

Final Inquiry Report

Report based on Inquiry of: Allegation of academic misconduct - research data fabrication

Inquirer: Jessica Schwartz, Ph.D., Professor of Molecular and Integrative Physiology

Allegation presented to: Ricky Malhotra, Ph.D. Research Assistant Professor, Internal Medicine
Allegation presented by: Ph.D., Professor,

Jessica Schwartz
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STATEMENT OF THE ALLEGATION:

The allegation, as presented to Dr. Ricky Malhotra in a letter from OVPR on Jan 8, 2007 (Appendix 1), maintains that, in his research efforts in the laboratory of "Ricky Malhotra fabricated data from a series of experiments exploring differences between dwarf and control cells in their responses to in vitro culture stress." Conduct of the experimental series, initiated early in 2006, involved comparing, in each experiment, a cell line from a dwarf mouse to a cell line from a littermate control, upon exposing the cells to one of four stress agents at set doses. Cell samples were processed by electrophoresis and immunoblotting, processed for image collection in .gel format (2 scans) and quantitative data collection in .xls format (2 density analyses), both on the Storm Phosphoimager. Summary tables of relevant data ratios were then prepared by Dr. Malhotra.

Based on tables presented to on Dec 4, 2006, the experimental series of 45 experiments should have generated 90 source images (.gel files) and 90 .xls data files. concern arose when a laboratory group member noted that the amount and nature of the reported work appeared to be inconsistent with Dr. Malhotra's witnessed work habits in the lab. When asked Dr. Malhotra where the experimental source data might be found, Dr. Malhotra indicated that they were archived on his laptop computer and flash drive, which were voluntarily turned over to and subsequently to OVPR. However, upon a search of the laptop and flash drive by and his staff, the original data were not found. Further, the login records for the Storm Phosphoimager indicated that Dr. Malhotra had logged in only twice in the last year, both times on Dec. 6, 2006 (email file to J. Nowack by 12/15/06).

The failure of Dr. Malhotra to provide original data, failure of searches to find original data in Dr. Malhotra's archives, and lack of records that Dr. Malhotra used the Storm phosphoimager led to the allegation that Dr. Malhotra fabricated data. It should be noted that although none of the data have been published, one figure based on Dr. Malhotra's data had been included in a grant application to NIH; the application was withdrawn by when the allegations arose.

REVIEW OF THE EVIDENCE (* attached):

The evidence reviewed includes:

1. Interview (taped) with _____ – Jan 17, 2007 (summary* prepared from tapes by OVPR, reviewed by _____) – annotated experimental protocol, excerpt from grant application, and Dr. Malhotra's curriculum vitae were also provided at interview. (Appendix 2)
2. Interview (taped) with Dr. Malhotra – Jan 24, 2007 (summary* prepared from tapes by OVPR, reviewed by Dr. Malhotra.) (Appendix 3)
3. Compilation of relevant emails*, relevant portions of emails, and email attachments shared with Judy Nowack about _____ concern with regard to Dr. Malhotra. This compilation was created by J Nowack 1/23/07. (Appendix 4)
4. Summary chronology of Dr. Malhotra's experience with _____ prepared by _____ in the OVPR office on 1/31/07, which refers to interview testimony and email documentation.
5. Email correspondence among J Nowack, _____ and Dan Sharporn (1/26/07) describing efforts to locate a black 3-ring binder which Dr. Malhotra indicated contained his experimental notes and data for his work in _____ lab. An additional composition notebook containing Dr. Malhotra's notes for work he performed prior to joining _____ lab was also available. (Appendix 5)
6. Email correspondence between _____ a postdoctoral fellow in _____ lab, and J Nowack – Feb 2, 2007. (Appendix 6)
7. Forensic review by _____ of Dr. Malhotra's laptop, flash drive, and the Storm phosphoimager – discussed with _____ via email, and in meetings on March 12 and April 5, 2007 (when CD of selected lists of files from Dr. Malhotra's laptop, flash drive and Storm was provided). Images from two powerpoint documents on the flash drive are included as an attachment.* The images were assembled by _____ on 4/30/07. (Appendix 7)
8. Powerpoint file* from Dr. Malhotra's USB drive called "RM.ppt" and represented by Dr. Malhotra in a 12/18/07 email to _____ as being, "The raw gel images of all these experiments . . . gathered together as per your email of Dec 13, 2006, and put together in a powerpoint file labeled as RM.ppt located on my USB hard drive, now in your possession." (Appendix 8)
9. Table* comparing images from file "RM.ppt" with another powerpoint presentation. The table was prepared by J Nowack on 5/10/07 (Appendix 9). "Ricky Presentation 06.ppt" is printed out as Appendix 10, with page numbers added.

