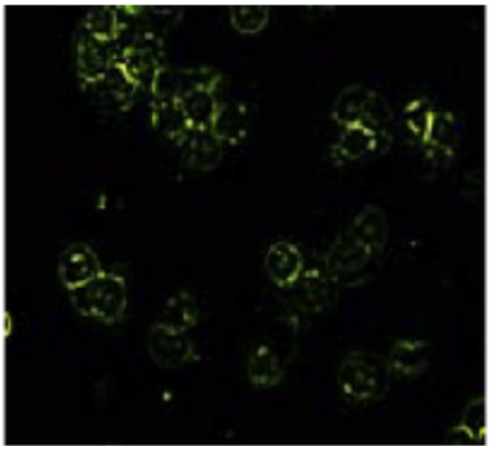
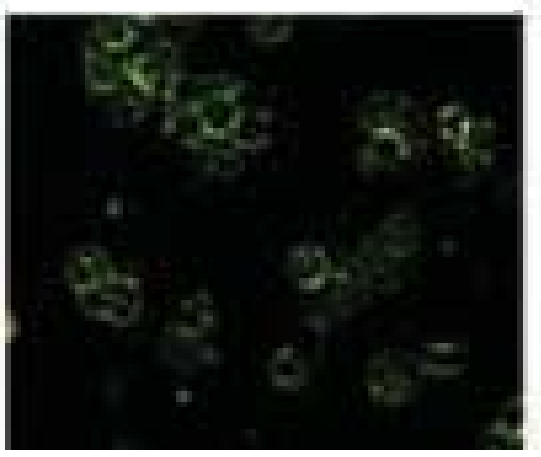


Figure 1D, Paper 4
(4T1 Cells, 40 ug/ml EGCG)



contacted. Dr. Katiyar also states that the experiments presented in Paper 4 were repeated under his supervision. However, he did not provide evidence of these replicate experiments, nor did he address the experiments in Paper 17 (see *2015-06-15 Response to Allegations from Dr. Katiyar*, pages 8 and 29, 37). Dr. Katiyar acknowledges the error in his interview, but puts the blame squarely on Dr. Punathil (see transcript, *FINAL – Dr. Katiyar 06172015*, page 111). However, he also states that while Dr. Punathil compiled the figures, that he (Dr. Katiyar) finalized the paper (see transcript, *FINAL – Dr. Katiyar 06172015*, pages 113-114). As noted above for many other allegations, following interviews with the senior staff in Dr. Katiyar's laboratory as well as Dr. Katiyar, the primary responsibility for manuscript and figure selection resides with Dr. Katiyar. In addition, in the transcript of his interview with the Inquiry Committee, Dr. Katiyar states (see transcript *Katiyar, Santosh 10-21-13*, pages 26-34) that he oversaw and designed all experiments in the laboratory, checked on progress and reviewed results daily, selected and collected the final images for publication, wrote the final version of submitted manuscripts, and wrote any required revisions. In addition, because the identity of the actual cell lines used in the experiments shown above is not certain, the assignment of quantitative data cannot be compared with certainty.

(c) Cited Support – Paper 4 acknowledges support from R01 CA129415 (Tollefsbol). Paper 17 does not acknowledge any support.

(d) Recommendation - The Investigation Committee recommends that both Papers 4 and 17 should be retracted from the published scientific literature. Retraction is warranted because of the unavailability of original data, the validity of the quantitative data based on the images of concern, and the lack of replicate experiments to affirm the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

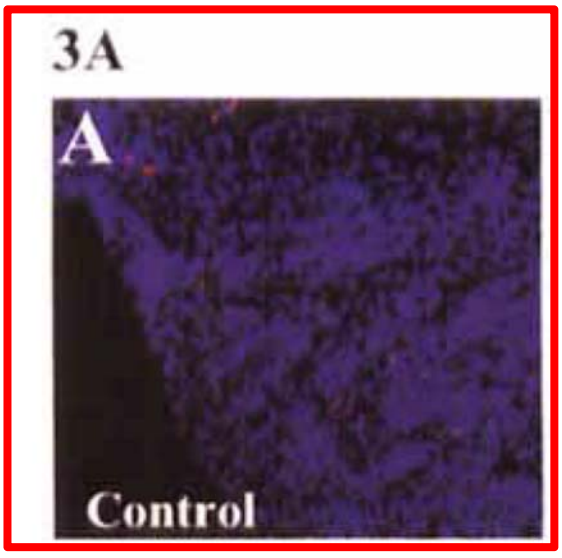
Allegation 25

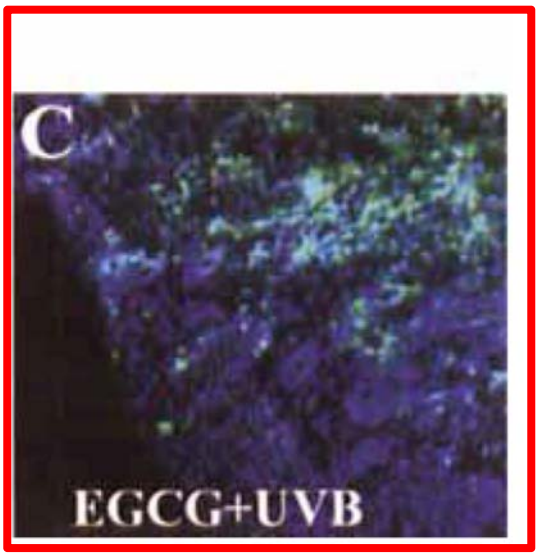
Dr. Katiyar and/or his co-author(s) may have misrepresented data in panels in Figure 3A and 3B (Paper 18). The image shown in Panel A in Figure 3A (control) appears to be an adjacent slice to Panel C in Figure 3B (EGCG+UVB), based on the morphology of the slice presented in the image.

> Paper 18: Mantena, S.K., A.M. Roy, and S.K. Katiyar, *Epigallocatechin-3-gallate inhibits photocarcinogenesis through inhibition of angiogenic factors and activation of CD8+ T cells in tumors.* Photochem Photobiol, 2005. **81**(5): p. 1174-9.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee reviewed Figure 3 in Paper 18. When closely observed, it is obvious that the same tissue section was used to represent two different treatment conditions (see below and Appendix 5). In Figure 3A, panel A is labeled as an untreated control. Based on the morphology of the tissue in this slide, it is either the same slide or an adjacent tissue section to that presented in panel C of Figure 3B that is labeled as being treated with EGCG and UVB irradiation. The tissue sections are described as originating from tumors in mice that either served as controls or were treated with EGCG and UVB light. In the expert judgement of the Investigation Committee, it is highly improbable that the tissue architecture of two animals, independently of their treatment, would have such striking similarity. There are no laboratory research records available to identify these sections. Dr. Katiyar purports that these figures were assembled by the first author on the manuscript, Dr. Mantena, who has returned to India and is unavailable (see *2015-06-15 Response to Allegations from Dr. Katiyar,* page 37). During his interview, he apologized for the error but did not take any responsibility for it (see transcript *FINAL – Dr. Katiyar 061715,* pages 146-147). Interviews with laboratory personnel indicate that during the period in question manuscript preparation, finalization of text and figures, and manuscript submission were carried out solely by Dr. Katiyar.





(c) Cited Support – Paper 18 acknowledges support from R03 CA105368 (Katiyar) and P30 AR050948 (Elmets). Also, support from a VA Merit Review Award (Katiyar) is acknowledged.

(d) Recommendation – The Investigation Committee agrees that Paper 18 should be retracted from the published scientific literature. Retraction is indicated because of the unavailability of original data and records, the ambiguous identification of tissue sections that lead to the major conclusions of the publication, and the lack of replicate experiments that validate the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 26

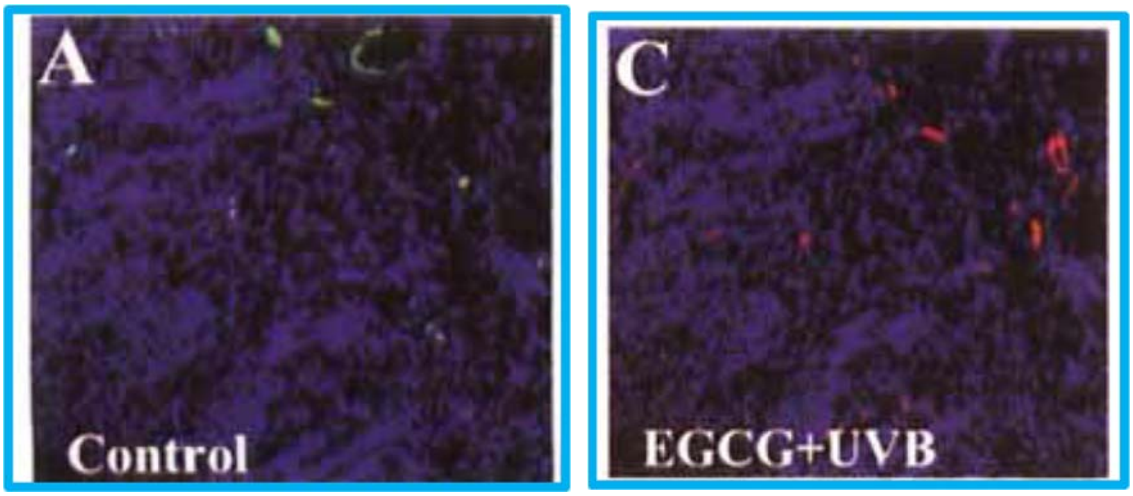
Dr. Katiyar and/or his co-author(s) misrepresented data in panels in Figure 3A and 3B of Paper 18. Panel C in Figure 3A (EGCG+UVB) appears to be an adjacent slice to Panel A in Figure 3B (Control), based on the morphology of the slice presented in the image.

