

This summer vacation I went to McMaster University where I spent about one month on studying genetics in medicine under Dr. Jack Wang's directions. The wonderful trip not only increased my knowledge of genetics but also broadened my horizons so I appreciate that China Medical University and McMaster University offered me the chance to learn.

Introduction to McMaster University

Located in west Hamilton, Ontario, Canada, McMaster University is a medium-sized research-intensive university. McMaster comprises six faculties: Science, Health Sciences, Engineering, Humanities, Social Sciences, and Business. McMaster ranks as the 89th university worldwide and the 4th in Canada in the 2008 Academic Ranking of World Universities (1).



Fig.1 McMaster University

My Learning at McMaster

Dr. Jack Wang, an assistant professor in the Department of Pathology and Molecular Medicine, planned a schedule of learning for me at McMaster. During the four weeks, I participated in safety training and then studied genetics. He gave me four chapters and related papers to read. Also, I discussed with him one-two times in his office each week.

The First Week

According to McMaster, fire safety and bio-safety training are necessary for all students who may work in the lab. In the training, students learned how to take proper actions in case of fire or chemical spill and the correct usage of centrifuges and cabinets in the laboratory. Besides, we were asked to recognize WHMIS symbols (see Fig. 2) and get chemicals information from MSDS sites on the Internet. After the training, I began to study the human genome and chromosomal basis of heredity. I made a table to summarize the organization of human genome after reading the chapter (see Table1).

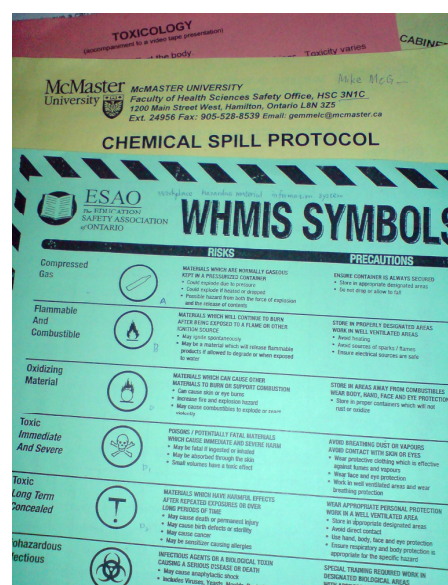


Fig. 2 Safety training documents

The Second Week and the Third Week

Firstly, I reviewed the structure and function of genes and chromosomes. Secondly, Dr. Wang explained the principle of the FISH experiment to localize a gene in the nucleus and the array CGH analysis of chromosome abnormalities by using PowerPoint presentation. Furthermore, I learned structural rearrangement of chromosomes and some abbreviations used for description of chromosomes and their abnormalities. For example, 46,XX,t(2;8)(q22;p21) means a female with balanced translocation between chromosome 2 and chromosome 8, with break in 2q22 and 8p21.

The Final Week

Dr. Wang presented me more detailed accounts of several chromosomal disorders and their causes, such as Prader-Willi syndrome (PWS). There are many causes of the disease: 15q11-q13 microdeletion, uniparental disomy (UPD) or a mutation at PWS-imprinting center. I learned “genomic imprinting” from studying PWS. Moreover, we discussed a pedigree which shows inheritance of PWS imprinting centre mutation (see Fig. 3).

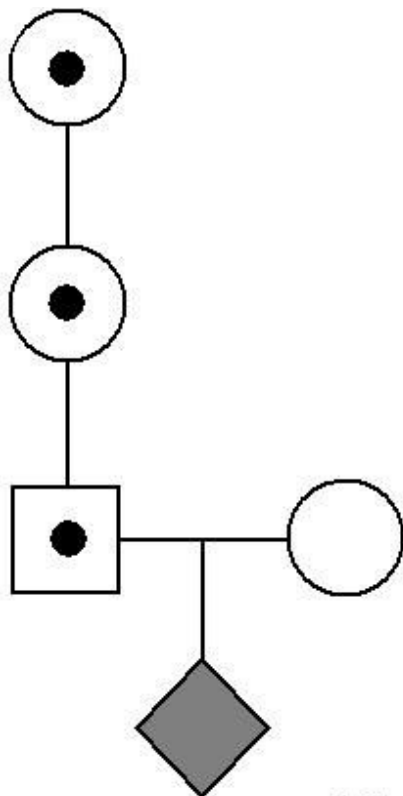


Fig. 3 The diagram shows that a mutation at PWS-imprinting center, marked by the dot, is transmitted silently by a carrier woman to her grandson. However, when the grandson passes the mutated allele, the imprinting centre will not be able to reset the maternal imprinting pattern and make it as a paternal imprinting pattern. And thus his child (diamond shape) develops PWS.

Table 1 Organization of the human genome

I Nuclear Genome	
●	Genes & gene-related sequences (unique or moderately repetitive)
☂	Coding DNA: exons
☂	Noncoding DNA
👂	Introns, UTR, promoters, enhancers, etc.
👂	Pseudogenes: processed, nonprocessed
👂	microRNA genes
●	Extragenic DNA
☂	Unique or low copy numbers
☂	Moderate or highly repetitive
👂	Tandem (clustered) repeats: satellite, minisatellite, microsatellite
👂	Interspersed: retrotransposons, DNA transposons
II Mitochondrial Genome	
●	Two r RNA genes
●	22 t RNA genes
●	13 polypeptide-encoding genes

Conclusions

The summer program created an opportunity for me to learn genetics. In fact, the chapters in the textbook of Medical Genetics I read are quite challenging, but interesting. I also found out that the more papers I read, the more problems I met. By discussing with Dr.Wang or searching information on the Internet, my knowledge about genetics increased little by little. I not only learned something new but also realized how little I knew in the past. I think I still have a long way to go. Besides that, the interactions with local students have also enriched experience. The trip to McMaster University undoubtedly had a tremendous impact on me.

References

1. Center for World-Class Universities, Shanghai Jiao Tong University, Academic Ranking of World Universities - 2008

My Trip to McMaster University



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