Summary information of the concern from the perspective of

The following is my recapitulation of relevant information provided by during the interview with him on January 17, 2007 (Appendix 2, above) and captured in the email chronicle prepared by Judy Nowack (Appendix 4, above).

narrated during the interview how Dr. Ricky Malhotra started in his lab Jan 2005 after working productively (per his cv, Appendix 2, above) in two other labs at UM; initial arrangement was for 2 years. Dr. Malhotra's research in the lab addressed signal transduction mechanisms mediating the resistance to stress of fibroblasts from dwarf mice, and an inquiry into cardiomyoblasts of these animals based on Dr. Malhotra's previous experience.

said he followed Dr. Malhotra's work through general group lab meetings and smaller meetings of the signal transduction subgroup in the lab. reported that his impression was that Dr. Malhotra was not very productive during the first year, and he transmitted to Dr. Malhotra that he needed to work more productively to obtain publications.

According to (and later confirmed by Dr. Malhotra) Dr. Malhotra presented an overview of his work in a lab meeting in June 2006, covering several areas of his research.

said that he noted that one aspect looked promising for a publication: data showing that the phosphorylation of JNK, a component of cellular stress responses, was reduced in cells from dwarf mice compared to normal.

said he told Dr. Malhotra to focus on this project exclusively, and began to meet with Dr. Malhotra 1:1 weekly to develop a research plan then follow the progress of this work. He said Dr. Malhotra provided research summaries for these meetings, in which ratios of phosphorylated JNK (pJNK) to total JNK from immunoblots were tabulated for cells from dwarf vs normal mice subjected to 4 different stresses. He reported that there were some gel images which had been "cobbled together." As this work progressed,

said he suggested to another lab member studying ER stress that he work with Dr. Malhotra. After several week's hesitation, said that the lab member indicated that he did not want to work with Dr. Malhotra, that he did not trust his work. This led to ascertain from multiple lab members, including several who worked nights and weekends, that the work Dr. Malhotra reported did not coincide with what people in the lab perceived:

said that he received reports that Dr. Malhotra was never seen performing electrophoresis in the lab, although he had occasionally been observed to subject cells to experimental stresses.

said that it was generally suspected that Dr. Malhotra's electrophoretic work was performed in the lab of

that when he inquired of about this, denied that such work occurred in his lab, and said that it could not have occurred without his knowledge.

On Dec 4, 2006, asked Dr. Malhotra to provide a list of all of the experiments he had completed for the pJNK project. The list indicated 45 experiments on pJNK and related molecule pMKK4. pointed out that these experiments should have generated 90 data files (one pJNK or pMKK4 and one total JNK or total MKK4 per expt) based on scans of the original electrophoretic gels, termed .gel files. Accompanying these should be 90 sets of quantification derived from each gel, computed on the Storm Phosphoimager (referred to as

Storm) as .xls files for each gel. said he told Dr. Malhotra that he needed to see the original data (.gel and .xls files) for Dr. Malhotra's experiments.

