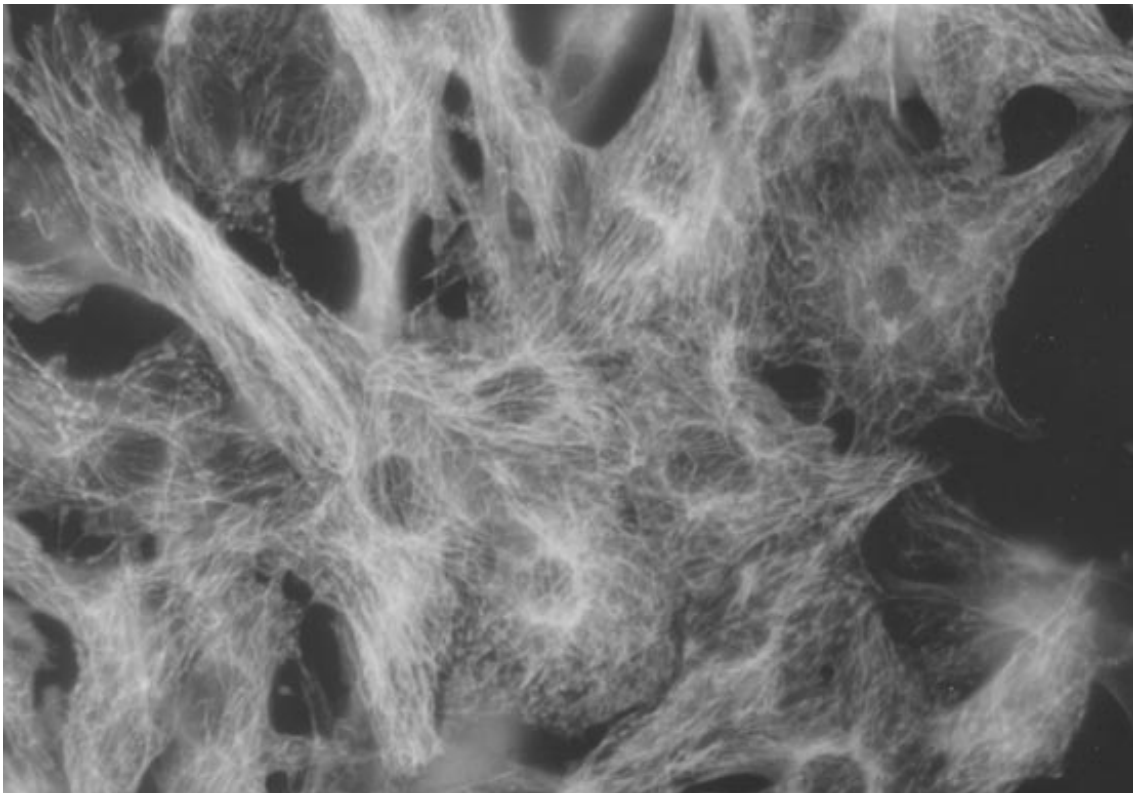


UIC Pre-Med Journal

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MEDICINE HEADING INTO THE NEW MILLENNIUM

■ Feature Interview

An in-depth interview with Dr. Edmund R. Donoghue, the Cook County Medical Examiner.

■ Should We Stay or Should We Go?

The pros and cons of graduating from college in three years.

■ Undergraduate Research

Get hints on finding a research position. Also, learn how to get published or recognized for your research.

■ Transplant Ethics

Ponder the ethics behind the organ recipient process.

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Editorial

Changes for the future...

Welcome to the final issue of the UIC Pre-Med Journal before the year 2000. The Journal has undergone significant change in organization, layout, and readership. First, the UIC Pre-Med Journal now has a larger staff including more Consulting Student Editors as well as Staff Writers. We are also very fortunate to have Professor Lon Kaufman from the Biological Sciences department join our staff as a Consulting Faculty Editor. We are working hard to make your reading experience a more pleasant one, and have now divided the Journal into various themes or sections including News, Features, Ethics, Research, and Pre-Med Exclusive. We are hopeful that this layout and organization will satisfy our current readers as well as attract new readers. Our readership has been ever-increasing since the first issue, and this year we will be printing a significantly larger quantity thanks to the growing support of the Honors College, College of Medicine, Biological Sciences Department, and the Chancellor's Office.

We remind our readers that if they ever have ideas for articles, comments on current articles, or just general questions that they can write to us via e-mail at premedj@uic.edu, submit feedback via our website at <http://www2.uic.edu/orgs/premedj> and of course old-fashioned snail mail at our mailing address.

The future has even more improvements in store for the Journal, and with your patience and support the Journal hopes to identify and meet the needs of students which is our paramount duty and responsibility.

In this issue...

Our News section presents four articles that have a wide range of implications that remind us that the changes in our approach to medicine and healthcare system are happening faster than we ever imagined. The success of the human genome project is a testament to modern technology and the relentless effort of scientists around the world to solve the puzzle of what makes us who we are, at least in the strictest biological sense. Talks of mergers abound at health care centers from the West Coast to the Midwest, and from an impending end to the UCSF Stanford merger to talks of a new UIC RUSH merger the Journal is happy to give you a glimpse of the issue at hand. And, from there we return to the realm of modern technology and the accomplishment of John Hetling's Artificial Silicon Retina project; \$6 million man, maybe not, but hope for the future, most definitely. Our news closes with a intriguing and well-written article on the effect of politics on medicine, a must-read with the looming Presidential elections.

The United States enjoys (well not according to many students at least) one of the longest educational tracks for students pursuing a professional medical degree. Whereas many foreign

countries have medical education tracks at 6 years, American students spend a traditional 8 years from college through medical school. Our first features article looks at the growing trend of students completing their undergraduate education in three years, and the varying reasons behind, "should we stay or should we go?" And with the question of having younger physicians comes the question of maturity, our next features piece looks at the value of professionalism among medical students. Continuing along, we find a perfect example of professionalism in medicine in Dr. Edmund R. Donoghue, Cook County's Chief Medical Examiner who gives the Journal an exclusive interview.

Our Ethics section provides a thought-provoking look at the organ donation system and the ethical and moral dilemmas that can arise. I invite our readers to read this article, and send in their thoughts in light of the questions, both direct and indirect, the author raises about this serious issue.

The research section in this issue is packed with informative articles on gene therapy and undergraduate research opportunities, not to mention an invaluable list of resources available online to students interested in research.

Perhaps the section most popular among our pre-med readers will be the Pre-Med Exclusive. Our readers are offered a brief look into alternative careers to medicine in a continuing series provided by our Pre-Med Exclusive editor. A student contributed article describes a first-hand account of spending time in an operating room, and how it proved to be instrumental in this persons pursuit of a career in medicine. So, once you have decided that medicine is your calling, one of our other editors provides you with a look at various combined degree programs at UIC. The guide is very helpful in understanding how the programs work, what they are useful for, how to apply, and some programs for the future.

Finally, UIC has gone through a lot during the past few months. We are a campus that is growing and a University that is evolving and adapting to the changing demands of our community. Unfortunately, the pursuit of success is not always without challenge, and UIC faced such a challenge in the form of a temporary shutdown of our research on human subjects. This was both a learning experience and a reminder of our duties and responsibilities to patients, research subjects, and each other. Circumstances may have resulted in specific people taking responsibility, but the problem was not the cause of one person, so if responsibility was taken, it is our duty to reinstate not only our research program, but to also reinstate our commitment to the community in the image of a Research I university that puts compassion, ethics, and responsibility first for anyone who entrusts it with its education or medical care.

News

Human Genome Project

Michael Hofkamp

News Consulting Student Editor

One of the most exciting endeavors in science today is the Human Genome Project (HGP). Initiated in 1990 as a joint venture between the Department of Energy and the National Institutes of Health, the HGP has five main goals, according to its website. The goals are listed as "identify all the estimated 80,000 genes in human DNA, determine the sequences of the 3 billion chemical bases that make up human DNA, store this information in databases, develop tools for data analysis, and address the ethical, legal, and social issues (ELSI) that may arise from the project," explained the website (http://www.oml.gov/TechResources/Human_Genome/home.html).

Since 1990, the HGP has made substantial progress towards these goals. An updated progress report was provided by the website. "Based on experience gained from the pilot projects, an international consortium now predicts they will produce at least 90 percent of the human genome sequence in a 'working draft' form by the spring of 2000, considerably earlier than expected," said the website. Vice President Al Gore praised the progress of the HGP. "I am extremely pleased that the Human Genome Project has accelerated efforts to complete one of the most important scientific projects in human history - unlocking the secrets of the genetic code. The Project will forever change how we understand the human body and disease, leading to improved prevention, treatments, and cures for what are currently medical mysteries," said Vice President Al Gore, as quoted by the website. "Specifically, I am thrilled that we are moving into full scale sequencing and are on track to complete a working draft of the human genome a year and half ahead of schedule. I want to commend the scientists that have dedicated themselves to moving forward on this project that will improve health care for millions of Americans," Gore said, as quoted by the website.