> Paper 18: Mantena, S.K., A.M. Roy, and S.K. Katiyar, *Epigallocatechin-3-gallate inhibits photocarcinogenesis through inhibition of angiogenic factors and activation of CD8+ T cells in tumors.* Photochem Photobiol, 2005. **81**(5): p. 1174-9.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee very carefully compared panel C in Figure 3A (EGCG+UVB) to Panel A in Figure 3B (Control) published in Paper 18. It is the judgement of the Investigation Committee that these photomicrographs originated from adjacent areas of the same tissue, despite labelling that indicated one slice was from a tumor from a treated animal and one was from a control animal (see below and Appendix 5).

It is most likely the control from 3B was simply the stained treated group from 3A without immunofluorescence detection. When Dr. Katiyar was questioned regarding this allegation his response was "Yes. Clearly, there is a mistake, wrong, error. And this paper was published in 2005. And the person who mainly responsible for this work left my lab in 2006. I tried my best to locate his notebook or slide, but I could not. So I have no correct answer because no person -- it is nine, ten years old work. I'm sorry, I could not find the best answer" (see transcript *FINAL – Dr. Katiyar 061715*, pages 146-147). The other two other authors on the publication could not be contacted for the Investigation Committee to interview them on how the figures were assembled and the manuscript prepared for publication. However, other research staff who were interviewed stated Dr. Katiyar produced the final figures for submitted manuscripts and generally the co-authors simply signed the outgoing final version (see transcript, *FINAL – Dr. Vayalil 041615*, pages 29-30). Dr. Vayalil's interview was consistent with that of other support staff, as documented in many of the allegations above.



(c) Cited Support – Paper 18 acknowledges support from R03 CA105368 (Katiyar) and P30 AR050948 (Elmets). Also, support from a VA Merit Review Award (Katiyar) is acknowledged.

(d) Recommendation – The Investigation Committee agrees that Paper 18 should be retracted from the published scientific literature. Retraction is indicated because of the unavailability of original data and records, the ambiguous identification of tissue sections that lead to the major conclusions of the publication, and the lack of replicate experiments that validate the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 27

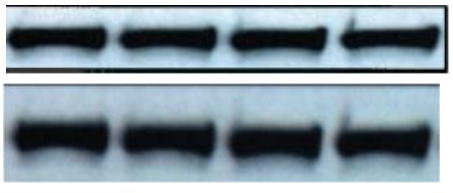
Dr. Katiyar and/or his co-author(s) may have misrepresented the data in panel b of figure 2 in that the beta-Actin bands appear to be identical to the center four beta-actin bands in Figure 4, panel C (Paper 19), labelled "IL-12 KO".

> Paper 19: Meeran, S.M., T. Punathil, and S.K. Katiyar, *IL-12 deficiency exacerbates inflammatory responses in UV-irradiated skin and skin tumors*. J Invest Dermatol, 2008. **128**(11): p. 2716-27.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee very carefully examined the data for the beta actin bands in panel b of figure 2 and the rightmost four beta actin bands in Figure 4, panel C, labelled "IL-12 KO". It was the conclusion of the committee that these were identical bands even though they are reported to be from different animals that had different experimental treatments. In addition to the re-use of a beta actin panel to represent an unrelated experiment, the image was either stretched or compressed (depending on which was the original) in the y-axis. This resizing is an intentional manipulation of the figure. When questioned about this allegation Dr. Katiyar's response was "Actually, this mistake was recognized by this committee, very simply. And I -- this -- the person who was responsible, Dr. Meeran, paper published in 2008, and he also left my lab in 2008. I could not contact to find a better answer how he did mistake. But because this mistake is recently found, I could not repeat. But I intend to repeat this experiment to verify that the data was submitted as accurate or not accurate. So I intend to do -- repeat some time." (see transcript *FINAL – Dr. Katiyar, 061715*, page 147-148).

Dr. Katiyar also responded that he was not able to locate any original data for this figure. The legends for both Figures 2 and 4 indicate that the blots were representative of three independent experiments. Comparison of the proteins of interest to beta-actin loading controls formed the basis for the accompanying quantitation presented in Figures 2 and 4. The Investigation Committee has not seen either the original data or evidence of verification that the published experiments were independently replicated either prior to following publication.



Paper 19, Figure 2B

Paper 19, Figure 4C

Paper 19, Figure 2B

Paper 19, Figure 4C, compressed 42% in the vertical plane.

Prior to the Investigation Committee interview of Dr. Katiyar, Dr. Katiyar responded to this allegation by simply stating that Dr. Meeran was most likely responsible for assembling the data and that Dr. Meeran had left his lab (see *2015-06-15 Response to Allegations from Dr. Katiyar,* page 37). However, other research staff who were interviewed by the Investigation Committee stated Dr. Katiyar produced the final figures for submitted manuscripts and generally the co-authors simply signed the outgoing final version (see as an example the transcript, *FINAL – Dr. Vayalil 041615,* pages 29-30).

(c) Cited Support – Paper 19 acknowledges support from R01 AT002536 (Katiyar) and also a VA Merit Review Award (Katiyar).

(d) Recommendation – The Investigation Committee agrees that Paper 19 should be retracted. Retraction is warranted because of the absence of original data, the re-use of controls for experiments that have different treatments, and the lack of replicate experiments to verify the published finding. If Dr. Katiyar chooses to replicate these findings, the Investigation Committee recommends that the experiments be performed under supervision.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 28

Dr. Katiyar and/or his co-authors may have misrepresented the data in Figures 2A (panel labelled "UV 1/2h" and "IL-12 KO treated with EGCG") and 3A (panel labelled "UV alone") in Paper 20. These two figures appear to be overlapping sections of the same image, based on the morphology of the cells included in the slice.

> Paper 20: Meeran, S.M., S.K. Mantena, and S.K. Katiyar, *Prevention of ultraviolet radiation-induced immunosuppression by (-)-epigallocatechin-3-gallate in mice is mediated through interleukin 12-dependent DNA repair*. Clin Cancer Res, 2006. **12**(7 Pt 1): p. 2272-80.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed - The Investigation Committee carefully examined Figures 2A and 3A of Paper 20. It is the expert opinion of all Investigation Committee members that these figures are from over-lapping sections of the same image, based on the morphology of the cells included in the tissue slice (see analysis below and in Appendix 5). The images are reported in Paper 20 to represent tissues from animals treated using different experimental conditions. When asked to explain how this obvious error could have happened Dr. Katiyar's reply was the following: "I recognized this error. And this paper was published in 2006. And main two main workers, Dr. Meeran and Montena, they left in 2008, and I exactly don't know their whereabouts. I could not find the correct answer how they used this panel here in different situations. I'm sorry about this. But this is a mistake, and I don't have the right answer how they did it". (see transcript *FINAL – Dr. Katiyar, 061715*, page 148-149). Dr. Meeran and Mantena could not be located for the Investigation Committee to interview them. However, other laboratory personnel stated the final submissions of the manuscripts were controlled by Dr. Katiyar. Dr. Vayalil who worked in Dr. Katiyar's laboratory made the following statement: "Some of my friends who worked there, they used to say some of the figures he will change. He has a stock of data I believe. From where I don't know where he gets it. So he'll put those things into that." (see transcript of the interview of Dr. Vayalil by the Inquiry Committee - *Vayalil, Praveen 10-21-13*, page 52). Although the Investigation Committee recognizes that Dr. Katiyar and Dr. Vayalil did not separate on good terms, Dr. Vayalil's statements are consistent with other laboratory personnel who stated that Dr. Katiyar prepared the

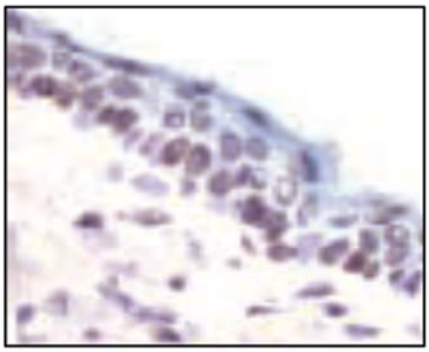


Figure 2A

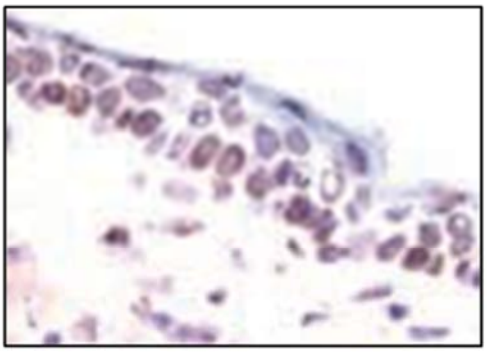


Figure 3A

figures, manuscript, and manuscript revisions for publication (see transcript *FINAL - Dr. Vaid 042815,* pages 15-16 and transcript *FINAL - Dr.Nandakumar 041615* pages 20-21).