With growing concern, advised that there might be a problem with the work of an investigator in his lab. On Dec 14, met with Dr. Malhotra, accompanied by said he first reviewed with Dr. Malhotra his procedures for conducting his experiments, and Dr. Malhotra confirmed in the meeting that his experimental procedures involved: subjecting cells to one of 4 stress conditions and collecting cell lysates at 4 timepoints. Cell lysates were run on electrophoretic gels and used for immunoblotting for pJNK. Blots were analyzed on the Storm, generating a .gel file for each probe. Blots were then stripped and evaluated on the Storm to verify stripping, then were reprobed with antibody for total JNK; the reprobed blots were also analyzed on the Storm to generate a second .gel file for that experiment. Each .gel file was quantified using ImageQuant software to generate a corresponding .xls file.

again asked Dr. Malhotra to show him the original .gel and .xls files for his experiments. As reported by , Dr. Malhotra indicated that they were on his laptop or USB flash drive. indicated to Dr. Malhotra that there was concern about whether or where he had done his work, and Dr. Malhotra stated that he had done the work in the lab, (See below where, in the interview with Dr. Malhotra, he acknowledged on further questioning that 2-3 gels had been run in lab.) asked Dr. Malhotra to provide him with the laptop and USB drive so he could examine the original files, and told Dr. Malhotra that until the questions about his work were clarified, that Dr. Malhotra should not come to the lab (this was recommended by Dean Jayne Thorson, who had been consulted prior to meeting).

relayed that, according to reports from people in the lab, in response to inquiries by Dr. Malhotra requested a password for the Storm on Dec 5, for the first time in his 2 years in the lab. It was reported that later that week Dr. Malhotra asked one lab member, , to teach him how to use the ImageQuant software that quantified .gel files into .xls files. said that it had been reported to him that Dr. Malhotra explained to that he had analyzed his gels on another system and wanted to compare the ImageQuant analysis to his other analyses. has confirmed this account. See Appendix 6, above.)

Although Dr. Malhotra's work had not yet been published, reported that one figure based on Dr. Malhotra's data was included in a recently submitted grant application to NIH. said he had contacted NIH to indicate that one figure in the grant was questionable, and was advised to withdraw the grant application, which he did.

Summary of information from the perspective of Ricky Malhotra. (The major source of this information is the interview on Jan. 24, 2006. See Appendix 3, noted above.) This interview covered three main areas:

Dr. Malhotra's research project: Dr. Malhotra came to the lab in Jan 2005, after working in two other labs at Univ. Michigan. In the lab, Dr. Malhotra initially worked on

apoptosis, as he had previously; he relayed that he had received an internal Nathan Shock Center grant. He had applied for the grant and [redacted] wrote a letter of reference for it. Dr. Malhotra said he presented a lab meeting on the apoptosis work in Oct 2005. At approximately that time he began working on the stress project which involved analyzing Jnk phosphorylation in cells from dwarf and normal mice. He said he received the cells from [redacted] a fellow in the lab who prepared them for everyone's use; Dr. Malhotra said his notes about receiving each cell preparation were written and kept in a black 3-ring binder in his office. Dr. Malhotra said there were lapses of 4-8 weeks when cells were not available because of animal breeding issues (also a lapse when the lab moved in Feb 2006). Dr. Malhotra said he ran his electrophoresis analyses, using equipment he had purchased through his grant, so that the blots were processed overnight. He commented that the project was not challenging, especially compared to the kinds of work he had done previously. He said that when he wasn't at the bench, he worked in his office, preparing grants (he said he submitted two more which were not funded) and doing email.

Dr. Malhotra reported that he presented a lab meeting in June 2006, after which he focused on the pJnk project with a goal of publishing it. He met with [redacted] frequently, presenting data summaries each week. The work was going well, and [redacted] suggested that Dr. Malhotra collaborate with another lab member working on ER stress, and requested that Dr. Malhotra and the other lab member coordinate their efforts, and set up a meeting with [redacted]