The website describes the international consortium working on the HGP as currently including "three U.S. laboratories funded by the National Human Genome Research Institute (NHGRI) of the National Institutes of Health (NIH), the Joint Genome Institute of the U.S. Department of Energy (DOE), and the Sanger Centre supported in the United Kingdom by the Wellcome Trust." The goals of this consortium are "to produce a working draft covering at least 90 percent of human genome sequence within one year," said the website. The website explained how this was to be accomplished. "The sequencing strategy involves determination of the sequence from mapped segments of DNA from known locations in the genome. These data are then assembled in overlapping

stretches that reflect the accurate orientation of the DNA in the genome," explained the website. The consortium reports that a "working draft" should be completed by the Summer of 2000 and a final copy sometime in 2003.

Merger Talks, New Trend?

four universities, two merger talks, one falls through, the other springs up...

FOR IMMEDIATE RELEASE

October 28, 1999

Contact: Mike Lassiter

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Stanford Ends Merger

UCSF Chancellor J. Michael Bishop has announced that the campus learned today of Stanford University's plan to withdraw from the two-year-old merger of the universities' hospitals and clinics.

Bishop stated that he expects a cordial dissolution process and emphasized that operation of the UCSF Medical Center will continue seamlessly, with no interruption to patient care services.

The financial recovery plan for clinical services at the campus will continue, including the transfer of all inpatient services from UCSF/Mount Zion to the UCSF Medical Center on Parnassus Avenue and the development of UCSF/Mount Zion as a comprehensive Cancer Center and outpatient services hub.

The reconfiguration of clinical services at Parnassus and Mount Zion is necessary to preserve the financial stability and the quality of health care provided at UCSF with or without the merger.

The Hunter Group will continue to manage the UCSF hospitals pending the development of a long-term plan, Bishop said. In remarks to the campus community on Wednesday, Bishop said, "With or without the merger, UC and Stanford hospitals face continuing financial pressures that can only be addressed by stringent management and improved revenues. I am confident that we will eventually prevail in this struggle. We have a resourceful staff and faculty, along with the strong backing of the Board of Regents; and we offer world class health care, a fine product for the market place."

For talks of a UIC merger with RUSH please see Chicago Sun-Times Article, "West Side medical centers consider merger" by Stephanie Zimmerman at: <http://www.suntimes.com/output/news/med30.html>

News

UIC Researcher Hopes to Make the Blind See

Rachel Snyder

Office of Public Affairs

The first motion picture images — even before Cecil B. DeMille's snowy classics — were hazy, black and white visages of movement, not unlike the images John Hetling anticipates blind persons may see if the retinal implants he is studying turn out to be as successful as initial laboratory tests suggest.

Hetling, a neural engineer who joined the burgeoning, five member bioengineering department last year at the University of Illinois at Chicago, has worked on the Artificial Silicon Retina (ASR) along with inventor-brothers Alan and Vincent Chow of Optobionics Corporation, since he was a graduate student at UIC.

While not intended to treat blindness caused by trauma, the ASR is currently being tested for use in patients who have lost their sight to retinal degenerative diseases such as retinitis pigmentosa (RP) and age-related macular degeneration (AMD), the two most common causes of blindness in the U.S.

"The first human clinical trials, which will hopefully be conducted here at UIC, will be very exciting. One frustrating aspect of the animal studies done so far is that we can't ask the animal what it sees after the ASR has been implanted," Hetling says. "Even if there's a definite visual sensation it will likely be very crude, and our next step will be to improve the device. In order to make these improvements, we have to understand this new artificial bioelectric interface, and that's the goal of my research."

Hetling and the team at Optobionics anticipate that the ASR may eventually allow a previously blind person to read large print in a well lit room, though the dynamic range of light perception will be significantly less than biological retinas and images will not be in color, although this may be a possibility in the future.

Hetling's work is representative of a new trend in bioengineering research and development toward biocompatible synthetic materials to "hot-wire a bad nervous system," as Hetling puts it.

"Until recently, the engineer couldn't do much more than just take physical measurements, or implant electrical or mechanical assistance devices," said Richard Magin, head of UIC's Department of Bioengineering.

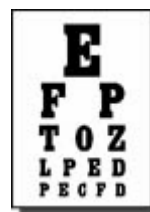
"But now you can design specific genetic materials, you can design proteins that have specific function. This results in the ability to launch a much broader attack on a medical problem."

While several other approaches to curing blindness due to retinal degeneration are being investigated, like gene therapy, pharmacological medications and transplantation, Hetling believes prosthetic devices will be the first viable treatments. "There are no external connections or batteries," he says. "Ours is a prosthetic device powered by light naturally entering the eye. The simplicity of the device is one of its greatest strengths."

The prosthesis, if approved by the FDA, will be implanted beneath the retina in the eye, where it will replace the function of the photoreceptor cells lost to disease. The great advantage of this approach, according to Hetling, is that the ASR

makes use of the part of the retina spared by the disease. Hetling's team hopes to have the implants in human volunteers within two years.

"The real excitement is what's going on in the field of bioengineering that allows devices like the ASR to move into the realm of real-world applications."



"The real excitement is what's going on in the field of bioengineering that allows devices like the ASR to move into the realm of real-world applications," Hetling commented. "Our ability to study and design interfaces at the molecular level has really thrown open the doors to a lot of new potential applications, like biochips to rapidly screen for potential new drugs and DNA sequences, biosensors that use living neurons to detect environmental chemicals, hybrid-device biocomputers for rapid parallel processing, and neural prosthetics, like the ASR." The UIC Department of Bioengineering is establishing a major research and curricular focus in interfacial molecular bioengineering, recruiting top faculty and developing exciting new courses in Bioinformatics and Genomics, Cell and Tissue Engineering, and Neural Engineering.



News

Effect of Politics on American Medicine

David Boren

Consulting Student Editor

For the past two years, I have been asking myself an old question, "What role do politics play in American medicine?" Although specifically identifying the effects of politics may pose a challenge, politics have in recent years played an increasingly significant role in determining the course of medicine. Responding to this influence, I asked political science professor Gerald Strom to give his opinion on various political issues that affect the field.



Strom says of the possibility of centralization that "According to our understanding of American politics, [it is not] likely without some major event or problem, a disaster or something...."



Bill Clinton's 1992 attempt to centralize American medicine probably illustrates the most controversial example of politics in medicine. Ever since World War II, every Democratic Presidential campaign, with the exception of Clinton's 1996 effort, has proposed a national health service. Yet, such a proposal has always failed, and, even though both the executive and legislative branches were mainly Democratic in 1992, Congress badly defeated the proposal.

Professor Strom explains the phenomenon of this defeat by reminding me that a fundamental change in our health care system would require incremental, as opposed to sudden, reform. He uses as an example of incremental change HMO reform in which people who are denied treatment seek recourse in writing to their congressmen to complain. In creating alternatives for the patients, such as an independent review board or the right to file lawsuits, Congress would move the system in such a direction.

"The other thing to think about is that all the action is not in Washington," Strom notes; states pass, for better or worse, new legislations. Depending on the successes of the legislations, the Federal government may choose to adopt such laws. California, for example, recently passed an HMO law that allows patients the right to litigate. Depending on the success that the state finds with this law, our nation may adopt such legislation.

Given that the American people have not complained about the miserable defeat of the plan, it seems questionable whether or not the U.S. will adopt such a policy in the near future. In agreement, Strom says of the possibility of centralization, "According to our understanding of American politics, [it is not] likely without some major event or problem, a disaster or something (e.g., major HMOs going out of business or many people dying because they weren't covered)."

Although socialized medicine does not stand as an immediate issue, the debate over whether Medicare should, as Clinton and Gore recently proposed, pay for prescription drugs draws much controversy. This issue poses a dilemma; the money can be spent for drugs, education, or crime fighting. "A significant factor here is politics and what old folks want. One thing about old folks is that they vote in substantial numbers and there are getting to be more and more of them all the time as the population ages. Politicians respond to voters so my guess is that if the old folks want it, drugs will be paid for," Strom predicts. Using the same reasoning that he uses to predict the possibility of socialized medicine, he denotes that any changes in Medicare will likely start as small programs and subsequently grow. Medicare may, for example, cover all drugs patients greatly depend upon in order to stay alive and later add less crucial drugs.

Just as the payment for prescription drugs causes debate, so does the talk over copays and deductibles. While some argue that copays and deductibles eliminate abuse of insurance, they prevent the consumers from using medical services. Professor Strom responds that if people abuse the system (e.g., seeing doctors too often), then copays will probably correct the overuse. "Essentially," he observes, "[copays] are rationing devices. You only have so many resources and if you want a more equitable distribution of services, some form of copay is a good idea."

As for other issues that need to be brought to national attention, Professor Strom comments that infinitely many can be addressed. He responds, "What an open-ended question. The answer is yes, but what? Remember, in politics, there are not right or wrong answers, just answers. Who gets what, when, and how is largely determined by who is willing to put the resources into getting [attention]." Accordingly, politicians try to respond in ways that please their voters.

Although many people agree that politics have profoundly influenced medicine, very few people will agree on where the future lies. As Professor Strom notes, people who directly benefit from a decision will likely hold a different view than people who pay costs for the decision. Medicine affects everybody, but due to varying interests, consensus will seldom exist.

Features

Should We Stay or Should We Go?

