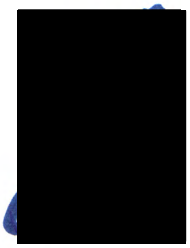

MINF 2201

Extra Credit Portfolio

Volunteer Location: College of Dental Medicine, Georgia Regents University
Contact: [redacted]

[redacted]

[redacted]

[redacted]

MINF 2201

Extra Credit

June 29, 2014

A Day in the Lab

I have had the opportunity to volunteer in a research lab in the Oral Biology Department at the College of Dental Medicine at Georgia Regents University that is involved in translational research. Translational research reinforces traditional classroom knowledge and translates it into actual practice. I found great gratification in being able to assist in experimental animal procedures, as well as analyze the data to test certain hypotheses, and I have come to realize the importance of data management in the conductivity of research.

Every day in lab was a new adventure for me. I would start off the morning with micro-CT scanning and end it with image reconstruction and data analysis. Some days I would work on a chemical inventory for the lab, while others I would help put together a presentation using the data I had analyzed earlier. Soon enough, I realized there was much more to research than meets the eye. From writing papers, to managing excel books, to editing presentations…all of which involved some sort of knowledge in microcomputer applications. One of the first questions I was asked on my first day of volunteering was whether I knew how to use Microsoft Office PowerPoint and Excel. I had had good experience with PowerPoint, but not so much with Excel. That was when I realized it was time to put my *Go! Office 2013* book to use.

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Micro computed tomography or "micro-CT" is x-ray imaging in 3D, which is the same method used in hospital CT (or "CAT") scans, but on a smaller scale with tremendously amplified resolution. It actually resembles 3D microscopy, where very fine scale internal structure of objects is imaged without harm. An x-ray source illuminates the sample and a planar x-ray detector records magnified projection images. While the sample rotates, a computer uses hundreds of angular views acquired to synthesize a stack of virtual cross section slices through the sample. You can then scroll through the cross sections, including sections along different planes, to inspect the internal structure. Selecting simple or complex volumes and regions of interest, you can measure 3D morphometric parameters and create realistic visual models for the sample. The micro-CT software automatically stores these parameters in Excel spreadsheets. My job then is to go in and find all those spreadsheets and import them into one compiled workbook and look for any trends in the data between the control and treatment groups. One important outcome of learning how to use Microsoft Office Excel was that it helped me spend less time gathering and plotting the data, and more time interpreting and evaluating the data, allowing me to be able to replicate, to evaluate, and to improve my techniques.

Graphs are a critical element in research. They are an effective way to communicate the trends in what may seem to the audience as pages and pages of numbers. Understanding how to generate the data in a spreadsheet and using it to graph the results was probably the most important aspect of my work because later on, those graphs were going to be presented to the research team who, without doubt, will ask for a detailed interpretation of the results.

Many times, you get to present unusual, exciting stuff. More often, you just have to present stacks of data. People make judgments about the quality of your work based on just your PowerPoint presentation sometimes, and that is exactly the case in biomedical research

particularly. After spending those long hours acquiring the data, it was time to present it. Starting with a descriptive title slide, to highlighting my results, to incorporating visual aid (such as images and graphs) and using animations in sequence as I reveal the whole story; all of this required a rather profound knowledge in Microsoft Office PowerPoint features. Although there are several different programs out there that serve the same purpose, PowerPoint happened to be the one we used in lab the most. I have come to especially appreciate the "notes pane" on each slide which tremendously helped me remember addressing certain issues that were not necessarily on the slide itself.