Dr. Malhotra's data: In the interview, Dr. Malhotra reviewed his experimental procedures: After running electrophoretic gels and performing immunoblots for pJnk and total Jnk, Dr. Malhotra said he analyzed his results on the Storm Phosphoimager. He said he sometimes transferred the scans of his gels (.gel files) to his USB drive to print out. He stated that printouts of about 80% of his gels were kept in the binder in his office (50-60 pages). Dr. Malhotra said that after scanning the entire gel, he would analyze a strip containing relevant bands. He said he prepared a "volume report," generating a 5-digit number indicating pixels; this was saved as an Excel file in a folder on the Storm; and sometimes he transferred it to the USB drive. To prepare summary files, he noted that he calculated the fold induction expressed as a ratio of pJnk to total Jnk. He indicated that his data were stored on his laptop (purchased with his grant, with permission of [redacted]) or on his USB drive. During the interview, Dr. Malhotra opened his computer and some of the data files (these had been in possession of [redacted] and OVPR since Dec 14, 2006). The files were all in the form of tables of numbers said to represent the quantification from his blots; there were no .gel or .tif files with images of the gels. Dr. Malhotra confirmed that the material on the laptop and flash was the same as the material on it when he had turned it over to [redacted] on Dec 14, 2006. At another part of the interview, Dr. Malhotra indicated that he stored his data (.gel files and .xls files) on the Storm, in a folder named "RMwesternraw". He said he did not make backups. He said he did not need a password for the Storm because it was typically left on, through a previous sign-in, and he could therefore use it without a record on the system of his having logged in. He said he did not request a password because of the warning he received when he came to the lab (see below). He said he asked for the password for access to the Storm in early Dec because he decided that he should safeguard his data, since he felt vulnerable and thought that people were going through his paperwork in the office. When asked, Dr. Malhotra said that two or three times, the gels were run in [redacted] lab; once when Dr. Malhotra's equipment (purchased on his grant) was erratic, once

when it was being used by someone else, once when there was a problem with the buffers. Apparently he transferred from gels to membranes in the lab, and said he then brought the blots back to the lab for analysis and processing on the Storm. He also commented that his schedule was sometimes erratic because he had family issues to juggle (e.g.

).

Interactions with people in the lab:

Dr. Malhotra opened our interview with comments on how he has enjoyed his time in lab. He next mentioned that when he started in the lab, he was warned by several people that certain others in the lab looked through people's data, and to be careful of those people. He said that the people who warned him are no longer in the lab. Dr. Malhotra worked on a bench in the lab both in the and in BSRB when the lab moved in Feb 2006; in BSRB he shared a separate office with He said that and two others from the lab would assemble for coffee in the office several times a day; they did not ask Dr. Malhotra if he was disturbed, and he was not included in the "coffee club." He said that occasionally he found them rummaging through papers on his desk. When asked Dr. Malhotra and another lab member, (also in coffee club), to collaborate on ER stress, Dr. Malhotra found that refused to work with him and said he did not trust his data. Dr. Malhotra wondered (several times during our interview) why did not question the data when he needed it for a grant application the previous August, and only mentioned his distrust later (in Dec). Dr. Malhotra said he felt that was jealous of him because of Dr. Malhotra's grants and higher salary. Dr. Malhotra stated that last summer (i.e. summer 2006), he had provided data tables to , who prepared a figure for a grant, which Dr. Malhotra never saw. Dr. Malhotra said that would not meet together with and Dr. Malhotra as requested and that yelled at Dr. Malhotra. Instead met with individually (Dr. Malhotra said that told him "I know how to manipulate "). Dr. Malhotra reported that one hr after that interview, told Dr. Malhotra that he should forget about the collaboration on ER stress.

Dr. Malhotra said he was away Dec 9-12, 2006 to attend a meeting He said that before he left all of his data were on the Storm. Dr. Malhotra suspects that when he was away, people in the lab deleted his files from the public computer. Dr. Malhotra said he had a paper record (printouts of some files from Storm) in a folder in his office.