Pooja M. Jain

Staff Writer

Medical school seems like a fascinating venture, at least to desirous premedical students. This desire, however, sometimes causes them to leave their undergraduate career, some would say, prematurely. Does finishing undergraduate study in three years hinder premed students in their quest for medical school? Or rather, does it allow students to pursue other areas of interest before dedicating themselves to their future profession? Is there really a significant difference between three years of college and the standard four years?



"I chose to graduate in four years in order to enjoy my time before medical school. I realize how much work and effort medical school is and I wanted the opportunity to take music classes, literature classes, and complete a philosophy major without doing summer school. I enjoyed the time to grow into myself and become developed as a person before entering medical school."

Nisha Chhablani-4th year

The faculty definition of the "essence" of a college education is defined in the standard course requirements: the humanities, social sciences, natural sciences, proper written and oral expression in English and a foreign language, and exposure to another culture through the cultural diversity class. Do all of these course requirements really complete the whole college experience? These are only the most objective part of a student's education, the part that can be graded to assess a student's progress in school, but what of the social maturation process that can occur during these four important years?

According to Dean Emanuel Pollack, LAS's Associate Dean for Student Affairs, college is a time of maturation, and a time to experience social interactions, as well as a means to increasing knowledge. Premed students who graduate in three years are literally missing 25% of the traditional college experience. According to him, they must be sacrificing something or missing some opportunities in that year that would enhance their college experience and, more importantly, their whole life. Dean Pollack's greatest concern with premed students is that they are in such a rush to complete

their undergraduate education and enter medical school that they neglect to fully understand all that medical school entails. He states that there is very little time for extracurricular activities, and "free time ceases to exist" once one is engaged in medical school. However, he also states that there are certain economic advantages to graduating early. For example, a student does not have the financial burdens of the extra tuition and housing expenses of the fourth year. The student is also "jump starting" his or her professional career. In finishing in three years, the student lacks the opportunity to pursue other interests such as: internship, study in another academic field, work experience, or study abroad. The advantages and the disadvantages, as with any other decision, depend upon the individual. Some students may feel that they are mature enough to matriculate into medical school, while others may want the experience of a final year in college. With such contrasts in views, it is difficult to reach a clear decision about the final year in college. For more information, we now turn to the Director of Special Academic Programs, Mary Glenn Wiley.

According to Mary Glenn Wiley, college is composed of the "intellectual aspect" and the "social maturity aspect." She states that students who complete school in three years lack a "breadth of education." In college, there are more interactions between students of different vocation, whereas in medical school, students all have the same goals. According to her, medical schools want students who are well-rounded individuals. Although this can be accomplished within three years, her viewpoint is that it is not very likely. Medical schools tend to look for the following qualities besides academics: leadership, service, social groups, and activities. Her opinion is that it will be more difficult to encompass all of these characteristics without the full undergraduate



"I think I've accomplished everything that I've wanted to during undergrad, such as study abroad, active participation in a student organization, and involvement in research. My advice is to do it in three years only if you are confident that you have done everything that you wanted to. Don't ever feel the pressure to do it just because everyone else is doing the same thing."

David Limsui-3rd year

Features

experience. Mary Glenn Wiley also speaks of graduating in the typical four years and then taking another year to pursue studies abroad through scholarship. One such example is the Fulbright Scholarship, which allows a student to study anywhere in the world for a full year. Her condition for this, however, is that whatever time is spent in the "year off" should be spent in pursuit of a medically related field. Her advice to premed students is the following: "Don't sacrifice the breadth of your education to get through in three years."

There are many different things to consider when making the decision to finish undergraduate studies in three or four years. Although advice may come from all directions, the ultimate opinion is that of the premed student himself. The student needs to weigh the advantages and disadvantages and decide which path is best suited for him. Hopefully the path taken is the right one.



"Medical schools are not impressed by three year graduates. They want "interesting people" and they don't think that three years is interesting enough."

Ajay Nemani-3rd year



"I am going to graduate in three years and take the full fourth year to enjoy my freedom before medical school, whether it be to study abroad, complete a masters degree, or to get involved in research."

Sarah Pae-1st year



"The financial issues of modern medicine make choosing and pursuing a career in medicine difficult. By completing undergrad in three years I have significantly improved my financial situation by eliminating costs from one year of schooling and being able to pay back incurred loans sooner."

Ashish Sud-3rd year



"Graduating in four years allows one more time to take classes and widen knowledge in their own areas of interest as well as other academic fields. Being a physician requires constant attention and dedication to medicine, so the fourth year presents one of the last opportunities to experience college life before taking a new step into the future."

Davina Singh-2nd year

Features

Value of Professionalism to Med School Students

Dushyant Sharma

Consulting Student Editor

In a September 1999 article published in *The Journal of the American Medical Association*, Kenneth M. Ludmerer, MD of the Washington University Department of Medicine discusses the issue of professionalism and how it is conveyed to medical students around the country. Dr. Ludmerer states that professionalism consists of three essential characteristics which are:

expert knowledge, self-regulation, and a responsibility to place the interests of the patient in front of those of the practitioner. There has been a stir of conversation in recent years about this important issue. The American Board of Internal Medicine offered a definition for the 'core of professionalism' as 'constituting those attitudes and behaviors that serve to maintain patient interest above physician self-interest.'

In today's managed care society, it is often difficult for physicians to show professionalism as defined previously. It seems that a larger interest is placed on keeping costs low rather than truly serving the patient. "Some managed care organizations have even urged that physicians be taught to act in part as advocates of the insurance payer rather than the patients for whom they care." This clearly violates the third characteristic of professionalism because it urges physicians to put monetary interests in front of patient interests. It is likely that this type of situation will curb any efforts made by physicians to act in a professional manner since the interests

of their employing organization will begin to overtake patient interests.

Dr. Ludmerer describes the efforts of US medical schools to instill values of professionalism in their students early in the medical school coursework. One hundred and four out of one hundred and sixteen US medical schools responding to a survey by JAMA claim that they have "formal instruction related to professionalism." There was a lot of variety in how this instruction is carried out. Some of it was conducted through a simple ceremony for graduates and some schools reported that there are actual courses present which address this issue. Even though the responses showed that there is no set standard for instilling professionalism in medical students, all the US medical schools surveyed agreed that there is "the

need to address professionalism as an essential element of the education of their students."

Dr. Ludmerer also states that public opinion about the medical industry and physicians has been quite negative for more than thirty years claiming that physicians are "impersonal, self-serving, greedy, and occasionally dishonest..." All this despite the fact that medical schools have attempted to keep



instruction on professionalism going. Dr. Ludmerer refers to an article by Dr. Epstein in which the writer claims that "values are absorbed from role models as well as learned from didactic teaching."

The question of how professionalism can be instilled in medical students still remains open for discussion because there are many factors to be considered in the debate. Should medical schools be required to have some kind of official coursework to address the preservation of professionalism in a post medical school managed care dominated environment? Also, it is important to realize that limiting commercialization in the medical industry and switching over to a more service based environment will be essential in order to allow physicians to act as professionals.

Features

Interview with Dr. Edmund R. Donoghue, MD - Chief Medical Examiner of Cook County, IL

George Nijmeh

Editor-In-Chief



Background

Dr. Edmund R. Donoghue, MD
Chief, Office of the Medical Examiner
of Cook County

Medical School

Medical College of Wisconsin,
Milwaukee, 1970

Post-Graduate Training

Medical Internship, Residency in Anatomic Pathology
Mayo Graduate School of Medicine
Rochester, Minnesota, 1970-1973

Residency in Forensic Pathology
Office of the Medical Examiner of Wayne County
Detroit, Michigan, 1973-1974

Residency in Forensic Pathology
Armed Forces Institute of Pathology
Washington, D.C. 1974-1975

Professional Affiliations

American Academy of Forensic Sciences, Fellow
National Association of Medical Examiners, President-1999
American Society of Clinical Pathologists
College of American Pathologists
Illinois Pathology Society
Chicago Pathology Society

When most students enter medical school they are focused on a limited number of specialties. Few medical students know much about the field of pathology or the duties of the medical examiner, a doctor whose role begins after a death occurs. A medical examiner is a MD who is generally referred to as a forensic pathologist. It is the role of the medical examiner to discover the cause and nature of questionable deaths. This field of medicine may appeal to those with an interest in forensic science or uncovering mysteries.

A medical examiner investigates deaths which are sudden, unexpected, or due to violence. They investigate homicides, suicides, accidental deaths, and natural deaths which occurred out of the attendance of medical personnel. They also investigate deaths which occur in jails or to people while they are in the custody of police. Their investigation aims to locate and identify the circumstances and causes which resulted in the death. Medical Examiners also play a large role in protecting the public health when epidemics or large disasters occur.

A recent interview with Chief Cook County Medical Examiner, Dr. Edmund R. Donoghue, MD, helped illuminate everything involved in this medical specialty. Most students generally do not know what the medical examiner does. This was also the case for Dr. Donoghue who did not discover his immense interest in this field until his second year of medical school. During this year, he was told he would have a week of lectures in forensic pathology and since he had no idea of what the field involved, he went to the library and researched it. He found it sounded interesting, and he was further motivated to go into this field the following summer when he did a 10-week fellowship in the Baltimore, Maryland Medical Examiner's office.