(c) Cited Support – Paper 20 acknowledges support from R01 AT002536 (Katiyar) as well as a VA Merit Review Award (Katiyar)

(d) Recommendation – The Investigation Committee recommends that Paper 20 be retracted from the published scientific literature. Retraction is indicated because of the unavailability of original data and records as well as the lack of replicate experiments that validate the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

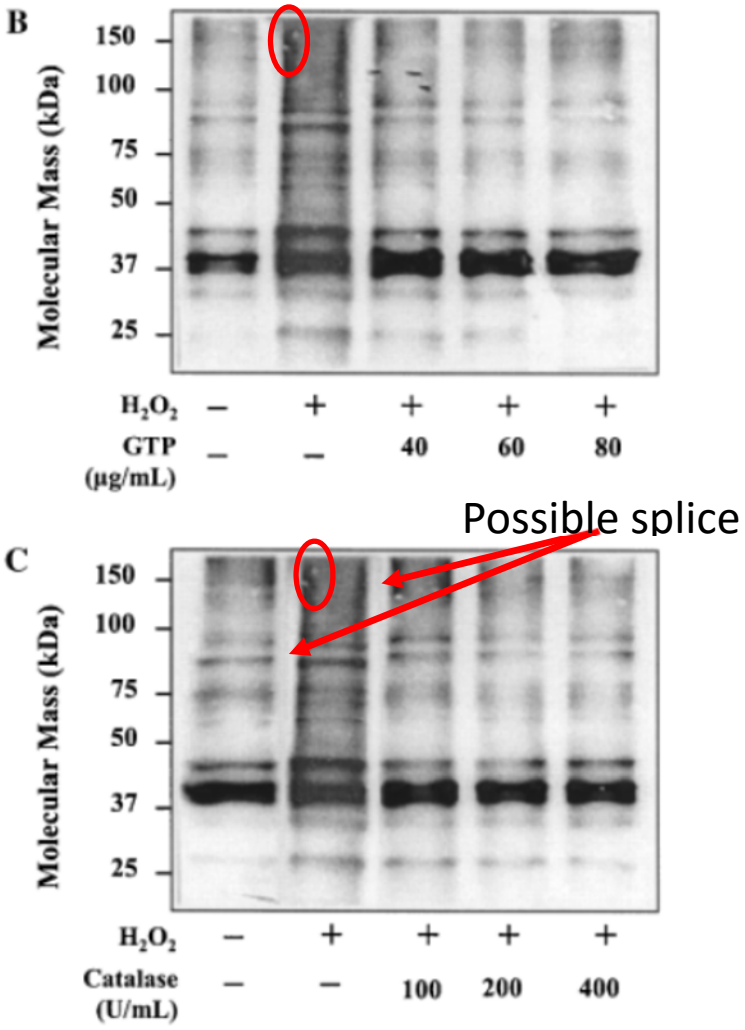
Allegation 29

Dr. Katiyar and/or his co-authors may have misrepresented the data in Figure 1, Panels B and C (Paper 21). The second lane from the left in each panel appears to be identical

> Paper 21: Vayalil, P.K., et al., Green tea polyphenols prevent ultraviolet light-induced oxidative damage and matrix metalloproteinases expression in mouse skin. J Invest Dermatol, 2004. **122**(6): p. 1480-7.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee examined Figures 1, Panels B and C carefully. The second lane from the left in each panel appears to be identical and the lane of interest in panel C has been spliced into the image (see analysis below and Appendix 5). Although the treatment conditions for these two lanes are similar it appears that at least one of the duplicated lanes, which serves as an experimental control, was spliced into the image. Splice marks are apparent in the figure. When asked about this irregularity, Dr. Katiyar responded as follows:" I will explain, and decision is up to the investigation committee. My explanation is that if we compare this lane and this lane, these are both two lanes, same lane, why they are -- it is used here. My explanation is this: Please see here under this lane, this lane are sample are cells while treated with hydrogen peroxide. Nothing else. Same is here. This sample was also treated with hydrogen peroxide. Nothing is more difference. No different. Both are same samples. Situations are same. Cell line is same. So for comparison purpose I believe that my research associate to compare because these were simultaneously conducted experiment because very much related. So to compare these



lanes with this and these lanes with same treatment group. They cut and paste here. But I will say this, if they did this or I did this, I should -- must explain in my paper. This is the error which I will accept. I should mention this to compare the same sample under these two figures under identical conditions, I should mention in my paper that I did this. Otherwise, technically I will say it is not incorrect because I'm comparing this with this and this with this. Same lane. So technically it is not incorrect. But I'm telling and saying my regret that if I did this, I should mention this. I did not mention in paper. This is the fault. Otherwise, technically, data is correct. "Presentation is fine. But it is up to you to decide." These statements can be found in the transcript of his interview (see transcript *FINAL – Dr. Katiyar, 061715,* pages 149-150). Although the Investigation Committee recognizes that the treatment and cells were similar for the two lanes, the fact that there is apparent splicing suggests intentional falsification occurred. Dr. Katiyar justified the splicing because the conditions were the same. Dr. Vayalil was also interviewed and he stated that Dr. Katiyar discouraged repetition of experiments: "Then he doesn't -- you know, if I get some data or something, he doesn't want to repeat it. He doesn't want repeating. Just want fine data, yeah, that's fine. That is his policy, "If you didn't get a pattern that he is expecting we have to repeat it until we get it. So there is no escape" (see transcript *Vayalil, Praveen 10-21-13* page 16).

The legend of Figure 1 in Paper 21 indicates that a representative blot from three independent experiments is shown. Dr. Katiyar did not provide any original data to confirm that three independent experiments were performed. In his response to the Investigation Committee in advance of his interview, he contends that the data as published are "technically correct" (see *2015-06-15 Response to Allegations from Dr. Katiyar,* page 38). While this might be the case, without the original data or replicate experiments to verify the findings, the experiment as presented in Paper 21 is not valid.

The Investigation Committee interviewed former and current laboratory members and they were consistent in their statements that Dr. Katiyar selected the figures for publication and wrote and submitted the final versions of manuscripts for publications (see as examples transcript *FINAL - Dr. Vaid 042815,* pages 15-16 and transcript *FINAL - Dr.Nandakumar 041615* pages 20-21).

(c) Cited Support - Paper 21 acknowledges support from R03 ES011421 (Katiyar), R03 CA094593 (Katiyar), R01 CA079820 (Elmets). Support is also acknowledged from the Veterans Administration (18-103-02, Elmets) and from the Purdue/UAB Botanical Center for Age-Related Diseases (Katiyar)

(d) Recommendation - The Investigation Committee recommends that Paper 21 be retracted from the published scientific literature. Retraction is indicated because of the unavailability of original data and records as well as the lack of replicate experiments that validate the published findings.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

Allegation 30

Dr. Katiyar and/or his co-authors misrepresented the data in Figure 4, Panels A and C (Paper 22). The image for WT mice exposed to UVB for ½ hr and treated with EGCG appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr. The image for IL-12 KO mice exposed to UVB for ½ hour appears to be identical to that for IL-12 KO mice exposed to UVB for ½ hr and treated with EGCG. The image WT mice exposed to UVB for 48 hours and treated with EGCG appears to be identical to that for IL-12 KO mice controls treated with EGCG.

> Paper 22: Meeran, S.M., et al., *(-)-Epigallocatechin-3-gallate prevents photocarcinogenesis in mice through interleukin-12-dependent DNA repair*. Cancer Res, 2006. **66**(10): p. 5512-20.

(a) Misconduct Finding - Based on the preponderance of evidence, the Investigation Committee agrees that research misconduct occurred and that it is intentional fabrication and/or falsification of data.

(b) Evidence Reviewed – The Investigation Committee carefully evaluated Figure 4 in Paper 22. In Figure 4 panel A, three pairs of images were used to represent three distinct experimental treatments (see below and Appendix 5). Orange, red, and green squares represent overlapping sections from tissues that are purportedly from individual animals with different genetic backgrounds that have been given different experimental treatments. In Figure 4 Panel A (concern 1), the same picture was used to represent skin sections from (1) WT mice exposed to UVB for ½ hr and treated with EGCG (orange rectangle, second row, second panel from left), (2) IL-12 KO mice exposed to UVB for ½ hr acting as controls (orange and green rectangles, second row, third panel from left) and (3) IL-12 KO mice exposed to UVB for ½ hr and treated with EGCG (green rectangle, second row, right panel). Different but overlapping sections of the same tissue section were used for the three different treatment conditions. In Figure 4 Panel A (concern 2) the same picture was used to represent skin sections from (1) WT mice exposed to UVB for 48 hr and treated with EGCG (red rectangle, top row right panel), as well as (2) unexposed IL-12 KO mice controls treated with EGCG (red rectangle, bottom row, second panel from left). Different but overlapping sections of the same tissue section were used for both the different treatment conditions. Since the use of the same tissue sections to represent different treatment conditions, generation of the figure involved the manipulation of the section of the tissues utilized as well as the orientation of the tissue sections. This involves deliberate actions.

The panels representing WT mice treated with EGCG and UVB-1/2 hr as well as IL-20 KO mice treated with UVB-1/2 hr and both control and EGCG treated contain cell patterns that show approximately 40-50% overlap that is identical indicating they are derived from a common larger photo. The overlap areas designated by orange and green squares show regions of identical cell patterns. The different pictures were also manipulated by resizing and reorientation for apparent presentation purposes. The committee recognizes that there were multiple cases of manipulation within the panels. The pictures represent different mouse strains as well as different treatment groups. Both the resizing and the re-use of photographs to represent different outcomes is intentional deception. Similar problems are observed with the tissue pictures representing WT 24 hr UVB and EGCG mice and the IL-20 KO EGCG treated mice. The red squares indicate approximately 30% of the pictures are derived from the same tissue section.