Review of additional evidence:

Email correspondence (Dec 14-Dec 21, 2006, **Appendix 4**, above) - A series of emails among Dr. Malhotra, Dr. Jayne Thorson of the Medical School and Judith Nowack of OVPR confirming much the sequence of events described in the interviews was assembled in a chronicle of events prepared by the OVPR office (Item #4 above). Additional points documented in the emails: (1) repeatedly asked Dr. Malhotra where the original gel files were. Dr. Malhotra replied that they were on his laptop

and USB drive. When [redacted] searched those for the files, he could not find the original data (90 .gel files and corresponding .xls files, although there were a few of the latter). [redacted] also searched the Storm phosphoimager, but could not find the folder RMwesternRaw, or any files identifiable as Dr. Malhotra's based on terminology Dr. Malhotra had indicated. The log of the Storm indicated that Dr. Malhotra had logged in only twice in two years, both times on Dec 6, 2006. (2) Although Dr. Malhotra said that he had used the Storm to analyze his data, a lab member speculated that Dr. Malhotra preferred to process his gels by ECL. This technique would have generated x-ray film images of his experiments. However, no x-ray films were mentioned or provided by Dr. Malhotra. [redacted] subsequently checked the login for the x-ray film developer used by his lab, and found that Dr. Malhotra had not used it. (3) Dr. Malhotra assembled a powerpoint file "RM.ppt" (Note: **Appendix 8**, above), stored on his USB drive, which he told [redacted] contained the missing gel image files. When [redacted] examined this file, it contained some partial gel images pasted into powerpoint. The original .gel files were not found. (4) The .xls files on Dr. Malhotra's laptop were not in the ImageQuant format; rather they were tables of summary statistics. The original .xls files from ImageQuant were not found. (5) [redacted] posed 9 questions directly asking Dr. Malhotra about his data analysis using Storm phosphoimager, .gel files, ImageQuant analyses, timing of his use of the Storm. The email correspondence did not contain direct answers to any of these questions. (6) Judy Nowack wrote to Dr. Malhotra (12/18/06) "If we can't produce data, the faculty inquirer will be justified in concluding (and authorized by NIH rules to assume) that it does not exist."

Lab notebook (Item #5 above). Dr. Malhotra indicated in the Jan 24th interview that he kept printouts of some .gel file images in a black 3-ring binder on his desk, which also included records of cell preparations he received. Under intense questioning by [redacted] as he was seeking original source data, Dr. Malhotra did not mention or refer [redacted] to any paper documents or notebooks. Judy Nowack went to the [redacted] lab on Jan 25, 2007 to look for the binder and any other written materials that might reference work done on the experiments in question, and reported in an email on Jan 26th that she found only one black 3-ring binder in his office, and it had only equipment and material data sheets in it. She did not find printouts of the data. When presented with failure to find the binder, Dr. Malhotra subsequently suggested that the binder might be in on his bench the lab. [redacted] searched his bench and found "nothing remotely connected to Ricky's experimental work here, although there is a folder of autoradiographs...representing work done in the mid-1990's." The OVPR did have possession of a "composition book" from Dr. Malhotra's desk labeled with the name [redacted] (item #5 above). This contained notes from a lab where Dr. Malhotra worked prior to coming to [redacted] lab.

Confirmatory Email (Item #6, above, and Appendix 6) from [redacted] to Judy Nowack, verifying that Dr. Malhotra asked her to show him how to use ImageQuant software on approximately Dec 7, 2006 and that Dr. Malhotra had told her that he had analyzed his gels using a program other than ImageQuant and wanted to compare the two analyses. [redacted] had also told [redacted] that she had seen Dr. Malhotra working with cells and subjecting them to experimental stresses in the lab. (See items #1 and #3 above)

Forensic Imaging of the Storm Phosphoimager. (Item #7 above)

Senior IT

Security Analyst, acquired a forensic image of the Storm system on Jan 30, 2007. The goal was to determine whether Dr. Malhotra's files of original data could be found either in existing files or deleted files. Based on information provided by OVPR and from a meeting with and on March 12, 2007, searched for files or folders containing the terms: RMwesternRaw, jnk, mkk4, in formats ".gel" and ".xls". He initially focused on times from Dec 4, 2006 on. He conveyed initial results by emails, which can be summarized as follows:

- there was no trace of a file called RMwesternRaw on the Storm system or detectable in the recycle bin – it would not be possible to know if it had been overwritten.