Dr. Donoghue then completed the post-medical school training required to get into this field. The minimum amount of training required would be two years of training in anatomic pathology and two years of training in forensic pathology. Some people also decide to get trained in clinical pathology. Key differences exist between a focus on anatomic, forensic, or clinical pathology. Anatomic pathology deals with the performance of autopsies and the examination of tissues removed in operations. Clinical pathology focuses on the management of the laboratory, and forensic pathology is a sub-specialty which is concerned with determining the cause and manner of death. After these four years of pathology training, a fifth year in clinical medicine or research is also required. Thus, it is common that residency would follow 4-

Features

5 years of pathology training. Currently there are 400-500 practicing forensic pathologists in the United States.

Dr. Donoghue's advice for any undergraduate who feels they may be interested in this field is that, "They should concentrate on their studies. They should also pay attention to all their other clinical rotations [psych., pediatrics, etc.] because everything one learns will be useful to a forensic pathologist, as they are some of the few remaining general practitioners." Dr. Donoghue also feels that someone who desires to become a good forensic pathologist must possess three key characteristics: wisdom, courage, and humility. The role of wisdom is that one must possess a good educational background as well as an understanding of human nature. The courage comes in when one must make tough decisions in cases such as homicides and suicides which, undoubtedly, will not please everyone. The third trait of humility helps one to keep their position in perspective. In the position of a medical examiner, one may receive a lot of attention, but the examiner must keep in mind that this attention is due to interest in the case and not necessarily in the qualities of the examiner himself.

As a medical examiner, one must work together with the four major branches which constitute most forensic pathology departments. The section of pathology is the branch of professional people and the people who perform the autopsies. There is also an investigative branch which gathers and researches information on specific cases. The next branch is made up of the toxicology laboratories which perform analyses for drugs, poisons, and other substances in bodily fluids and tissues. The final branch is that of the administrative clerks who type up autopsy reports and maintain records and payrolls.

As Chief Medical Examiner, Dr. Donoghue must work with all these branches in order to conduct his daily duties. His duties vary greatly from day to day. However, in a typical week, he usually supervises new residents and teaches them the procedures and philosophy of the office in performing autopsies. He also has many administrative meetings and ceremonies which he must attend. In addition, he teaches at the University of Illinois at Chicago College of Medicine and does trial practice demonstrations at various law schools. Dr. Donoghue also performs autopsies and goes to court to testify in homicide cases. A lot of interaction occurs between the medical examiner's office and the legal system. It is important to learn the victim's situation and history from the law enforcement officials so they may determine possible diagnoses and legal issues. They also work closely with prosecutors and public defenders. A medical examiner ends up testifying in about 10 percent of homicide cases they do, and they never know which ten percent it will be.

A medical examiner encounters homicides as well as various other types of cases. There are many difficult cases they

come across. In Dr. Donoghue's opinion, "Some of the most challenging cases to ascertain causes of are asphyxia deaths (where the oxygen supply is cut off). This is because there aren't many pathologic changes and you must rely on external injuries or circumstances in making your diagnosis." Over his career, Dr. Donoghue has been involved in many substantial and notable cases in the Chicago area. He performed the autopsy on comedian Chris Farley who died of a drug overdose. He has also worked on many Illinois area airplane disasters, including the crash of American Airlines flight 191, the largest plane crash in U.S. history. He also handled the cases in the Paxton hotel fire and the recent train crash in Bourbonnais. In addition to mass disasters, he has taken part in public health emergencies. For instance, the Medical Examiner's Office played a key role in the investigation into the 1982 Tylenol cyanide poisoning cases which attracted worldwide media attention. More recently, the Medical Examiner's Office covered the more than 800 deaths which resulted from the heat wave of 1995 and the 110 deaths which resulted from the heat wave of 1999. Dr. Donoghue stated, "The deaths of 1995 were unexpected because prior to that Chicago hadn't had a serious heat wave in forty years."

The heat related deaths of 1999 first came to Dr. Donoghue's attention because of the large number of deaths that came into the office. On an average day, the Medical Examiner's Office covers 17 deaths. On a Friday in late July, Dr. Donoghue called into the office at 11:00 P.M. and was told everything was OK. However he was contacted at 2:00 A.M. by the office, and told that 17 cases were brought in during just the last three hours. This was a clue that there was some sort of public health emergency. By the time he got in the next morning, there were 42 cases, and since the heat index was at 119° F and they had a similar experience in 1995, they realized they were having another heat epidemic. Dr. Donoghue was gratified that his employees knew what to do, and thus his role was simply to supply resources such as refrigerated trucks to accommodate all the bodies and to gather enough manpower to transport the bodies. The characteristics of heat related death includes mental confusion, a body temperature higher than 106° F, and elevated liver and muscle enzymes in the blood. In cases where such symptoms could not be assessed, heat related death diagnoses were based primarily on the exposure to high temperatures in homes which were reportedly found with closed windows and doors and with no air conditioning or fans.

Many cases resulting from violent deaths also come through the Cook County Medical Examiner's office. Dr. Donoghue feels a lot of the deaths represent a loss of the sense of value placed on life. He reports many cases coming in of young lives wasted due to gang and drug activity. Some medical examiner's offices have also noticed this problem and have

Features

implemented programs where violent youths are brought in to witness everything that goes on in homicide cases in order to scare them and deter them from committing such crimes. However, Dr. Donoghue is in strong opposition to such programs. He feels that such programs can be disruptive to the office or even backfire by desensitizing an individual or by giving them clearer ideas of how to commit murders. He also feels it contributes to the stigma and irrational fears that already surround death. Dr. Donoghue wants people to understand that, "The Medical Examiner's Office is not a frightening, morbid place, but rather a place of science where information is collected that is very useful to the living."

10th Annual AIDS WALK

Sarah Pae

If you didn't participate in Chicago's 10th annual AIDS Walk, then you missed out on a great day packed with exciting moments! On this past September 26, 1999, over 100 dedicated walkers from UIC joined forces and participated in a 10K walk to raise money for AIDS. The fun-filled day began early in the morning at eight a.m. when groups such as the Honors College, The Society of Future Physicians grouped together at the CCC. Half of the people showed up groggy-eyed, their bodies unfamiliar with the concept of waking up before noon on a Sunday morning, but they were soon awakened by the bumpiness of the shuttle buses, complimentary of UIC. The shuttle busses then took the walkers from the CCC to Grant Park, where everyone partook in a complimentary continental breakfast. Following the snacks, the participants registered for the Walk, and turned in their contributions to the fundraiser. And if it was your lucky day, you even got a free T-shirt generously donated by the UIC hospital administration. But perhaps one of the best parts of the walk was the live performance of "Seasons of Love" by the cast of "Rent", done for the participants. The music inspired the participants and by ten A.M., it was time for the actual AIDS Walk to begin. The dedicated participants walked 10 kilometers down the lakefront, beginning by the Shedd Aquarium and ending at Navy Pier. With the shimmering blue lake, shining sun, and spectacular skyscrapers next to them, the meaning of a nice Sunday morning stroll came to life. Senior Bojan Petrovich described the AIDS Walk as "a good chance to bond with friends, see the Chicago skyline, and raise money for a good cause." And by the end, the walkers not only felt physically invigorated by the walk, but they also ended up with that warm, fuzzy feeling you get when you know you did something good for others.

Approximate Yearly Statistics for Cook County Medical Examiner's Office	
Death Certificates Issued	8000
Bodies Brought In	5000
Autopsies Performed	4000
Homicide Cases	1000
Suicide Cases	500
Accidents	1500
Natural Deaths	1000

The one image that remains in the mind of participant Tyler DePew is a sheet of cloth signed by many of the people at the AIDS Walk that had been affected by the disease in one way or another. "Just seeing all the signatures and personal messages on the cloth really hit home and reminded me of why I was at the Walk". Senior Rajeev Garg said, "Even though the 10K walk was long, just making it to the finish line made it all worth it and made me feel like I made a difference." And what a difference all the participants made by raising a total of about \$1.5 million for the AIDS cause. In Illinois alone, there are 43,716 total AIDS and HIV cases reported, and Illinois ranks 7th in the nation with total AIDS reported cases. All in all, the AIDS Walk was another successful event that UIC participated in, and hopefully, the turnout from UIC will be even greater at the 11th annual Aids Walk.

Ethics

A Matter of Life and Death

Shuchi Patel

Staff Writer

In the various rooms on the third floor of the hospital lay three individuals, each with their own story, yet all linked through the common need for a kidney. In room 356 is 27-year-old Jane who suffered from kidney failure 3 years ago and has been on dialysis since then and is waiting for a transplantation to avoid the unfavorable and restricted lifestyle that dialysis causes. A few rooms away is 16-year-old John who ingested ethylene glycol, antifreeze, and now needs a kidney. Lastly, in the small corner room is 72-year-old Isabelle who has exhausted all her options and her last hope is transplantation. Unfortunately for you, you have received only one kidney from an accident victim and now you have to decide who will receive the kidney. How do you decide?

Currently the standard procedure for receiving organs involves being placed on a waiting list, and this puts the patient in a Catch-22 situation. The patient has to be sick enough to need the transplantation, yet he/she can't be so sick that the procedure is not believed to be favorable. This limits the time period during which one is eligible for a transplanted organ. Wouldn't it be wiser to put the patient on the list before his/her condition becomes critical? Shouldn't Jane at least be able to be on the list even though her condition is not critical but she wants to improve the quality of her life? Obviously the degree of the illness shouldn't be the only aspect that is considered when being put on the list and when being considered as a top candidate for transplantation.