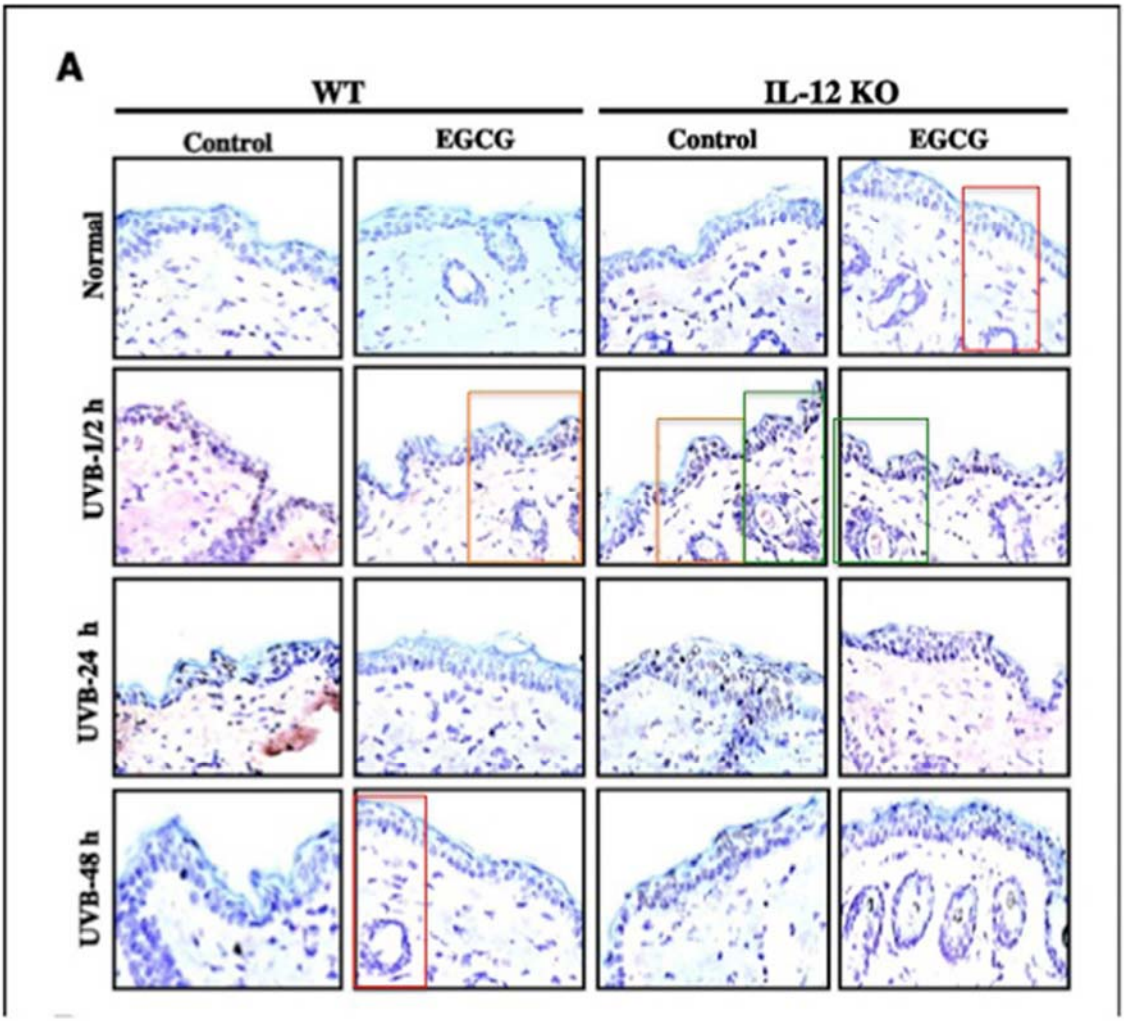


Figure 4 - EGCG removes or repairs UVB-induced CPDs more rapidly in WT mice than in IL-12 KO mice. A, WT or IL-12 KO mice were treated topically with EGCG then exposed to UV (60 mJ/cm^2) 30 minutes later as described in the Materials and Methods. Mice were sacrificed at 30 minutes (immediate), 24, or 48 hours after UVB exposure, and skin samples were collected and frozen in optimum cutting temperature medium. Frozen sections (5 μm thick) were subject to immunoperoxidase staining to detect CPD$^+$ cells that are dark brown. CPD$^+$ cells were not detected in non–UVB-exposed skin whether treated or not treated with EGCG. B, numbers of CPD$^+$ cells were counted in five to six different areas of the sections, and the numbers reported represent the percentage of CPD$^+$ cells in epidermis. Columns, mean (n = 5); bars, SD. *, P < 0.001, significant reduction versus non–EGCG-treated UVB-exposed mice. C, EGCG removes or repairs UVB-induced CPDs rapidly in WT mice than in IL-12 KO mice. CPDs were estimated using Southwestern dot blot analysis. The treatment protocol was similar to (A). Mice were sacrificed 0.5 or 24 hours after UVB irradiation with or without EGCG treatment (1 mg/cm^2), and skin samples were collected. Genomic DNA was extracted from the epidermal skin samples and subjected to Southwestern dot blot analysis using an antibody against CPD. The mice that were not exposed to UVB did not show the presence of CPDs in the dot blot analysis. Experiments were conducted and repeated separately in five animals in each group with identical results.

Since these tissues sections were utilized for the quantitation of CDP+ cells, this data is not credible because the source of material and treatment conditions are called into question. Allegation 30 arose late in the investigation process. Soon thereafter, Dr. Katiyar was alerted to the Allegation and a response in writing was requested. Dr. Katiyar acknowledged the problems with the figure in his response on June 8, 2016 (see *20160608 Katiyar response to Allegation 30*).

He contends that the first author, Dr. Meeran, is primarily responsible for figure preparation. Interviews with laboratory personnel indicate that during the period in question manuscript preparation, finalization of text and figures, and manuscript submission were carried out solely by Dr. Katiyar.

(c) Cited Support – Paper 22 acknowledges R01 AT002536 (Katiyar) and P30 AR050948 (Elmets). There is an acknowledged that the research was conducted in a facility that was renovated with support from C06 RR015490 (Gerrity). Also, support was acknowledged from a VA Merit Review Award (Katiyar).

(d) Recommendation – The Investigation Committee agrees that Paper 22 be retracted from the published scientific literature. Retraction is warranted because of the absence of original data, and the lack of replicate experiments to verify the published finding. If Dr. Katiyar chooses to replicate these findings, the Investigation Committee recommends that the experiments be performed under supervision.

(e) Responsible Individual – The Investigation Committee agrees that Dr. Katiyar is responsible for the research misconduct.

7. Response to Draft Report from Dr. Katiyar

The following is the body of the response to the draft report that was received on September 30, 2016. The signed version of this response is also included as Appendix 6.

Dear Members of the Investigation Committee:

First of all, I very much appreciate the extra time that was provided for me to submit my response to the Investigation Committee's August 12, 2016, Draft Investigation Report. The reason that was necessary is that I am going through cancer chemotherapeutic treatment and facing some difficult problems. I thank (b)(6) for Research at UAB, for granting me extra time to prepare this document for the Committee. I recognize that as a PI, I have responsibilities for the research conducted in my lab; I accept that responsibility, but I do not believe that responsibility is all-encompassing, especially when the nature of a PI's work necessarily depends on the collaborative efforts of others upon which he must rely.

I have reviewed the draft of the Report in great detail. With all due respect and honor to all the members of the Investigation Committee, I must say that I am deeply disappointed and frustrated to read the proposed outcome of the investigation. I have always believed that achievements in research are not based on a single person work, but rather, the work of a team, which requires active roles from each and every person working on the project or in the laboratory. Even collaborators play a significant role in accomplishing the project. Each and every person involved in the authorship of any publication contributes in one way or the other and is responsible for the credit, whether the research is good or bad.

I do not understand the reason why the Investigation Committee believes that I am responsible for all of the mistakes and errors in published papers. I have explained to the Committee that all the experiments in each publication have been conducted by my staff members. Although I understand the ultimate responsibility for research rests with myself as the PI; as the PI, I am unable to conduct all of the bench work in the laboratory. All data generation and the accumulation of that data in final form is the responsibility of the staff members involved in any particular project or manuscript. As a PI or supervisor, my responsibility is to supervise the work and discuss the outcome of the data with the staff members on regular basis. After discussion, we finalize the data, if it is publishable, and arrange it in a sequence so that it can be in a better form for presentation. It is the responsibility of the research staff members to manage, arrange and maintain the record of everything. With all due respect, I am strongly disagree with the conclusion that I am responsible for "intentional fabrication and/or falsification" of the data published in the papers. Although I have explained the facts to prove my innocence on these mistakes, I want to take this opportunity to again explain the facts one-by-one, with the request that the Investigation Committee please consider my explanations, as well as the fact that I am not solely responsible for these mistakes. Again, I will say that based on my knowledge, all of the

mistakes are due to unintentional carelessness of the staff members. I would further say that it is the combined responsibility of the entire research team to maintain error-free data and practice proper ethics in research.