-The account "rmalhotr" was used to login once on Dec. 6, 2006.

-no .gel files could be found on the Storm which contained the term "jnk," which had been indicated by Dr. Malhotra to be a standard part of the names he gave to his files of individual experiments.

-The recycle bin contained 391 deleted .gel files. Of these, all but 5 were overwritten; a forensic utility was used to recover as much data as possible under the Recycle bin. The recycle bin had last been emptied on Jan 25, 2007.

-there are 23 files whose names contain the term "jnk", which were opened by the "rmalhotr" account on the Storm system from an external device (flash drive), that included .xls and .tif files.

-subsequent search for .tif files (converted from .gel files) on the flash drive (12/13/06 directory) found a series totaling 43 files with names containing the term "jnk" such as "Jnk Cd 1-9.TIF" and "Jnk UV 10-19.TIF".

On April 5, 2007, met with and to review the forensic imaging. The overall data processing procedures were clarified and dates were associated with the portions that involved the Storm. Some observations:

(1) Dr. Malhotra's flash drive contained .tif files which had been created on 11/02, 12/05, 12/06 and 12/13/2006.

(2) Dr. Malhotra's laptop had .xls but no .gel files associated with the name "jnk".

(3) The flash drive contained .xls files created prior to Dec 2006, mostly with names associated with p53 or Caspase, associated with Dr. Malhotra's other projects. There was one .xls file named "Jnk data" created 2/22/06 and last accessed 6/23/06. All other .xls files were created 12/05/06 or 12/06/06.

generated a CD containing lists from the Storm image, an index of some files on the laptop and on the flash (containing "jnk" and .xls).

Two powerpoint files from the flash drive were included on the CD, one entitled "Ricky presentation 06.ppt" and the other entitled "Joint lab meeting.ppt". Review of the powerpoint files leads to some observations of concern:

-Powerpoint File named "Ricky presentation 06.ppt"

The powerpoint file contains 37 pages. The index of files from the flash drive indicated that this had been created 6/23/06, last written 12/13/06. Examination of this powerpoint document showed slides containing bands derived from immunoblots labelled pJnk, total Jnk and sometimes actin, and also slides containing graphs representing the time course of responses to various stresses in dwarf and control cells. It was not determined which slides were actually used in presentations to others, but comparisons among data representations among slides within the file raised the following inconsistencies, which suggest concerns about authenticity:

Some gel excerpts appeared on more than one slide, with apparently identical images being represented as the consequences of different stresses.

The gel image on page 1, labeled as the results of anisomycin treatment, may be the same image on page 5, labeled as being associated with H₂O₂ treatment.

The gel image on page 3, labeled as being associated with UV stress, appears identical to the image on page 18, labeled as being associated with H₂O₂ treatment.

The gel image on page 4, labeled as being associated with exposure to cadmium, appears identical to the image on page 10, labelled as being associated with UV treatment.

Some of the graphs appeared on more than one slide, very similar if not identical graphs being represented as the results of different experiments.

The graph on page 3 (labeled as representing results with UV stress), the graph on page 5 (apparently represented as the results of H₂O₂ treatment, N=8), and the graph on page 23 (apparently represented as the results of H₂O₂ treatment, N=3), appear to be the same graph.

The graph on page 6 (labeled as "UV, N=8") appears to be the same as the graph on page 20 (labeled as "New UV, N=3").

The graph on page 8 (labeled as "Cadmium, N=6") appears to be the same as the graph on page 17 (labeled as "New Cd, N=3").

As mentioned previously, the gel images were discontinuous composites cut and pasted from different gel images or different parts of a gel image. The end of this file also contained information on Autophagy and p53 pathway parameters, related to other projects Dr. Malhotra worked on in the lab.

-PPT file named "Joint lab meeting."

The first page of this presentation indicates that it presents the work of she works in the lab of The file contains 57 pages and is entitled "Cellular toxicity associated with FVIII expression."