A logical alternative factor to consider would be age. Similar to the wide range of ages that were given in the hypothetical situation above, this is the range on the waiting list. Currently, society stresses no age discrimination which sounds fair, but then, are there situations when it is fair to show discrimination? Should all ages be equally eligible for the organ? Is it not fair to say that the children have their whole life ahead of them? But is equivalent to saying that the elderly have no rights and that they do not want or deserve a longer, healthier life?

So if in your decision you don't consider age, do you consider the circumstances that brought about the failure? In the

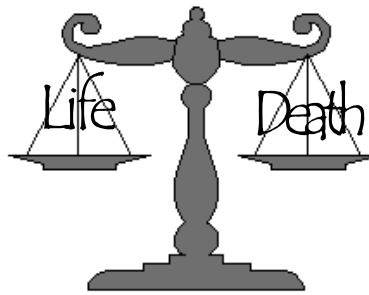
hypothetical situation described above, the elderly woman and the 15-year-old boy both need the kidney to survive. If their age is not taken into consideration, should the fact that Isabelle has done nothing to bring on her kidney failure make her a better candidate than John who caused his kidney failure by ingesting the antifreeze? Everyone makes mistakes, so should John be punished with his life? Conversely, is it fair to take the kidney away from Isabelle?

If we don't even want to consider the circumstances that brought about the failure, then maybe we should look at which candidate may be in a position to take better care of the organ after transplantation. Granted, this is hard to assess because many factors are involved, but after an assessment should we give priority to those that seem to be more responsible and more likely to follow the strict regimen that is required after transplantation? Studies show that family offers a tremendous support to the patient so it follows that those with an encouraging family will be more likely to follow the treatment procedure, take necessary medicine and visit the doctor. So perhaps those with a family should be given priority over those without one.

With family playing an important role in recovery it should be asked if the family has a moral obligation towards the patient. Current procedure dictates that even if a family member does provide a match, the patient is still put on the waiting list until the operation is complete. This is to protect the patient in case the family member backs out at the last minute, because obviously, if the patient could get another kidney, who wants to lose

theirs? This could be taking an organ away from someone who has no other option and whose family did not provide a match. On the other hand, just because there is someone with a match that doesn't mean that other options shouldn't be made available to the patient.

So now that you have thought about some of the factors, whom do you choose? Will it be Jane because she has the best chance for survival? Or do you overlook the fact that John ingested alcohol and choose him because of his young age? Maybe you choose Isabelle because her condition is terminal without the transplant, or do you not consider her because of her age and possible lack of family support? As you can see, it is a difficult decision because when it comes down to it, you are deciding who lives and who dies.



Research

Clinical Gene Therapy *Theories becoming reality at UIC*

Osama Aduib

Gene therapy is a novel approach to treating genetic diseases based on the idea that inherited or acquired defects can be corrected by transfer of a corrected genetic sequence into the body's cells. Genes carry the information required for the synthesis of the thousands of proteins needed to run the biochemical reactions in the body. Occasionally, these genes are affected by mutations, leading to a variety of diseases. Currently, there are over three thousand diseases that have been characterized as genetic defects or as having genetic factors, including various cancers, cystic fibrosis, and AIDS. "Gene therapy is based on the premise of correcting disease at its root," says Dr. Jeffrey Medin, Ph.D., Assistant Professor of Medicine and Director of UIC's Clinical Gene Therapy Lab. "It looks to answer the question of how to treat these illnesses on the genetic level." The idea for such therapy came about when scientists noticed that genetic defects lead to disease. However, gene therapy had not developed into an experimental field until the mid-1980s when innovative scientists like W. French Anderson, A. Dusty Miller, and Theodore Freedman felt that the technology of the time had sufficiently advanced and enough information was known to attempt to bring the theories of gene therapy to reality. The first clinical trials came soon after; the field grew dynamically, encompassing many different scientific applications and the number of papers published yearly has increased exponentially.

Presently there are a variety of laboratory techniques being tested which attempt to transport and place corrected gene sequences into cells. One method involves the extraction of native genes from a virus and the replacement of these extracted genes with corrected copies of the gene desired to be transplanted into the human cell, thus converting the virus into a "gene ferry." A variety of viruses have been employed for this experimental procedure. The problem that common viruses present is that the body responds to them in the same manner it would respond to any virus: it recognizes the virus as a foreign element, attacks it, and ultimately destroys it. Employing such viruses in gene therapy procedures allows only for minimal infection of the body's mutated cells. Recently discovered adeno-associated viruses cause no known diseases and do not trigger the patient immune response. Retroviruses, which have RNA as their genetic material and use reverse transcription to assemble DNA from RNA, are also being tested as candidate viruses for gene therapy procedures. Another method utilizing the

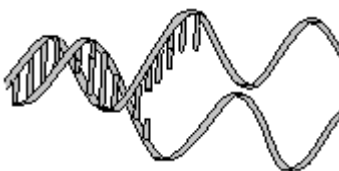
synthetic implantation of a lipid capsule with viral recognition factors on its surface is also currently being tested as a means of transporting corrected genes into cells. Lipid transports have the advantage of not being recognized by the body's immune system foreign and, therefore, are not attacked. They also have the added benefit of easily permeating the cell and its nucleus, making delivery of DNA, in theory, more successful and efficient. All of these techniques have encountered obstacles in the laboratory for various reasons and the details of each individual procedure are still undergoing scrutiny and revision.

At this point in time, scientists have identified two different general procedures for injecting genes into the body. There is the *ex vivo* method, where the virus is mixed with the cells outside of the body and then implanted back into the host, and the *in vivo* method where gene transfer occurs directly inside of the host. Both of these techniques sound good in theory, but either has yet to show substantive clinical results. "The

progress and success of the field is bottlenecked on the efficiency of gene delivery—the efficiency versus the long term expression," says Medin. "The body is a highly complex system of mechanisms and reactions, and we need to understand these in detail. The challenge now is to overcome the early idea that [scientists] had that they could cure everything immediately because it hasn't been that easy. We need to overcome that by developing vectors and procedures that actually allow us to get into a high enough number of cells to correct the disease. That is today's challenge."

"The advancement of gene therapy relies on the second generation of scientists working in cellular and molecular biology to come in and attempt to fill in the basic science that will make the clinical experiments successful," says Medin. Other foreseen hurdles include the initiation and regulation of gene expression once genes are inserted into the cell. This will require an intimate understanding of the operations of the cell on every level.

Up until this past year, there have been over 2100 patients receiving gene therapy on a trial basis around the world. The first trials went through 20-30 regulatory commissions and meetings before they were allowed to move into the clinic. This precaution was understandable given that these newly proposed methods sought to alter the human genetic code. The regulatory procedures have since been streamlined in light of much amassed data vouching for the safety of these trials. Clinical results have been moderate as of yet, but the field is only a little over ten years old. Dr. Medin and his associates believe that great progress is being made in the realm of gene therapy and cures for genetic diseases may be seen as early as



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within the next 5 to 10 years.

On UIC's medical campus, gene therapy is being explored in the Clinical Gene Therapy Lab. Dr. Jeffrey Medin, the director of this lab, was recruited from the National Institutes of Health (NIH) to head up a laboratory that would deal primarily with gene therapy. "The laboratory was set up in collaboration with the UIC hospital and the university. The university wants to be known in this area, and Dr. Ronald Hoffman's [MD, Ph.D., Director of the Section of Hematology/Oncology at UIC] vision has been to create a gene therapy lab where we can not only make vectors, but also transduce cells and make this more of a clinical reality. UIC will be uniquely qualified in the city of Chicago to be able to develop this procedure and carry it into the clinic within the next 5 to 10 years."

When asked when the lab would move into the clinic, Dr. Medin stated that much still needed to be done before the move could be made. The clinic would need very specific layout and ventilation designs, with seamless floors and specially filtered air. There would also need to be a gowning room for those working with the viruses. All of this would need to be done in order to ensure a strict level of sterility and good laboratory practice. The clinic will have two arms, one that deals with the making of the vectors for various diseases, and another for cell manipulation and transduction.

Dr. Medin's lab is currently conducting a number of investigations, including both practical procedures that are working towards moving into the clinic as well as those experiments that deal more with the basic science of discovering the roles of certain molecules the cell. Medical doctors have proven to be a necessary component in moving the field towards translational research by bridging the gap between experimental and clinical science as they can see the clinical applications of research.

In regard to those who are considering a career in research, Dr. Medin has this to say: "The life of a researcher is very fulfilling. It involves the skills of problem solving and deduction. But, it is not a field for everyone. You have to make sacrifices because it takes a lot of years of training — there are graduate studies, your post-doctorate, and years of practical experience you need to accumulate. Persistence is key. This is not a field with immediate benefits. It is more like a marathon than a sprint. But in the end the results are worth it and it makes for an interesting life."

If you are interested in learning more about gene therapy and/or UIC's Clinical Gene Therapy Laboratory, email Dr. Jeffrey Medin at JMedin@uic.edu.