I write the manuscripts for publication because other staff members are unable to write a publishable manuscript. I agree that most of the manuscripts have been written by me and submitted to the journals for consideration of publication. This is because most of my staff members; whether they are postdoctoral fellows, research associates or research assistants with more than 5 years of experience in the lab, are unable to prepare a final manuscript that can be submitted for consideration. Although excellent researchers, most of the staff members have limited knowledge of the English language and weak writing skills. They are unable to explain and interpret the data in a convincing and effective manner in an English manuscript. Because I am the PI or supervisor, I perform this work. Funding agencies provided funds to me for our work, and I am answerable to funding agencies to submit reports to them to show the productivity of our research project.

Staff members have acknowledged that they prepare final figures for publication purposes.

Based on the Investigation report, Ms. Singh, Dr. Vaid and others acknowledged that they have compiled the data, prepared power-point figures, presented them to me for discussion and sometimes also have prepared a first draft of the paper. The staff is responsible for conducting the experiments, collecting the data and presenting it. My role as a supervisor is that to guide them, and if they have any problem or difficulty in accomplishing the experiments I help them with the experiments and help them to arrange the final data in a sequential form so that the outcome can be presented in a logical story of scientific achievement, as well as to arrange the data in the form of a manuscript. Although I supervise the staff on regular basis and check the outcome of any experiments, the completion of any study takes several months and some times more than a year. At the final stage, I may not remember whether any particular beta-actin band/blot has been included before in any other paper or if it is wrongly duplicated in any figure. It is the responsibility of the staff members to maintain this integrity to avoid any mistakes. Although I cannot and do not deny my responsibility as a supervisor or PI, I am not the only person responsible for any mistakes; the whole team is responsible for these unintentional errors, just as the whole team is credited with successes. Still I believe strongly that the mistakes in the publications are unintentional and only show the lack of experience of data management or simply the carelessness of the research staff who worked on the bench. Although, I have not fired any individual in my lab after knowing these mistakes, but sincerely advised them to change the place and find out the alternate research laboratories. Three persons have already left my lab till now. It was done to prevent any future problems in my publications.

The research staff members who conducted all the experiments and prepared final figures of the data have not been held responsible for research misconduct. As I have explained and as all of the staff members have acknowledged, they conduct all of the experiments, do bench work, and assemble data into final figures for discussion, presentation

and publication purposes. Yes, it is true that as a PI, I must understand the data, discuss it with the research staff and suggest any changes in the presentation of the figures, a repeat of the experiments, etc., if required. Changes such as a change of sequence, fixing panels in the figures so that a sequence of events can be established and flow of new information can be explained are sometimes necessary for the clearest, most accurate presentation of data. These are the types of adjustments PIs routinely make, it is the responsibility of a PI to do so when necessary. At all times, I believed that our data presentation was correct and appropriate to the best of my knowledge. However, if any kind of error occurs or a mistake is made, it should first and foremost be the responsibility of the person responsible and the whole team, not only the PI. This is what disappoints and saddens me about the Committee's proposed findings. How can other members of the team be excluded from these mistakes, especially those who made them (even if unintentional)? In a real sense, these unintentional mistakes should not be considered research misconduct, because they were, by definition, unintentional mistakes. Our repeated experiments support and verify that the published data are reproducible. I have shown the outcome of these repeated experiments and the data generated to the Inquiry Committee and the Investigation Committee.

Collaborators on the research have not been held responsible to research misconduct and/or falsification. The National Institutes of Health (NIH), Veterans Administration (VA) and many other funding agencies suggest a collaboration in research projects so that we can improve the quality of our research projects. Based on these guidelines, I have collaborated with Dr. Elmets (Prof. of Dermatology), Dr. Tollefsbol (Prof. of Biology) and Dr. Rosenthal (Prof. of Otolaryngology) at UAB. It is a common practice that in any publication, authorship is given based on some contribution from each author; it is not and should not be an honorarium. When any manuscript was submitted for consideration of publication, these collaborators were given the final copy of the manuscript for their suggestions, comments and final approval. Just as I am, each collaborator is responsible for checking everything for correctness of opinion and data presentation. No one was able to catch these errors or mistakes in the final papers. Similarly, I was also unable to pinpoint the mistakes. When mistakes are published, each author is equally responsible for these mistakes. While I certainly wish no ill will on any of my collaborators, and I would not want any of them to have to go through this same process, it is very disappointing to me that the Committee purports to hold me solely responsible for mistakes. This is particularly so because other collaborators' names have been mentioned in connection with several of the allegations raised against me (*i.e.*, Dr. Elmets' name is mentioned in 7 Allegations [Allegation # 6, 12 17, 18, 19, 29 and 30], Dr. Tollefsbol's name is mentioned in 4 Allegations [Allegation #5, 9, 23, and 24] and Dr. Rosenthal's names is mentioned in 3 Allegations [Allegation # 1, 2 and 13]).

Dr. Vayalil's personal statements against Dr. Katiyar are not correct. I have reviewed the interviews given by the staff members of my research laboratory, including the statements by my previous postdoctoral fellow, Dr. Vayalil, who made some negative and inflammatory personal statements about me, including my behavior. Those statements are not true. As a responsible investigator, funding agencies, including NIH and VA, rely on me, and that is why

they provide funding for my research projects. I am accountable and answerable to them. During his tenure with my lab, I asked Dr. Vayalil to maintain a professional working environment in the research lab, which included coming to the lab on time for work. He could not do this. After two years of service in my lab, I declined to extend his tenure in my laboratory for a third year, so he became unhappy. That's why he has given these inaccurate and untrue statements about me. It is now evident from the publications that Dr. Vayalil made mistakes in his experiments, final figures and data presentation. These include Allegations # 6, 7, 14 and 29.

Most of our data from 2001 to 2010 was lost in a computer crash. As I informed the Committee, my office computer abruptly crashed in the year 2010, and almost everything was lost, including original data records and manuscript files. I informed the Department Chair and UAB's IT office when this occurred. UAB IT personnel tried their best, but could not recover a single file. In this situation, I was helpless to show any piece of evidence to the Inquiry Committee or the Investigation Committee. The other point of consideration is that some of the alleged mistakes happened more than ten years ago. The persons who conducted those experiments had long since left UAB. It is difficult to recollect and recognize the older data in the absence of the persons who are no longer here. Additionally, during this time period, several times, computers have been changed, and many computer programs have been altered and updated. These changes make record maintenance difficult. However, we have learned a great deal from these problems and mistakes, and we are now exceedingly more careful to maintain the record of new data so that we will not have problems in the future.

I requested that the Investigation Committee allow for a closed-door confidential meeting to include all research staff members so that we could determine the root cause of any mistakes in our publications. To find out the root cause for similar or identical mistakes in most of the papers, I had requested that the Investigation Committee convene a closed door meeting to include all research staff members and myself, so that we could openly discuss these issues and try to determine the root cause for any errors or mistakes in our publications. I sincerely believed then, as I do now, that the truth regarding who was responsible for any errors or mistakes and how they occurred would be found. As I explained to the Committee at the time of my interview, these proceedings are not secret; unfortunately, everyone involved in these mistakes knows about the investigation against me, due to the sequestration of data, their interviews, etc. I am confident and strongly believe that I am not solely responsible for any fabrication, falsification or research misconduct in publications. I always tried to say and explain the truth, and I sincerely have tried to do my work with the utmost in integrity. But still, I am blamed for research misconduct and fabrication of data, which I strongly deny. I am extremely unhappy, disappointed and frustrated by this proposed finding.

The vast majority of the data are reproducible. I strongly believe that it would be in the best interest of all involved that I request to publish corrections or corrigendum instead of retracting the papers in their entirety, especially given that the research remains valid as a basis for other research. After learning about the alleged mistakes in our publications, I immediately asked our staff to repeat the experiments to verify whether the published data was

reproducible or whether an error had been made. These repeat experiments were conducted under my direct supervision. Before the Inquiry Committee convened, we had repeated data from 12 papers/allegations. Significantly, almost every portion of the data was exactly reproducible when the experiments were conducted under the identical experimental conditions we used before. I have shown all of these repeated experiments and the resultant data to the Inquiry Committee and the Investigation Committee. These reproducible results show that there was no research misconduct. However, I agree to accept that our staff made some unintentional mistakes in the presentation of final data in a proper manner, and this mistake I have admitted from the beginning. Because the data are reproducible, I would like to correct our mistakes by publishing the corrections/corrigendum in the respective journals, which is a routine procedure utilized by others to correct any mistakes or errors that are later found. I strongly believe that retraction is not an appropriate action at this time because we have spent years and expended a great deal of research funds to established valid hypothesis and generate new information on the subject, which has been widely accepted by the scientific community. This new knowledge and information should not be wasted, because it is just as valid as it was when we first reported it. Moreover, our published data were supported and appreciated in publications generated from other research laboratories world-wide. I would be pleased to work with the Committee regarding how to word any proposed corrections/corrigendum to be submitted.

The Committee can be absolutely assured that if any data is found to be not reproducible, we will retract that paper without question. I also would welcome and encourage any Committee members or others appointed by the Committee to observe all experiments that are conducted, to further assure the integrity of the process.

I still believe that research is not a one person's work but it is the work of a team. I have always tried to develop trust and confidence among the staff members and treat them as family members so that we can freely discuss any problems or issues related to the research projects and rely on each other. Without teamwork and trust, we cannot achieve anything. I believe that this trust and confidence on the staff members turned into the inadvertent errors and mistakes that were found in some of our publications. I believe it may have been a mistake on my part to rely on my staff members as I did.