In this file, one figure (slide 50, "JNK Activation in Mouse Liver") showed pJnk under various conditions in cells from mice deficient in the factor chop. The pJnk image strongly resembles a pJnk image in Dr. Malhotra's "Ricky presentation 06.ppt" file (slide 7, "JNK Activation after Cadmium").

-PPT file named "RM.ppt"

The additional powerpoint file named "RM.ppt" (item #8, above, and Appendix 8), which Dr. Malhotra indicated contained his original data, and which was present on his flash drive, was also examined further. This file was created on 12/05/06, last written on 12/14/08 at 8:08 am, and contained 6 pages, each labeled with a different stressor. Each page contained 4-8 sets of excerpted gel images which were unlabelled but presumably represented pJnk and Jnk pairs based on their resemblance to labeled images in "Ricky presentation 06.ppt." Various sets of data in the file "RM.ppt" were also used in "Ricky presentation 06.ppt." However, the attribution of the stresses for at least 12 of the apparently identical images differed in the two powerpoint files. A sampling of the comparative labeling, prepared in a table by J Nowack (item #9 above) and confirmed by includes:

Ricky Presen.06.ppt	Rep'd as	RM.ppt	Rep'd as
p.1 p-JNK	Anisomycin	p.4 #8 P-JNK?	H2O2
		p.6 #1 P-JNK?	Anisomycin
p.1 total-JNK	Anisomycin	p.4 #8 total JNK?	H2O2
p.3 Dwarf p-JNK	UV	p.6 #2 upper right	Anisomycin
p.3 Control p-JNK	UV	p.6 #2 upper left	Anisomycin
p.3 Cont Total-JNK	UV	p.6 #2 lower right	Anisomycin

SUMMARY:

Dr. Ricky Malhotra is an experienced investigator who has expertise in all procedures involved in the project on Jnk phosphorylation during experimental stress in cells from dwarf mice: This project involves generating samples from cell culture for electrophoresis and immunoblotting, analyzing and processing the data. At least one colleague in the lab attested to Dr. Malhotra performing experiments subjecting cells from dwarf and control animals to experimental stress. At lab meetings, he presented summarized data in the form of ratios of pJnk to total Jnk, in response to experimental stress. According to his testimony and written representations, he performed 45 experiments in this series, which would be expected to generate 90 individual pieces of data based on individual electrophoresis procedures (generating .gel files) and 90 sets of quantification from the gels (.xls files).

It is alleged that Dr. Malhotra fabricated data. indicates that he bases the allegation on the fact that individuals in the lab did not witness Dr. Malhotra performing electrophoresis in the lab; that there is evidence that Dr. Malhotra did not sign on to the Storm Phosphoimager before Dec 6, 2006; and that Dr. Malhotra has not provided the original data (.gel files) for his experiment series (ongoing since at latest June 2006) upon repeated requests.

Dr. Malhotra reported at his interview that he did purchase electrophoresis apparatus with his grant, supporting that he had the capability to perform electrophoresis. He indicates that he did not have to sign on to the Storm because other users generally failed to log out.

Still, the key issue is to obtain Dr. Malhotra's primary data, presumably in the form of the .gel files containing full gel images, from the Storm Phosphoimager, from which ImageQuant produced numerical data that were used to calculate summary ratios. So far, the .gel files have not been identifiable on the Storm Phosphoimager, on Dr. Malhotra's flash drive or on Dr. Malhotra's laptop. It is possible that a set of 43 Tif files which contain the term 'jnk' on Dr. Malhotra's flash drive may be derived from .gel files. These should be examined. However, the number of Tif files is not sufficient for the number of files which should have been obtained (90) according to Dr. Malhotra's reported experimental output.

There are several inconsistencies: Dr. Malhotra claims that his original data were stored on laptop and USB but the data can't be found. Dr. Malhotra also claims that his original data were stored on the Storm in the file RMwesternRaw, but the folder cannot be found. A folder created Dec 6, 2006 entitled "rmalhotr" does exist on the Storm. The folder contains two .xls files; it does not contain .gel or .tif files. Dr. Malhotra claims that printouts of some of his .gel files were generated and kept in a binder on his desk; the binder could not be found.