Present your Research

Wondering where you can find a formal forum to present your research to real scientists and peers with similar scientific interests? Check out the following websites for more information...

Conference for Undergraduate Research
Undergraduate Research Poster Session on Capitol Hill
2000
<http://cur.org/postersession.html>

National Conferences on Undergraduate Research
<http://www.union.edu/NCUR/>

Publish Your Research

Looking for an opportunity to publish your research in an undergraduate research journal? Interested in getting a little recognition for the research you have done? Check out these websites...

The Proceeding of the National Conference on Undergraduate Research
<http://www.unca.edu/ncur-proc/>

American Society for Microbiology
Raymond W. Sarber Award
<http://www.asmta.org/acasarc/aca19.htm>

Research

Research Opportunities:

Making them happen for Undergrads

Monica Oberoi

Editor-In-Chief

As pre-medical students, several undergraduates hope to gain experience with meticulous techniques and procedures needed to perform accurate research studies. While finding a worthwhile research position may be a challenge, several opportunities do exist on the UIC campus, in the Chicagoland area, and also throughout the entire country. Without experience, many undergraduates feel it necessary to settle for laboratory positions that involve menial tasks such as slide preparation or data entry. These research positions often leave students feeling dissatisfied with their work, and thus, they shy away from careers in research. Although positions such as those mentioned may result in a learning experience, and some may even lead to a more substantial lab position, several hands-on research positions do exist for undergraduate students without any experience.

According to second year pre-medical student Shripal Bhavsar, "You just need to keep your eyes open for new opportunities. Whether on the web, campus bulletin boards, or e-mails, you'll soon find something that interests you." Over this past summer, Bhavsar worked in the lab of Dr. Ronald Hoffman MD, PhD, Director of Hematology/Oncology, in the Molecular Biology Research Buildings. By the end of the summer, Bhavsar was allowed to draw blood, administer drugs and participate in various surgeries on baboons. In order to find this job, Bhavsar searched UIC's Internet site for research projects in his fields of interest, e-mailed the professors in charge of the labs, and waited for a reply. "Sometimes the professors are so busy they don't end up returning your e-mails. The best thing to do is to be persistent. Try calling them and make sure to show your strong interest," commented Bhavsar. Like most undergraduates, Shripal did not have any prior experience. Although he had only completed his first year of college, Bhavsar was given the chance to work with physicians. All it took was a little bit of persistence and a lot of determination.

Senior bioengineering major Manu Goyal agreed with Bhavsar when he cited the Internet as one of the greatest resources available. "It's very easy to find a good research position on this campus. Just look up professors and see what research they're involved in. If you're interested, all you need to do is give them a call." Goyal mentioned that most professors at UIC don't mind taking time to teach students that are willing to learn, especially if the student is willing to perform the tasks on a voluntary basis. If students are expecting to be

paid for their work, their options may be limited without prior experience or alternate qualifications. On the other hand, most professors are usually willing to pay students that are in the work-study program.

When asked about his many research experiences, Goyal mentioned one of the most important components of having a successful research experience: a large time commitment. "You must be willing to put in at least 15-20 hours, and maybe up to 40 hours per week if you want to get the most out of your research." Goyal often found himself working late nights, including Fridays, just to complete his projects. Goyal has worked as an intern at the MD Anderson Cancer Center in Houston, Texas, one of the top cancer institutes in the nation. He has also performed research under a pulmonologist at UIC, helping in the development of gene therapy for asthma and pulmonary fibrosis. His responsibilities included maintaining the mice facilities and directing the gene therapy experiments performed on them. During the process, Goyal not only learned the importance of determination and persistence, but was exposed to advanced medical treatments.

Yet another pre-med student, Sagun Desai, recently began work under Dr. Peter Okkema, Assistant Professor in the Department of Biological Sciences, right on the UIC campus. She found her research position by visiting the biology department and searching through the Biological Sciences handbook. This handbook lists professors and gives topics of the research in which they are involved. Once again, Desai stated that all you need to do is "just call around." Although making phone calls may not get you a research position right away, don't give up. Since she never received a reply from any of the professors she contacted, Desai was willing to settle for a job as a lab aide because she figured that she needed more experience and coursework to find a position at a higher level. By continuing to call around and express her interest, however, Desai was soon given a research position. As of now, Desai is being trained by Dr. Okkema to fuse plasmids and work with *C. elegans*.

While research can be done simply to get a taste of the field or to learn more about the process of experimental procedures, many students, including Desai, receive independent coursework credit through their individual departments. Desai is currently receiving independent study credit for BioS 399. Students may also gain recognition of their research by being published or having their research experience noted on their transcript. Members of the UIC Honors College may receive recognition for their research by joining the Undergraduate Research Assistant (URA) program. In order to be eligible for this program, students must be members of the Honors College and fill out a preliminary application expressing their interests. Once this is completed, Dean Jeff Lewis helps students to find a professor working in their area of interest.

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While Dean Lewis does his best to match students with mentors, he does admit that most students, about 80%, take initiative and find their own projects. Once the student shows initiative, faculty members are usually willing to put in their time to help. "The professors will teach you what you need to know once they know you're dedicated," stated Dean Lewis. "The student will have to be willing to work without pay and put in a lot of time, but in return, students will gain a learning experience, build a relationship with the professor, and may even have a published article by the end." In order to get more information about the URA program, visit Dean Lewis' website at: <http://www.math.uic.edu/~lewis/hc>. Students participating in the URA program may be eligible for the Kabbes Research Award, funded by an endowment from the late Sarah Madonna Kabbes, a faculty member at UIC.

As a Research I University, there is a plethora of opportunities available to students of all calibers right on campus. Interested students should also keep in mind research opportunities

throughout the rest of the Chicagoland area, such as Rush, Northwestern, and the University of Chicago. Research internships are also available on summer and yearly bases throughout the country at the National Institute of Health (NIH), the Mayo Clinic, the Howard Hughes Medical Institute, and all major universities. The best way to find out about opportunities is to go to each individual website and search within the university for research opportunities.

Although research sounds like a daunting field, undergraduate students do have the skills required to become involved in projects. Remember to stay dedicated to the search for a worthwhile research position. The best place to start may be the Internet. Make sure to follow through on interesting projects with phone calls and e-mails. While research positions are available for undergraduate students, they are not as plentiful as opportunities for graduate level research work. For this reason, it is important to remember the keys to finding these positions: patience, persistence, and motivation.

Summer Research Internship Opportunities

Interested in participating in biomedical research this summer? Considering pursuing an MD/PhD? Now is the time to start applying for internship programs for summer 2000. Check out the websites below for opportunities and more information...

Iowa State
Research Experience in Molecular Biotechnology
<http://molebio.iastate.edu/chitnis/nsf-reu.htm>

Loyola University Medical Center
Summer Research Internship Program
<http://www.meddean.luc.edu/lumen/DeptWebs/microbio/micro.htm>

University of Minnesota
Summer Undergraduate Research Programs
http://www.cbs.umn.edu/summer_research/

University of Texas-Houston
Summer Research Program 2000
http://www.uth.tmc.edu/ut_general/research_acad_aff/ee/res/intro.html

University of Wisconsin-Madison
Summer Research Program for Undergraduates in Cell and Molecular Biology (SRP-BIO)
<http://www.wisc.edu/cbe/bioprog/>

Washington University in St. Louis
Undergraduate Summer Research Fellowships in Developmental Biology
<http://dbbs.wustl.edu/dbsummerbrochmain.html>

A Guide to Summer Research Opportunities for Undergraduate Students in Science and Engineering
<http://www.yale.edu/necuse>

National Institutes of Health Summer Internship Program in Biomedical Research
<http://www.training.nih.gov>

Partnership for Minority Advancement in Biomolecular Sciences
<http://www.unc.edu/depts/pmabs/summer.htm>

Summer Research Internship Programs
http://www.biology.iastate.edu/BiologyPages/Interships/internships_summer_1999.htm#RESEARCH_INTERNSHIP

Summer Undergraduate Research Jobs
<http://fischer.union.edu/summerjobs.html>

VISIONS Worldwide, Inc.
<http://www.hcs.harvard.edu/~visions/>

Pre-Med Exclusive

Alternatives to Medicine

Shimoni Kadakia

Pre-Med Consulting Student Editor

There is an overwhelmingly large group of students here at UIC who have declared themselves as pre-medicine students. Some of them have worked hard throughout their lives to become a "doctor." Yet, many more are intrigued by the concept of medicine, but are not positive of their decision. They often find themselves questioning their future interests. Medical school is much too long and harsh for most people to "try out." Thus, many of them want occupations or careers where they are practicing similar principles at a different level. The following are just a few alternatives to medicine and medical school.

- Osteopathic Medicine
(and the difference between allotropic medicine)

The difference between allotropic and osteopathic medicine is that osteopathic medicine focuses around the maintenance of proper relationships among various structures of the body. It emphasizes the patients' welfare is a result of complete physical, mental, and social well being. In allotropic medicine, the goal of the doctor is to diminish the disease. The osteopathic physician is taught to treat the whole patient, considering their nutrition and mental health along with the physical symptoms. They are allowed to prescribe drugs, surgery and other treatments in the similar manner as an allotropic physician. However, they also reflect upon the mental and other physical consequences of their prescriptions and therapies. An osteopathic physician's education involves three to four years of premedical study, four years of training at an osteopathic college, and one year of internship. Graduates of the school receive a D.O., doctor of osteopathy. They make take additional years of residency training depending on their field of specialty.