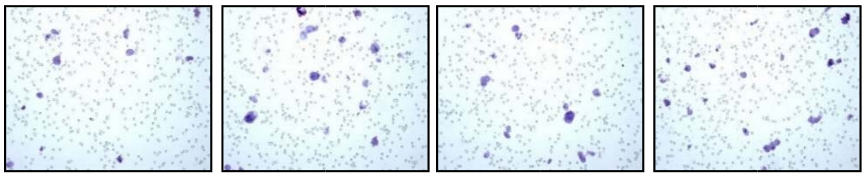
As I addressed above, after learning about the mistakes in these publications, I instructed my staff to repeat the experiments to determine whether the published results were correct and reproducible. The details of the following repeated experiments suggest that the published data are reproducible. Therefore, I respectfully request that the Investigation Committee allow us to continue repeated the experiments, verify the results and correct them by publishing any necessary clarifications, corrections or corrigendum in the respective journals. Any data that are not reproducible can, and should, be retracted. I would also like to mention that the data obtained from repeated experiments, either from in vitro cell culture or in vivo animals, may not reproduce exactly the same, however we expect the identical pattern or trend of the data or results. It is because that when cell lines are thawed from liquid nitrogen and passages or splits them to grow, there may be a difference in number of passages or some other changes. Similarly, it is the case with animal experiments. Every animal may not give identical results but it is

***expected that resultant data may have identical pattern compared to the previously conducted experiments in the same animal strain. Multiple experiments* were repeated before the start of the Inquiry. Examples are as follows:**

Allegation 1: Dr. Katiyar and/or his co-author(s) may have misrepresented the cell line used in Figure 1A. The article states that the data represents the FaDu cell line. However, the figure appears to be very similar to, or the same as, Figure 1A in a *BMC Complementary and Alternative Medicine* article (2011, 11:134) which is referred to as the A431 line.

Paper 1: PLOS ONE, January 2012 | Volume 7 | Issue 1 | e31093; "Grape Seed Proanthocyanidins Inhibit the Invasiveness of Human HNSCC Cells by Targeting EGFR and Reversing the Epithelial-To-Mesenchymal Transition", Sun Q, Prasad R, Rosenthal E, and Katiyar

Response: For independent verification of the results presented for FaDu and A431 cells (in both PLOS ONE and BMC Complementary and Alternative Medicine journals), the cell migration experiments were repeated under my supervision. It was found that the cell migrating ability of FaDu and A431 cancer cells are identical or similar to each other. The cell migration in FaDu cell line was repeated, and different pictures are shown from an experiment. **Representative data from the FaDu cell line are presented.** The Figure appears to be very similar to, or the same as, Figure 1A in BMC Complementary and Alternative Medicine paper.

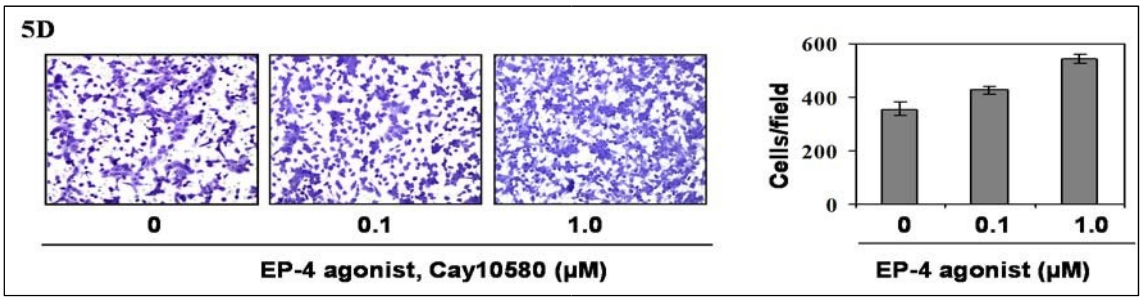


Allegation 2: Allegation 2 has been dismissed by the Inquiry/Investigation Committee.

Allegation 3: Misrepresented data in Figure 5D in that the second panel (labeled "0.1") and the third panel (labeled "1.0") appear to be identical.

Paper 2: PLOS ONE, October 2011 | Volume 6 | Issue 10 | e25224; "Green Tea Catechins Reduce Invasive Potential of Human Melanoma Cells by Targeting COX-2, PGE_2 Receptors and Epithelial-to-Mesenchymal Transition", Singh T and Katiyar S

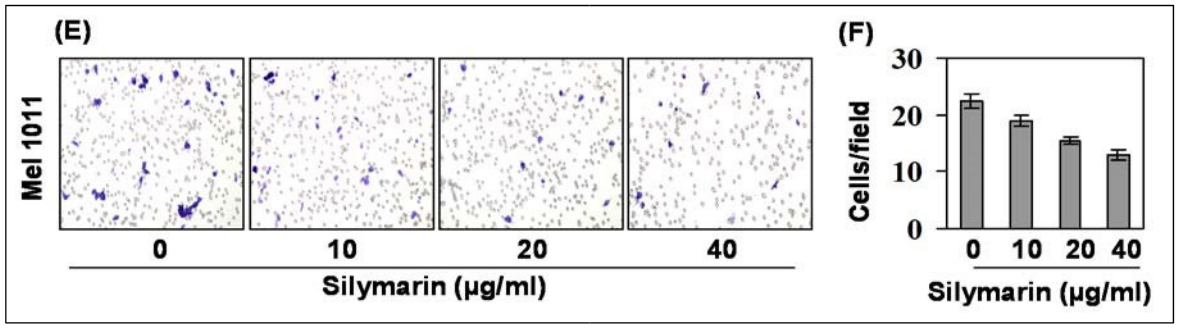
Response: Data are reproducible as published in the PLOS ONE Paper, as shown below.



Allegation 4: Misrepresented the data in figure 5 in that the lower right portion of panel E (labeled Silymarin 10 µg/ml)) is very similar to the top-left portion panel of the fourth image (labeled Silymarin 40 µg/ml).

Paper 3: PLOS ONE, July 2011 | Volume 6 | Issue 7 | e23000; "Silymarin Targets β-Catenin Signaling in Blocking Migration/Invasion of Human Melanoma Cell", Vaid M, Prasad R, Sun Q, and Katiyar SK

Response: To verify the authenticity of the data published in the figure 5E, we have repeated this experiment under identical conditions. We have found that resultant data presented, summarized (Figure 5F) and published in PLOS ONE is correct and reproducible based on the new information in repeated experiment. Please see the repeated data below:



(b)(6)

Allegation 6: Misrepresented the data in figures 3c and 4c in that there are artifacts present which suggest that images of some bands may have been cut and pasted from other figures.

Paper 6: Carcinogenesis, Volume 24, Issue 5, 1 May 2003, Pages 927-936; "Treatment of green tea polyphenols in hydrophilic cream prevents UVB-induced oxidation of lipids and proteins, depletion of antioxidant enzymes and phosphorylation of MAPK proteins in SKH-1 hairless mouse skin", Vayalil PK, Elmets CA, and Katiyar, SK

Response: We have reported earlier to the committee that we do not consider that there is any mistake in this published paper. We did not cut or paste anything here in the figure. We have explained that in the upper layer of western blot (EGCG+UVB), we did not show the band under control. We did not consider it as a part of the western blot. There is no band. Band area or length of the gel is clearly marked by arrows-line in original publication. This information is also supported by the fact that under the western blot, we did not show the relative density of control band for the layer of blots belong to EGCG+ UVB treatment, while the relative density of control band is shown for the lower western blots (UVB alone) in original publication.

Moreover, this experiment was repeated by a current laboratory staff member (Fig. 3c and 4c) under identical conditions of experiment and western blotting as was done before. Our resultant data verified that the results that we have published in the journal are correct, and there is no false information. Please also see new results.

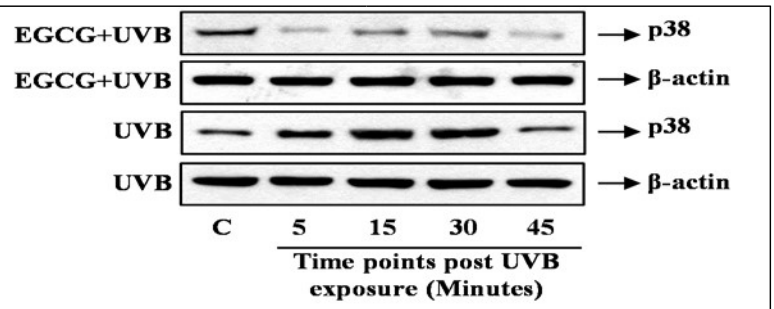


Figure-3C: Treatment of EGCG prevents UVB-induced phosphorylation of p38 time-dependently *in vivo* in mouse skin.

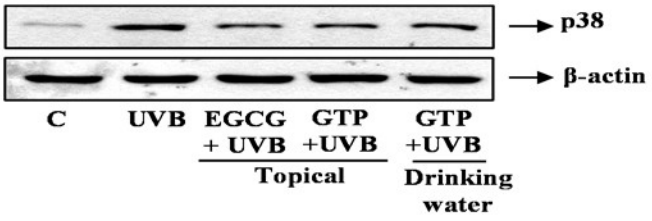


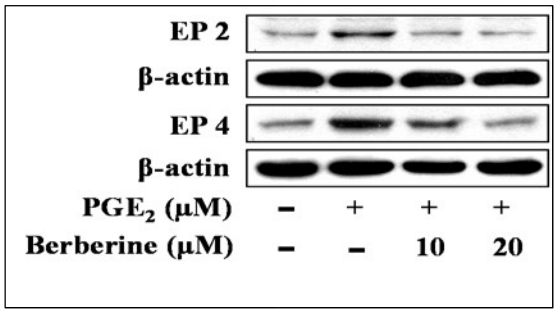
Figure-4C: Treatment of GTP prevents UVB-induced phosphorylation of p38 time-dependently *in vivo* in mouse skin.