However, that is not all. Every presentation requires a manuscript, a summary or description of the project that is being presented. Knowing how to format scientific data in Microsoft Office Word was crucial. At present, the Introduction, Methods, Results, and Discussion (IMRAD) format is the most encouraged for the text of observational and experimental studies by the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals." Most authors use the two-column layout in their papers. The results paragraph usually incorporates tables in which the data is presented. The reference page was the most challenging for me. I had to make sure that all the references were cited in the correct format and order, and that the in-text citations corresponded with the correct source. One valuable feature I learned to use was the "track changes." As I completed my first draft, I sent the manuscript to my supervisor so she could proofread it and make any necessary changes. Being able to see the changes she made along with the comments as to why those changes were necessary helped me improve my writing style, while simultaneously preserving the originality of my script because I had the choice to accept or reject those changes. Once again, the time and effort I had previously spent learning how to use these different microcomputer applications actually saved me time on

the long run and made data management a much more effective process. Best part about it was being able to save the formats as templates for future projects, presentation and papers.

Another aspect of my project included microscopy. I became familiar with the AxioVision software accompanied with Carl Zeiss microscopes. All of the microscope settings and processing steps are adjusted quickly and easily in a single user interface. The functionality of this imaging toolbox expands constantly with a wide range of different modules that are tailored to specific applications or microscope accessories. For example, image acquisition allows you to produce two-dimensional images with a great depth of field or combined time-lapse and 3-dimensional fluorescence images in numerous dimensions. Interactive Measurement is another helpful tool which allows you to measure microscopic structures interactively; trace the contour of a cell nucleus with your mouse to determine its area; and count cells simply by clicking on them. You can perform a comprehensive and precise analysis of the cell in a single operation. For each tool you can also specify which measurement results are shown in your image. One very helpful feature is the Z-Stack. With this unit you can acquire your microscope images as Z-stacks. The resulting image stack contains valuable information about the relationship of structures in axial dimension and will be saved as one single ZVI-file. This is important when viewing a microscope slide with a sample that has different levels (depths) because the microscope, using this feature, will merge the best focus at each level to create one compiled image.

With this software, I was able to generate scaled, in-focus images which I used as visual aid in the presentation I mentioned above. This demonstrates how data management really is an integrated process that involves the utilization of different programs.

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MINF 2201

Extra Credit-Statement

June 30, 2014

Understanding the nature of biomedical research is far more than simply satisfying an academic requirement. Direct immersion in research leads to a more profound comprehension of, and appreciation for, the discipline under investigation. As someone who's interested in both research as well as a clinical career, I see translational research to combine the best of both worlds.

The project I am assisting in primarily focuses on determining the biologic mechanisms behind bisphosphonate-related osteonecrosis of the jaw (BRONJ), a devastating side effect of long-term, intravenous use of bisphosphonates. Bisphosphonates are used for treatment of cancer and other bone malignancy. My aunt is a breast cancer survivor and that is why I have keen interest in studying aspects that relate to her condition. The research team created an animal model and I was involved in characterizing it using various analytical techniques. I have learned to utilize Micro CT scanning to analyze the amount and quality of bone. I have also been involved in tissue processing for histology and histomorphometry.

What I really enjoy about research is that it requires critical thinking and self-learning skills in various fields that impact people's lives. It also provides an understanding of current medical problems and an opportunity to learn from professionals in the medical research field on the future directions of medicine. Above all, it allows me to cultivate the skill of investigating the mechanisms behind different medical conditions in way of finding new therapies, a passion of mine that got my mind set on a career in medicine.

TOTAL HOURS:		112.00	Course Info:	MINF 2201	Online	Student Name:	Asma Daoudi
Date	Time	Total Hours	Organization	Contact Person	Contact Phone Number	Activity/ Volunteer Duties	Reflection Notes
9-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab	[redacted]		Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
10-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
11-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
12-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
14-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
15-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
16-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
17-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
18-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
19-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
21-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
22-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
23-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.
24-Jun	9:00-5:00pm	8.00	GRU College of Dental Medicine Research Lab			Volunteer Research Assistant	Used Micro CT scanner, Atomic Absorption Spectroscopy (AAS), soft X-ray, and other experimental apparatuses. Analyzed data and worked on chemical inventory.

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6/27/14