- Physician Assistants

Physician assistants deliver basic health services under the general supervision of a physician. They examine patients, order X rays and laboratory tests, and prescribe drugs or other treatment. In some rural areas, physician assistants provide all basic health care for patients, consulting with a supervising physician by telephone or electronic mail.

Watch for even more alternatives in the next issue of the Pre-med Journal

Miracles Aren't Just for Television

Nirav Shah

For as long as I can remember, I have wanted to be a doctor. Although my dream initiated simply out of respect and admiration for my father, as I gained exposure to the medical field, it began to intrigue me more. To advance my knowledge, I started volunteering at a local hospital, talking to my father and his colleagues about various aspects of medicine, and exploring medicinal-related topics for school research papers. But while all of the knowledge I accumulated through such endeavors was invaluable, it paled in comparison to the information I sought. As most people know, the education most valuable in a given situation usually comes from hands-on experience, and this was what I needed to ensure I was choosing the right career path. This past summer, I received that which I sought when my father arranged for me to view an actual surgery. Needless to say, the entire process heavily impacted my decision to declare pre-medicine.

As most people can easily guess, there is a lot that must be accomplished for a surgery to be successful. For more complicated surgeries, such as the quadruple-bypass heart surgery I saw, the criteria become even steeper. This became quite clear to me as I personally saw the step-by-step intricacies involved. I began by scrubbing up and meeting all of the doctors.



The surgical staff consisted of the cardiologist, three nurses, the anesthesiologist (my father), the nurse anesthetist, the resident cardiologist, and the pump technician. Each of these people had different, but imperative roles to fulfill. My father acted first, hooking the patient up to an IV, giving her a mask, and administering anesthesia. Within a few minutes, she was asleep and ready for the operation to begin. My father's job, however, was not over. For the next eight hours, he, or the nurse anesthetist, would monitor the patient's vital signs to ensure quick reaction to any unexpected occurrences. At this time, though, the cardiologist called me to his side. I stayed there for the remainder of the surgery as he explained everything he was doing as the surgery progressed.

Through all that I saw, there were certain highlights, which really amazed me. The reason for the surgery was to add a new artery to the heart because the existing one was too clogged. In order to do this, the resident cardiologist removed a vestigial vein from the leg to use as the new coronary artery.

Pre-Med Exclusive

Prior to that day, I had not known what was used; I always assumed that it was some artificial tube. While the surgery took place, the heart was rendered inactive. This puzzled me; I wondered how the patient could survive without a functioning heart. The cardiologist explained to me that for the duration of the surgery, an exterior pump would perform all cardiac duties. The pump consisted of one container for all deoxygenated blood and another for its oxygenated counterpart. Wrestled in between was a mechanism responsible for pumping the blood and transferring it from one container to the other. There were tubes traveling to and from the heart and blood flow was easily observable. The sight of the pump truly amazed me; it was hard to believe that one machine could be capable of sustaining human life. There were many other facets that factored heavily in the success of the surgery, and collectively they made me realize the extent to which everyone involved must be prepared and focused for such a long period of time. Throughout the entire operation, I noticed many other things occurring around me. My father told jokes to everyone around. The pump technician evaluated the Bulls' newest draft class. The nurse anesthetist played Hootie and the Blowfish in the background. At first, I questioned whether or not this would hinder focus on the surgery. But with the fate of human life resting on every action, tension could easily mount. I soon realized that whatever was happening external to the actual operation was simply there to prevent the tension from accumulating.

The overall experience profoundly impacted my decision to declare pre-medicine. Aside from the medical knowledge I gained, what I learned could not be substituted in any given text. I finally knew that I could deal with seeing an abundance of blood, body parts, and open wounds. Until that point, I could never be sure that I would be apt when placed in such a position. Moreover, I saw the multitude of work I had ahead, but I also saw the fruits that my labor would produce. The patient's surgery was a success; the doctors had prolonged her life for at least another twenty or thirty years. I knew that this was possible before that day, but seeing it in person made it all the more worthwhile. I realized that I had a long, difficult, path in front of me, but now I was absolutely certain that I wanted to tread it. For the student who is not completely certain he wants to enter the field of medicine, I strongly recommend some hands-on experience. Aside from broadening his medical knowledge, viewing a surgery will test the student's ability to react when seeing the opened body, showing him whether or not he will be able to perform when he is required to. It will show him the toils and benefits of being a doctor; and ultimately enable him to breach the gap between certitude and reservation.

Enhancing Your Medical Education:

Combined Degree Programs at UIC

Haley Naik

Research Consulting Student Editor

Today many medical school applicants are opting to supplement their medical education with the pursuit of other degrees in order to enhance their medical careers with different perspectives of medicine. Combined degree programs allow students to complete two degrees, the MD along with one other, in a minimal number of years. Such programs are rapidly becoming very popular, and thus extremely competitive, among medical school applicants because of the obvious benefits attributed to physicians who can see medicine from scientific, public health, business, and/or judicial perspectives.

Currently the University of Illinois at Chicago offers two combined degree programs in medicine, the MD/PhD and the MD/MPH. The MD/MBA program is currently going through its approval stages, and the MD/JD (Juris Doctor) combined degree is still a tentative idea in the making.

Medical Doctor/Doctor of Philosophy (MD/PhD)

UIC's MD/PhD Training Program is presently one of 90 extremely competitive programs of its kind in the United States. The primary objective of this program is to train students for careers in biomedical research and academic medicine. The regular course of the program covers about eight years, and students often complete the first two years of medical school (M1 and M2) and then move on to finish the PhD degree over the course of three to four years. The final two years of the program are dedicated to the completion of the requirements for the M3 and M4 years of medical school. Along with fulfilling the required M1 and M2 curricula during the first two years of the program, MD/PhD students complete short rotations through laboratories of several potential advisors to get an idea of what specific field of research they plan to pursue. One particularly nice incentive about the MD/PhD program, and the majority of other programs like itself, is that tuition for MD/PhD students is waived provided that they have a research assistantship while pursuing their studies, and they also receive a stipend for living. The reasoning behind this is that medical students pursuing this degree are spending an extra four years in school when they could be making money as practicing physicians, so the

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financial support serves as an incentive for students to pursue and complete their PhD.

Students who obtain the combined degrees have a variety of career options after completing their education. Most go on to pursue academic medicine, which primarily consists of conducting research in their area of interest, taking care of patients and teaching both medical and graduate students. The combination of clinical practice with laboratory research enables students who have both the MD and PhD degree to become more well-rounded medical scientists.

How do students become admitted to UIC's MD/PhD Training Program? What makes one a more competitive candidate for this program? All MD/PhD programs nationwide are highly selective, and this is no different at UIC. In fact, only seven students were accepted to begin the MD/PhD program this fall. Given the competitive nature of these types of programs, no preference is given to Illinois students for this program. Applications are processed on a rolling admissions basis and so it is best to apply early in the fall of the year preceding admission in order to provide the fullest opportunity for consideration. The selection committee at UIC looks at a number of criteria when selecting applicants. The Medical School Admissions Test (MCAT) and cumulative GPA are important factors in determining a student's eligibility and competitiveness in this program. The average MCAT score for applicants accepted into the program for this year was 32, while the average cumulative GPA was 3.65/4.00. In 1998/1999, the average MCAT score for accepted applicants was 36, while the average cumulative GPA was 3.60/4.00. In addition to the necessary scores, the selection committee also looks for applicants with a "solid background in the hard sciences in order to ensure the success of their students in this rigorous and intensive program," says Dr. Edward P. Cohen, Director of the MD/PhD Training Program. This most often means that the minimal undergraduate pre-medicine requirements for biology, chemistry, and physics, which is also the minimal coursework required for the MCAT, will not necessarily provide enough knowledge of the basic sciences to successfully carry a student through the MD/PhD program. However, in addition to a firm science background, "the selection committee also looks for well-rounded students. After all, this is an MD/PhD degree, not simply a PhD degree. We wish to produce well-rounded physicians and scientists and we encourage individual initiative and creative thinking," says Cohen. In addition to outstanding performance in undergraduate coursework and superb scores on standardized tests, applicants must also show research experience and dedication to a research career: "undergraduate experience in the laboratory research environment is essential to show the selection committee that students know what they are getting into with the MD/PhD degree," states Cohen. Publications themselves are not necessary at the

undergraduate level, but are highly regarded. One of the most important pieces of advice Dr. Cohen offers to MD/PhD applicants is that "the admissions committee wants to see MD/PhD students with a strong desire to pursue academic medicine and research. We look for a particular level of intensity in terms of work ethic and desire to succeed in academic medicine in our applicants." "This," he says, "is absolutely essential."

For more information about the UIC MD/PhD Training Program, visit www.uic.edu/com/mdphd/ or email Dr. Edward Cohen at epcohen@uic.edu.