(b)(6)

[redacted]

Allegation 8: Figures 3E and 5B in that both figures appear to use the same β-actin blot to represent different experimental conditions. The β-actin bands in Figure 3E and 5B panels are identical.

Paper 8: Carcinogenesis, Volume 32, Issue 1, January 2011, Pages 86-92; "Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2, prostaglandin E and prostaglandin E receptors", Singh T, Vaid M, Katiyar N, Sharma S, and Katiyar SK



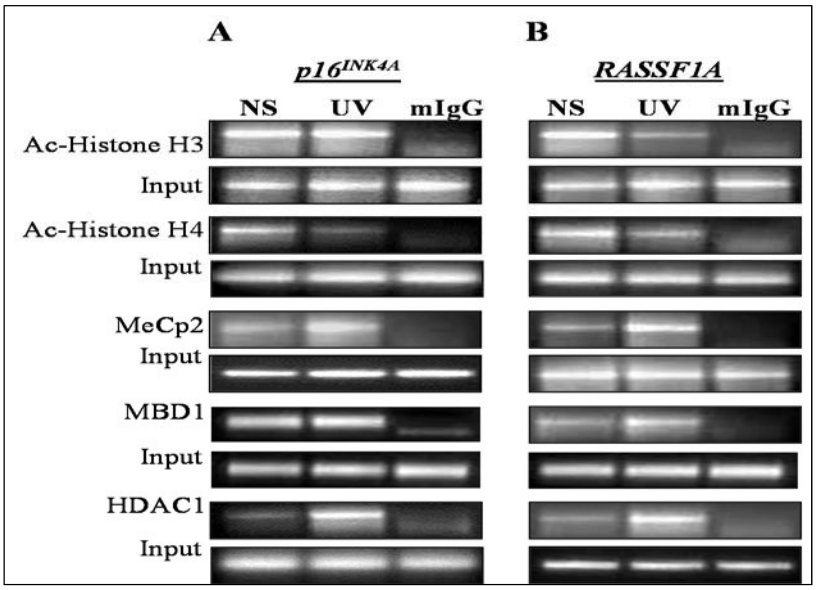
Response: Figure 3E was correct.

Figure 5B: We repeated the experiments in the lab to check the reproducibility of the data. As shown here, all data are reproducible. The placement of βactin bands was the mistake. These data can be corrected in the journal by publication of an erratum and an explanation of the correct data.

Allegation 9: The data in figure 5 in that the bands used to represent different experimental conditions are the same, i.e., the bands labeled P16INK4a "Ac-Histone H3" and "MBD1" are the same; the bands labeled P16INK4a "Ac-Histone H4 Input" and "MBD1Input" and "HDAC1 Input" and RASSF1A "HDAC1Input" appear to be identical.

Paper 9: Carcinogenesis, Volume 32, Issue 4, April 2011, Pages 597-604; "Aberrant DNA hypermethylation patterns lead to transcriptional silencing of tumor suppressor genes in UVBexposed skin and UVB-induced skin tumors of mice", Nandakumar V, Vaid M, Tollefsbol TO, and Katiyar SK

Response: We have repeated the analysis of parameters in skin and tumor samples using identical experimental protocols as was done earlier. The resultant data are reproducible and comparable to the results published in the Carcinogenesis paper (Paper 9). Repeated experiments and results are as follows.

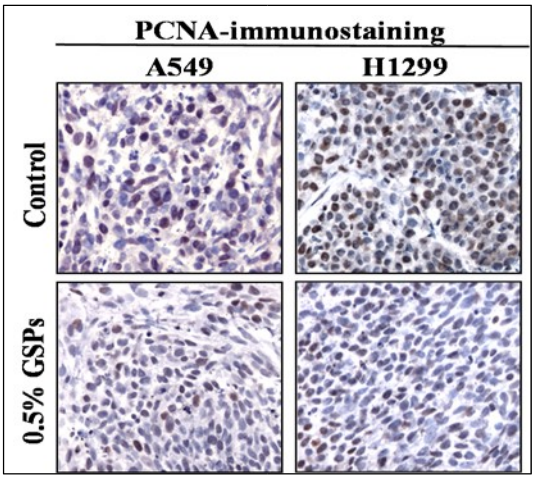


Allegation 10: The data in figure 5 in that the two panels labeled "0.5% GSPs" appear to represent overlapping parts of the same image, even though they are labeled to represent different cell lines (A549 or H1299).

Paper 10: Clinical Cancer Research, Volume 15, Issue 3, 1 February 2009, Pages 821-831; "Grape seed proanthocyanidins inhibit the growth of human non-small cell lung cancer xenografts by targeting insulin-like growth factor binding protein-3, tumor cell proliferation, and angiogenic factors", Akhtar S, Meeran SM, Katiyar N, and Katiyar, SK

Response: After knowing about the errors in this Figure 5, my research associate, Dr. Vaid, repeated the immunohistochemical analysis for PCNA-positive cells in tumor samples. Our resultant data verified that the information reported is correct and data are reproducible, however, there was a mistake in the placement of the right staining panel in the figure 5. We can publish correction in the journal.

Figure 5

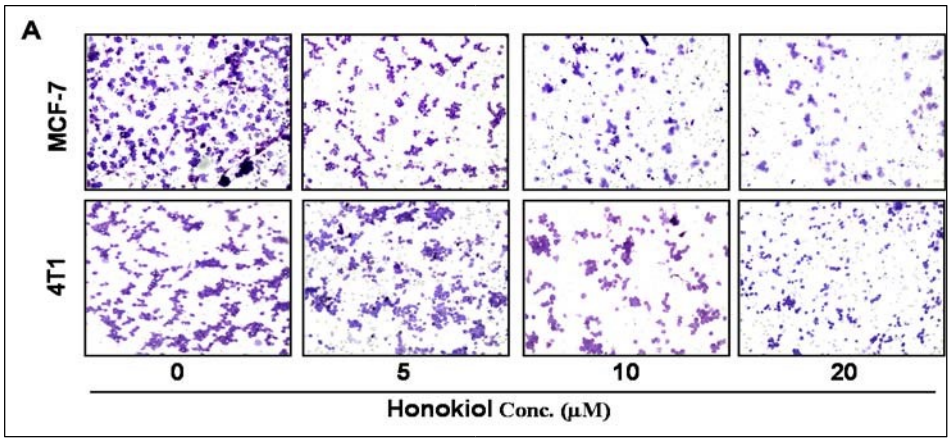


Allegation 11: Misrepresented the data in figure 2 in that the panels labeled "10" appear to contain portions of the same image in both the MCF-7 and the 4T1 panels.

Paper 11: International Journal of Oncology, Volume 38, Issue 3, March 2011, Pages 769-776; "Honokiol, a phytochemical from Magnolia spp., inhibits breast cancer cell migration by targeting nitric oxide and cyclooxygenase-2", Singh T and Katiyar, SK

Response: When the error in the figure 2 was identified, I asked my research staff to repeat similar cell migration assay using MCF-7 and the 4T1 cell lines under identical conditions and under my

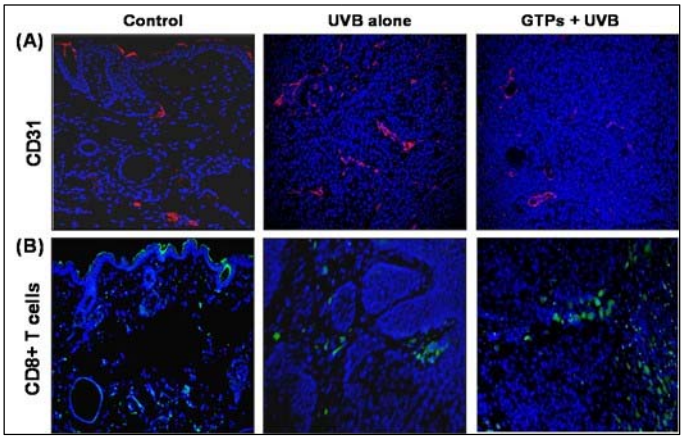
direct supervision. It was found that the overall finding was the same as published in our paper in the *International Journal of Oncology*. Repeated results are shown in the following figure (Figure 2).



Allegation 12: Misrepresented the data in figure 4 in that the same images appear to represent different experimental conditions, i.e., Control A is the same as GTPs+ UVB B and UVB alone B is the same as GTPS+UVB A.

Paper 12: Journal of Nutrition, Volume 135, Issue 12, December 2005, Pages 2871-2877; "Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activation of cytotoxic T cells and inhibition of angiogenesis in tumors", Mantena SK, Meeran SM, Elmets CA, and Katiyar SK

Response: The immunostaining was repeated for both CD31 and CD8+ T-cells in skin and UVinduced skin tumor samples. The resultant data verify and confirm the outcome of results reported in the published paper.



Allegation 19: Dr. Katiyar and/or his co-author(s) may have misrepresented the data in the actin blots from Fig. 3D and Fig. 5B. These two blots appear to be identical yet represent different experimental conditions.

