

Dr. Kenneth Kwong, Ph.D.

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By Xin He

During his undergraduate education at the University of California at Berkeley, Dr. Kenneth Kwong was interested in political science. In particular, he was attracted to social science, and thus worked in the local community on civil rights and anti-war efforts. Dr. Kwong's experiences made him more attentive to human development and freedom, and he began to feel the need to understand the physical world further. In a bold change of focus, he began studying physics at the University of California at Riverside.

After earning his doctorate degree in physics, Dr. Kwong began working at MGH on positron emission tomography. He realized, however, that tomography involved only studying energy. As Dr. Kwong wished to work in other fields of the hospital, he changed his focus to Magnetic Resonance Imaging, MRI, a field he knew very little about. Once again, Dr. Kwong started from the beginning, spending much time learning the technical foundations of MRI.

Dr. Kwong describes his change in interest from political science to physics, then in the field of physics from tomography to MRI, as a reflection of his lack of preparation and attention to his career development. He simply desired to be an honest, hardworking citizen of world, who contributed to society. In retrospect, however, Dr. Kwong does wish that he had more seriously considered his options early on. Nevertheless, taking sharp turns in the path of life led him to an ultimately successful career.

Dr. Kwong's work has been focused on functional MRI (fMRI), a branch of MRI. The technology is able to study changes in the various functions of the human body by studying and tracking hemoglobin, the intrinsic MR contrasting agents involved in these functions. His current work looks to developing MR techniques, such as silent MRI. In addition, Dr. Kwong is interested in learning about the functions of neurotransmitters like carbon dioxide.

Early in his career when the MRI field was still in its developing stages, an accredited scientist used MRI to show that high blood flow lead to high diffusion. Dr. Kwong found instead the high diffusion was really due to partial volume of CSF. Challenging authority during this point in his life was difficult, but necessary. We must have the integrity to interpret scientific data as they are, Dr. Kwong says, regardless of the implications they may have on prevailing ideas and knowledge. There was also a common belief that strokes in the brain lead to high diffusion values. Although the study done included only old stroke sites, it was assumed that there would be high diffusion values in fresh stroke sites as well. However, Dr. Kwong and Dr. Daisy Chien instead observed lower diffusion values in fresh stroke sites. One must be able to break with the established mode of thinking, states Dr. Kwong, before one can make advances in science and medicine.

Integrity in data interpretation of course first depends on obtaining such information through research. For students like us, finding a subject area in which to perform such research is the main task at hand. It is not easy to decide among the multitude of fields available to us and succeed in our line of work. Dr. Kenneth Kwong is optimistic for us hardworking students, however, for “fortune smiles upon those who work hard.”

Positron Emission Tomography (PET) research in Harvard-MIT HST:
Lab of Dr. Robert Rubin - <http://web.mit.edu/bcs/nklab/research.shtml>
PET Laboratory at MGH - <http://neurosurgery.mgh.harvard.edu/pet-hp.htm>

Dr. Kwong cited in:

“Major Advances in MRI”

<http://www.parisdeveloppement.com/index.php?id=993212415&langue=2>

“Biology of Behavior”

http://www.wi.mit.edu/news/archives/2004/cpa_0609.html

“Functional Magnetic Resonance Imaging,” *Trends in Neurosciences*

<http://airto.loni.ucla.edu/BMCweb/SharedCode/TINS/FMRI-TINS.html>

“New breakthroughs in what MRIs can see” in *US News and World Report*

http://www.acutestroke.com/usnews_mar98.htm

Dr. Bruce Jenkins, Ph.D.

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By Xin He

Early on in his life, Dr. Bruce Jenkins realized that he was indifferent to subjects in classes that did not interest him; thus, he decided his future would reside in an intriguing field – like science and technology. Dr. Jenkins found himself interested in the problems posed in biology, but not the memorization associated with it. At the same time, he liked that physics provided him with methods to solve problems. In a perfect solution, he majored in biophysics at SUNY Buffalo during his undergraduate education, then obtained a PhD in crystallography from the biophysics department at the Rosewell Park Memorial Cancer Institute. Soon after, he began working at MGH as a post-doctorate.

In graduate school, Dr. Jenkins had begun practicing stand-up comedy. He explains that humor and scientific research are similar in that they both require creativity. However, the former is mostly self-generated through one's observations of the world, while the latter is based on asking questions about the world outside of oneself. In addition, comedy has no rules, but there is a high risk of failure; in contrast, science is much less risky. Humor has helped him deal with rejection in life, as well as capture the attention of his audience during his scientific talks - as our seminar was able to confirm in class.

Dr. Jenkins's research involves using NMR spectroscopy to chemically analyze in vivo neurodegenerative illnesses like Parkinson's or Alzheimer's disease. He has also been developing new methods to use MRI in improving detection of drug stimulation on brain activity. For example, his lab used MRI to quantify liver iron levels in patients who suffer from overload of the metal. These measurements were then used by drug companies to test the efficacy of iron chelators in clearing the nutrient. He has most recently used MRI, which can also be used to determine the exact areas of the brain that drugs are targeting, in mapping brain activity. One of Dr. Jenkins' ultimate goals is to use MRI to increase our understanding of signal transduction mechanisms involved in neuro-vascular system interactions.

Over his years of research experience, Dr. Jenkins has noticed the development of the institutionalization of science, of research becoming an increasingly political issue. Since many scientists depend on federal funding, they must perform research in politically and socially popular areas of science. Scientists must get support from politically active organizations and people. On the one hand, this means scientists are forced to think about how their research impacts the tax payers; for example, diseases like AIDS have now become very well researched due to such publicity. Over-funding in these particularly areas may not be disadvantageous or detrimental to society, but it means that there are less resources available solving what many scientists consider to be more pressing problems. This is not to say it is impossible for scientists and students to study those issues that truly interest them. Compromises can be made, and there are ways to direct

the limited resources. It simply takes clarity of vision, dedication and perseverance to “cut through the bamboo to see the promised land.”

Yet before scientists can use their skills to do this, they must decide a field in which to study and work, then become aware of the specific problems and questions that need solutions. How exactly one can and should make these decisions is perhaps the most difficult question for students like us.

“Follow your bliss,” is the simple solution Dr. Jenkins gives to those of us fortunate enough to know where our bliss lies. For those who do not, like students enrolled in this particular seminar, there are practical solutions to finding where they are. He encourages us to consider our options not solely on the basis of subject area, but also the personalities of those in the field. Ultimately, Dr. Jenkins concludes, we will derive happiness not from the acquisition of material and egotistical rewards, but rather from that which come to us on a day to day basis.

Crystallography in Drennan Lab at MIT:

http://web.mit.edu/cld/welcome_files/welcome.html

IAP course on NMR: *<http://ocw.mit.edu/OcwWeb/Nuclear-Engineering/22-920A-Hands-On-Introduction-to-Nuclear-Magnetic-ResonanceJanuary--IAP-1997/CourseHome/>*

NMR spectroscopy at MIT:

Prof. Stephen J. Lippard - *<http://web.mit.edu/chemistry/www/faculty/lippard.html>*

Prof. Robert G. Griffin - *<http://web.mit.edu/chemistry/www/faculty/griffin.html>*

MIT/Harvard Center for Magnetic Resonance NMR Facility -

<http://web.mit.edu/fbml/index.shtml>