Medical Doctor/Master of Public Health (MD/MPH)

The MD/MPH program at UIC has been around for about ten years but has not been formally articulated until the past year or so. The primary objective of this program is to "produce physicians who want to practice public health, to produce physicians who see the need to improve quality of life...not just to treat diseases but to understand the steps required to prevent them as well," says Dr. Shafdeen Amuwo, Associate Dean of the School of Public Health. The course of the program covers five years of study and students in this program are encouraged to use the summers before and after their first year of medical school (M1) to complete some of the MPH core course requirements. The fourth year of this five-year program is dedicated to the completion of the MPH and the fifth year is dedicated to the completion of the M4 medical school requirements. The School of Public Health (SPH) has designed a fairly rigid curriculum for MD/MPH students which allows them to complete the required 36 credit hours necessary to obtain the MPH within one complete year of study. A tuition waiver is available through the SPH to students who participate in a research assistantship at the university concurrently with their studies.

What line of work does the MD/MPH degree prepare a physician for? The insight into medicine which comes as a result of this combination of degrees is beneficial to physicians in many ways. Physicians with such degrees are able to focus not only on the treatment, but also on the prevention of the spread of disease within communities and populations through clinical practice, hence improving the quality of life for immediate populations at hand. "Physicians with a background in public health work in a variety of settings. They work in academe, in program development to address specific disease entities, such as the prevention of cancer or cardiovascular diseases, to name two. They work in administrative sectors, they work for pharmaceutical companies. They work in all walks of life," asserts Amuwo. "Clinicians who have public health training are able not only to treat their patients, but can also aid in the prevention of

the spread of such diseases. They are able to not only become better practitioners, but also become better advocates of disease prevention for their patients."

Application to the MD/MPH program is a bit more involved than application to the MD/PhD program, in that students applying to this program must apply to both the College of Medicine and the SPH and must also make both colleges aware of the dual application and their intent to participate in the MD/MPH program. Like the MD/PhD program, no preference is given to Illinois residents during the selection process. The minimal requirements for admission are essentially the same as that for other medical school applicants. An applicant's MCAT scores can be submitted to the SPH in place of the GRE, the standardized test normally submitted to the SPH for admissions purposes. However, the SPH does recommend those students applying for the MD/MPH take both the MCAT as well as the GRE in order to make comparison of the MD/MPH applicant with the other MPH applicants. Students applying for this degree should have a strong undergraduate background in the sciences and in mathematics in order to be competitive applicants for the program. Equally important is field research experience: "Rarely do we admit students who have spent their last four years in the library just studying and getting good grades," says Dr. Amuwo, "We recommend that students spend their summers doing public health-related work, especially work related to their own area of interest."

For more information regarding the MD/MPH program, email Dr. Shafdeen Amuwo at amuwo@uic.edu or call (312) 355-2951.



Medical Doctor/Master of Business Administration (MD/MBA)*

Although the MD/MBA is not yet a confirmed combined degree program at UIC, it is expected to be so in the near future. Completion of the MD/MBA curriculum is expected to take a total of five years, wherein the fourth year of study is dedicated to the intensive completion of the MBA requirements. As proposals currently stand, the program itself is expected to be fairly rigid in terms of when certain courses are expected to be taken and completed in order to

accommodate the two curricula within the allotted five year time span. The already existing flexibility within the College of Medicine would continue, while in the College of Business Administration (CBA) two structures are feasible. A cohort structure could facilitate the completion of as many core courses as possible in a short period of time, or a flexible structure where core courses are taken during the first three years and electives during the third year. Electives within the CBA would be quite flexible allowing timely completion. Currently, no provisions have been allotted for a tuition waiver for MD/MBA students as is the case for both MD/PhD and MD/MPH students.

One might ask, what are the advantages of pursuing an MD/MBA? More and more doctors today end up in businesses of their own, whether it is their own practice, supplementing and enhancing their practice, or starting a partnership. In addition, with the changing healthcare systems that has become such a major part of medicine and patient care in the last decade, physicians are in an advantageous position to understand the business aspects of medicine. To this extent, the MBA will help these physicians to analyze the viability and sustainability of their business, and physicians who end up straddling medicine and hospital administration are also well-served to understand the business side of medicine in order to better serve patients, care-givers, and the community.

Because the MBA is often termed a "generalist" degree, with students coming from all backgrounds, there are no set program prerequisites for students planning to pursue an MBA. However, the CBA does require that students have strong quantitative skills and are familiar with computer applications most often used in the business. Whether or not the GMAT will be a required standardized test for the admissions and selection process for this program, along with the possibility of a minimum required MCAT score and cumulative GPA, are topics still under discussion.

All further questions regarding this program can be directed to Dr. Joseph Cherian, Associate Professor of the College of Business Administration, at cherian@uic.edu.

* The MD/MBA program is currently in the process of being approved as a combined degree program at UIC. All information presented is tentatively correct.

COLLEGE OF BUSINESS ADMINISTRATION
at the University of Illinois at Chicago

Editorial

Multifaceted Responsibility in Research and Practice

Oveys Mansuri

Senior Editor

We are individuals, neighborhoods, cities, nations, and a global society who are being constantly bombarded by information. Some we can use, and the rest we could easily do without, but information technology does nothing to separate the two for us. So, in an age where there is so much information, we many times find ourselves misinformed because we cannot filter and process masses of information. This may be peculiarly acute in domains where the general public rarely venture such as medical research and clinical care and yet where changes in knowledge are very rapid.

Dissemination of information becomes more crucial when human lives, individual rights, and personal privacy become the key targets of public policies. If central processes are used to determine what is "proper" when conducting medical research, we may reach a consensus, we may protect the majority of those involved, and we may make the process more efficient for everyone, but there is an important secondary level of responsibility here. It is the responsibility that transcends centralized authority and falls in the domain of personal ethics and moral duty as well as social responsibility. Should we create a system where the checks and balances lie within the decision-making process all of us use to make our everyday choices in the best interests of society? We often do this, for example; to fasten our child's seatbelt, to make sure we (at least try to) eat a healthy diet, or to stop at a red light. We accept the laws of society and express displeasure when others do not obey them.

In a similar fashion with medical research and clinical practice there needs to be a mutually agreed upon set of behaviors followed by a self-imposed authorization process. We do have public policies guiding research on human subjects (http://grants.nih.gov/grants/oprr/library_human.htm) These tell us that an institutional review board (IRB) has approved a particular study involving human subjects based on the risks and benefits with an understanding of the scientific, ethical and moral grounds. However, the responsibility does not stop there because, as individuals it is our responsibility to provide a continuous check on the who, what, and how of our research.

The federal regulators are in the Office for Protection from Research Risks (OPRR) and they have closed down several medical research centers in the past year including UIC. The problems have not been the same everywhere, they can range

from improper consent, to undue risk, to breaks in confidentiality of the subject. These problems can be reduced if everyone involved made a conscientious effort to improve the system. This process needs a multifaceted approach with the subjects understanding their rights and responsibilities through the procedures known as informed consent. This must go hand in hand with the investigator who explains fully what is really involved in terms of risk or benefits to the subject.

For the provider of care or a researcher the term "informed" may simply imply following the guidelines set for obtaining consent, but this is not what the federal regulators mean. They mean that since people are different, attention must be given to the point of view of the subject so that no inaccurate assumptions are made. There is the overlying responsibility that lies with all care providers and researchers to make every effort to explain health risks and subject confidentiality as well as the benefits. With a renewed multifaceted responsibility in research and practice we can provide care by showing that we care, and avoid mishaps no matter how minor they may be.

With so much information out there, the general public is drowning in information, but perhaps still not understanding and accepting the risks associated with modern health research. However, at the same time the level of responsibility for all involved must grow. Centralized authority has never been sufficient unless a personal commitment and duty to patients and research subjects also exists. We should not employ resolution of mistakes in the system by simple disciplinary actions. We should not feel that responsibility taken is responsibility achieved. If one, whether it is a chancellor, sports team coach, or a CEO of a company, takes on the responsibility on behalf of many, this is responsible and respectable, but the goal for everyone should be to recognize that by this one person taking the responsibility for many, there needed to be a lapse of responsibility on the part of many that no matter how minuscule had a cumulative effect that resulted in not so desirable situations for certain individuals as well as an entire university, team, or company. Let us learn from what we did and did not do, and hope to teach what we learned to others, because to teach responsibility can be centralized, but to teach the importance of responsibility is a job each individual must do each and every day.

Article Submission Policy

At this time we are open to any and all articles which are related to either medicine or pre-med students. If you are a pre-med student, write the kind of article you would enjoy reading and find informative and helpful. The UIC Pre-Med Journal prefers articles written by UIC students and faculty. It is important though to have open channels of communication in the sciences and academics in general. Therefore we invite students and faculty from other colleges, medical schools, and even high schools to submit an article they would like considered for publication. It is too early for us to designate strict policy for article submissions. Yet, with any publication of this nature some general rules must be established to make the production aspect more efficient as well as provide a sense of consistency.

Information for Authors:

Two typed double-spaced copies should be submitted along with a cover letter which has the author's name, address, phone number, and email address. Other pertinent contact information should also be included. The UIC Pre-Med Journal also requires an electronic copy of the article. It can be submitted via disk or email. If your article has diagrams, picture, or other graphics those should also be included on the diskette. The articles should be accurate and carefully proofread. References should be cited when necessary.

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