Paper 13: Cancer Research 2007, 67:3785-3793. Interleukin-12 Deficiency Is Permissive for Angiogenesis in UV Radiation-Induced Skin Tumors. Syed M. Meeran, Suchitra Katiyar, Craig A. Elmets and Santosh K. Katiyar.

Response to the allegation 19: The samples used in both the figures (Fig. 3D and Fig. 5B) were generated from the identical or same treatment groups, such as the samples from IL-12-KO mice and their wild-type (WT) counterparts. The levels of different biomarkers were compared between these two mouse strains, and the samples from normal skin and skin tumors were used from both mouse strains for the analysis. The experimental conditions and mouse strains used in both the Figures are identical. Samples were prepared, and the levels of different biomarkers, such as bFGF (Fig. 3D) and Cip1/p21 (Fig. 5B) were determined using western blot analysis. Both of these biomarkers were analyzed from the same gel or membrane, and the beta-actin blot was generated from the same membrane, which was a common membrane for these 2 panels (figures). Therefore the same beta-actin was used for these two parameters. Although these two biomarkers are presented in two different figures, the beta-actin remained the same. It will not change, and therefore, it was presented in both figures but with different parameters. This data was correct, and it was not misrepresented.

Summary of Repeated Experiments and Data: Based on the data from our repeated experiments, I want to communicate and emphasize that most of the data in most of the allegations in related papers are reproducible, as is evident by the replicated experiments that have already been performed by different staff members. We have shown these repeated results and data to the Investigation Committee. As explained above, I humbly request that the Investigation Committee please allow us to repeat these remaining experiments, and if data are reproducible, allow us to publish corrigendum or corrections in the respective journals, with the understanding that the Committee or its designee will approve all such corrigendum or corrections. Any papers containing or relying on data that are not reproducible will be retracted. The NIH and VA have spent hundreds of thousands of dollars for this research, and my staff and myself have devoted much of our time to accomplish it. We do not want to waste these important pieces of research. Moreover, our published research is supported, verified and appreciated by other investigators working in the same area of research. These experiments represent important work, and the results should not be wasted or retracted from the scientific literature without verification. It is my humble request that we be allowed to do so.

8. Consideration of Comments Provided by Dr. Katiyar.

The Investigation Committee received Dr. Katiyar's comments on the draft report on September 30, 2016 (see Section 7 and Appendix 6). The Investigation Committee sends its condolences to Dr. Katiyar regarding his cancer chemotherapy and wishes him the best. It is clear from his comments that Dr. Katiyar did not agree with the conclusions of the Investigation Committee. In his response, examples of new experimental results related to some of the allegations were supplied by Dr. Katiyar. Dr. Katiyar chose not to respond to eleven (11) of the thirty (30) allegations (Allegations 20-30). Dr. Katiyar's response to the draft investigation report was evaluated by each member of the Investigation Committee. The Investigation Committee does not feel that a point by point discussion of Dr. Katiyar's response is warranted. However, Dr. Katiyar argues that his responsibility is not "all-encompassing, especially when the nature of a PI's work necessarily depends on the collaborative efforts of others upon which he must rely." (see Section 7 and Appendix 6). Science is inherently collaborative. The principal investigator on a project and corresponding author on a paper have the final responsibility for supervision of co-workers, accuracy of results, and integrity of the entire work. The Investigation Committee disagrees with Dr. Katiyar's position on responsibility.

The fact that Dr. Katiyar persistently writes manuscripts due to his staff members limited knowledge of English suggests that language training opportunities were not made available to his personnel. Such training is likely to be necessary for staff members to advance in their careers and should be part of mentoring and training for their individual career development.

The argument that staff members prepared final figures and have not been held responsible is not compelling. Dr. Katiyar acknowledges in his response that he would "help them to arrange the final data in a sequential form so that the outcome can be presented in a logical story of scientific achievement, as well as to arrange the data in the form of a manuscript" and that "Changes such as a change of sequence, fixing panels in the figures so that a sequence of events can be established and flow of new information can be explained are sometimes necessary." (see Section 7 and Appendix 6). The final and ultimate responsibility is thus Dr. Katiyar's. A pattern of similar problems was found in papers that spanned nearly a decade (2003-2011). Each of these papers was communicated by Dr. Katiyar, while the co-authors varied. This indicates a lack of appropriate supervision and training provided by Dr. Katiyar to his staff in the rigorous conduct of scientific research.

The Investigation Committee is not convinced by Dr. Katiyar's statement that "The vast majority of the data are reproducible. I strongly believe that it would be in the best interest of all involved that I request to publish corrections or corrigendum instead of retracting the papers in their entirety, especially given that the research remains valid as a basis for other research." (see Section 7 and Appendix 6). The data provided as independent verification for some of the questioned results provide no information about the number of replications involved or statistical evaluation of graphical data, and were sometimes also problematic.

In summary, the Investigation Committee decided that the conclusions reached in the draft investigation report remain valid and that no revisions to the report were needed.

9. Active and Pending Support for Dr. Katiyar as of 10/31/16

Below is a summary table of active and pending extramural support on which Dr. Katiyar is listed as key personnel (Table 3).

Table 3 – Active and Pending Support for Dr. Katiyar as of October 31, 2016

Sponsor/Award Number	Role of Dr. Katiyar	Title	Project End Date
ACTIVE			
PHS/5R01CA140197-05	Principal Investigator	Prevention of UV-Carcinogenesis through DNA Repair-Dependent Immunomodulation	12/31/2016
PHS/1R01CA183869-01A1	Principal Investigator	Prevention of UV-Carcinogenesis through DNA Repair-Dependent Immunomodulation	05/31/2020
VA IPA (Tripti Singh) Note: Singh is no longer in the laboratory of Dr. Katiyar	Principal Investigator		08/31/2017
VA IPA (Ram Prasad)	Principal Investigator	Prevention of Photocarcinogenesis by Dietary Immunomodulation	12/31/2016
VA IPA (Harish Pal)	Principal Investigator	Prevention of Photocarcinogenesis by Dietary Immunomodulation	08/31/2017
PHS/ R21AR067471	Co-Investigator Dr. Hui Xu is the PI	Mechanisms of Ultraviolet Radiation Induced Immune Suppression	06/30/2017
BVAMC	Principal Investigator	Research Career Scientist Award	03/31/2019
PENDING			
(b)(6)	Co-Investigator (b)(6) is the PI	Mechanism of Ultraviolet Radiation Induced Immune Tolerance	06/01/2017 to 05/31/2022

10. List of Appendices and Other Attachments

Appendices

Appendix 1 – Curriculum Vitae of Dr. Santosh K. Katiyar received in 2014

Appendix 2 - UAB's *Policy for the Maintenance of High Ethical Standards for Research and Other Scholarly Activities*

Appendix 3 – PHS *Policy for Research Misconduc*t

Appendix 4 – Inquiry Committee Report

Appendix 5 – Investigation Committee Analysis

Appendix 6 – Response from Dr. Katiyar to Draft Investigation Report

Other Attachments

1 – Publications of Concern

2 – Transcripts of Interviews

3 – Relevant Correspondence

4 – Referenced Laboratory Notebook

5 – CVs of Investigation Committee

6 – PHS grant submissions and progress reports

7 – List of sequestered evidence

DEPARTMENT OF VETERANS AFFAIRS
Medical Center
700 South 19th Street
Birmingham, AL 35233

AUG 11 2017

In Reply Refer To: 521/151

Dr. Curtis C. Harris
Editor–In–Chief, Carcinogenesis
E-mail: carcinogenesis.editorialoffice@oup.com

Dear Dr. Curtis:

As the result of a joint research misconduct investigation, the Birmingham VA Medical Center and the University of Alabama at Birmingham request the retraction of the following papers:

1. Nandakumar, V., et al., *Aberrant DNA hypermethylation patterns lead to transcriptional silencing of tumor suppressor genes in UVB-exposed skin and UVB-induced skin tumors of mice.* Carcinogenesis, 2011. **32**(4): p. 597-604.

2. Mantena, S.K., S.D. Sharma, and S.K. Katiyar, *Berberine inhibits growth, induces G1 arrest and apoptosis in human epidermoid carcinoma A431 cells by regulating Cdki-Cdk-cyclin cascade, disruption of mitochondrial membrane potential and cleavage of caspase 3 and PARP.* Carcinogenesis, 2006. **27**(10): p. 2018-27.

3. Vayalil, P.K., C.A. Elmets, and S.K. Katiyar, Treatment of green tea polyphenols in hydrophilic cream prevents UVB-induced oxidation of lipids and proteins, depletion of antioxidant enzymes and phosphorylation of MAPK proteins in SKH-1 hairless mouse skin. Carcinogenesis, 2003. 24(5): p. 927-36.

4. Singh, T., et al., Berberine, an isoquinoline alkaloid, inhibits melanoma cancer cell migration by reducing the expressions of cyclooxygenase-2,prostaglandin E(2) and prostaglandin E(2)receptors. Carcinogenesis, 2011. 32(1): p.86-92.

During the course of our joint investigation, the committee members found that the conclusions of the papers could not be substantiated by available data. The corresponding author, Dr. Santosh Katiyar, is no longer employed at either facility.

If you need additional information, please feel free to contact us.

Thomas Smith, III, FACHE
Director
Birmingham VA Medical Center

(b)(6)

University of Alabama at Birmingham

cc:

(b)(6)

University of Alabama at Birmingham

Kathy Martin, MA
Research Integrity Officer
Birmingham VA Medical Center