Dr. Malhotra claims that fellow lab members destroyed his original data files on the Storm and destroyed all paper files associated with this work. Dr. Malhotra did not have an account for the Storm until Dec. 6, 2006 and, although he might have accessed the system when an authorized user did not log-out properly, there is no affirmative evidence that he did so. From the forensic imaging, it may be possible to reconcile sign-on and file creation dates on the Storm with file creation dates on the flash drive and laptop, to evaluate whether Dr. Malhotra's files were created at times when the Storm was accessible through a prior signon. There is testimony,

however, that Dr. Malhotra admitted to another staff member that he did not use the ImageQuant system on the Storm, in apparent contradiction to his account. If lab members destroyed Dr. Malhotra's original data files, they removed records from existing files and traces of deleted files on the Storm drive. They also would have removed the binder Dr. Malhotra says exists containing data printouts from his office or lab, and they would also have found and removed all other indications of his having performed the work. Such possibilities might themselves be cause for further investigation.

A powerpoint file of excerpts from source images was represented by Dr. Malhotra as the "raw gel" images, but they are not the source data sought. As secondary representations of experiments performed, the images in this file still raise concern, given that segments of various images which appear in this file and in the two other PPT files reviewed are not consistently labeled, with some images being represented as data from experiments in which different stresses were applied, or different numbers of experiments represented.

RECOMMENDATION:

Based on the information available so far, particularly the lack of primary data, my judgment is that there is substantial reason to believe research misconduct (data fabrication) occurred. It is recommended that this allegation of data fabrication be investigated further. Such an investigation should address the following issues:

Original data showing gels which analyzed samples from dwarf and control cell cultures subjected to experimental stresses and probed for phosphorylated Jnk and total Jnk (or phosphorylated MKK4 and total MKK4) have not been provided by Dr. Malhotra and have not been found. Secondary displays of images purported to be derived from the source gels are problematic. If gel images cannot be found, confirming evidence of data fabrication might be sought in the numerical data in Dr. Malhotra's .xls tables. This should be considered in the context of his curious statement that the volume reports (represented in the .xls files) contained "5 digits." The statement is considered strange because scanning gels is typically in arbitrary units of varying magnitude; it is the relative differences in the numbers, not the absolute values, that are biologically meaningful. Given the variations in intensity of the bands in the images provided that were excerpted from gels, it would be anticipated that the number of digits from the scans would vary over many orders of magnitude, even if the maximum response was quantified to 5 digits. In the data summaries, the data are expressed as ratios, and number of digits obtained from scans is not relevant.

The possibility might also be considered that the primary data were obtained, analyzed and possibly stored elsewhere (e.g. lab).

It may be that data were obtained but recordkeeping was inadequate so the gels were not clearly identifiable. This might account for the powerpoint presentation "Ricky presentation 06" in which the same data were represented in multiple slides for different stresses. If data were fabricated, one would expect that they might not be as inconsistent as they appear here.

A major concern, in the context of the allegation, is the extreme similarity of pJnk images in Dr. Ricky Malhotra's and powerpoint presentations on different projects, which were both stored on Dr. Malhotra's flash drive. In another powerpoint presentation on the flash drive, "RM.ppt", data appear similar if not identical to data in "Ricky presentation 06", except that the attribution of stresses is different for the identical gel excerpts in the two powerpoint presentations. A detailed analysis of Dr. Malhotra's excerpted gel images throughout his data (e.g. in Tif files and powerpoint presentations on his USB flash drive) is strongly recommended.

A draft of this report was sent to Dr. Malhotra with an invitation to comment by June 11, 2007. In a letter dated June 4, 2007, his attorney requested an extension on the comment period. In a letter dated June 6, 2007, from Associate Vice President and Deputy General Counsel Daniel Sharphorn, the University provided Dr. Malhotra extended the deadline to June 25, 2007. In a phone message for left for Daniel Sharphorn in June 22, 2007, Dr. Malhotra's attorney stated that there would be no response from Dr. Malhotra at this time.