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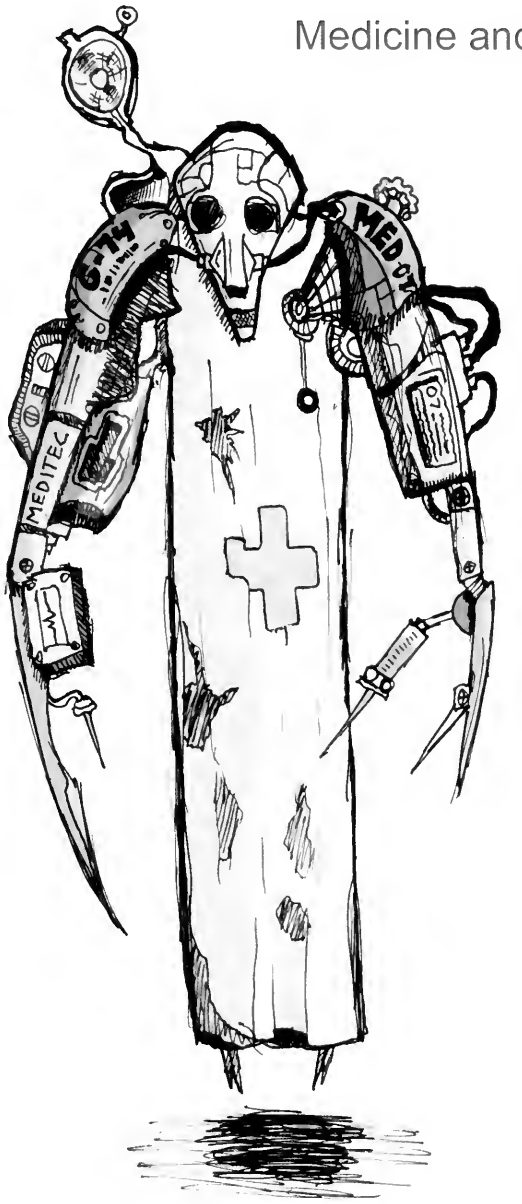
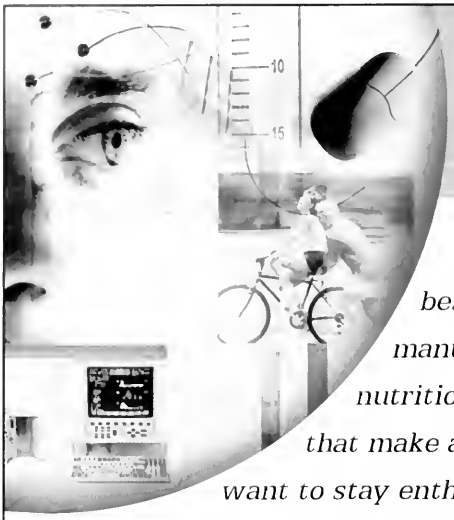
Medicine and Technology





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features

Biotechnology is a burgeoning field. Our primer helps take some of the mystery of out it.

By Jason Wong

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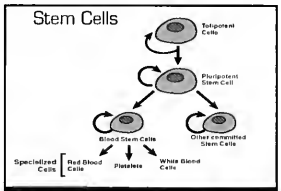

Has the controversy over stem cell research ended or just heated up?

By Niraj Nayak

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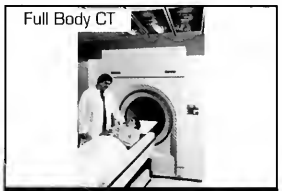

Full body CT scanning will help increase patient comfort and diagnostic power.

By Michelle Monnat

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New technology from GE promises to revolutionize medical imaging.

By Chirantan Mukhopadhyay

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departments

The Technograph welcomes your comments and ideas. Weekly meetings are held on Wednesdays at 6:15p.m., in room 112 of Engineering Hall.

You can contact the staff of Illinois Technograph by:

postal mail
Illinois Technograph
57 East Green Street
Champaign, Illinois 61820

campus mail
Illinois Technograph
MC-596

electronic mail
technoe@illinimedia.com

world wide web
http://www.technograph.org

fax: 217.244.6616
leave a message at: 217.333.3733

THE MIRACLE OF MEDICINE AND TECHNOLOGY

A thousand years ago, you would have been lucky to live to the age of 40. A hundred years ago, you would have been "old" at 50. Toda thanks to the almost miraculous advances made in medical technology, you can expect to live probably beyond the age of 70.

My situation would have been far different than yours, however. A thousand years ago, I wouldn't have survived beyond the age of 6, ar a hundred years ago, 10. Spending the first 5 years of my life in a developing nation, I know first-hand the importance of technology medical care. Most of my time growing up in India found me sick and weak. I missed nearly 70% of my schooling in those early yea and doctors were baffled as to the problem. Eventually, after visiting Saudi Arabia and undergoing several blood tests, physicians we able to determine that I had a hemoglobin deficiency. Though they now understnod exactly what was wrong with me, they we powerless to do anything about it since they lacked the proper tools. Eventually, my doctor learned of a German wonder drug and h it imported. He prescribed it to me, and after several months of treatment, I was cured.

What I learned from my experience was though the techniques used by doctors in the developed world are practically the same as tho used by doctors in poorer nations, the technological chasm is striking and a large cause of the disparity in life expectancies betwe peoples of the world. People without access to hi-tech medical care are seemingly caught in a 100-year time warp – they're lucky to li to 60, if they survive childbirth at all.

As time goes on, some scientific breakthroughs can have a global impact – the polio vaccine, the eradication of smallpox and t dissemination of penicillin have all undoubtedly saved millions of lives. But a more powerful medical revolution will occur not with t results of pure laboratory work, like the three abovementioned cases, but through the influence of computers.

The use of computers is starting to fundamentally change health care, as it has changed nearly every other field of human endeavor. fact, they have changed medicine so drastically that if Florence Nightingale were alive today, maybe she'd carry a laptop instead o lantern. In probably the most notable recent achievement, computers helped crack the human genome – the first step in developin functional knowledge of which genes control which characteristics. The next step? As the saying goes, "map the genome, hack t genome."

As science readies itself to ask, and perhaps answer, the most fundamental questions about life and human existence, advanci technology has given way to ethical debate. Stem cell research is the current contentious issue, and the decisions made today regardi the funding of such research may have far-reaching implications for humanity.

The possible benefits of such research are staggering and so far only speculated upon, but many observers agree that the use of embryo stem cells in medical research may lead to the eradication of several deadly diseases, helping an estimated 100 million people. The effe of diseases like Alzheimers, Parkinson's, diabetes and many others could be seriously alleviated through this research. On the other si critics claim that an embryo utilized in such research represents a human being with a soul and an unalienable right to live.

It will be our job in the coming years to set a course of action regarding medical research, and, hopefully, find a middle path that w respect life while alleviating the suffering of millions.

It was the use of computers that also led to life-saving medical imaging technology like CT, or Computed Tomography, and PET, Positron Emission Tomography. With the advent of fused imaging systems, like GE's Discovery LS, the precision and effectiveness such scanning technologies continues to improve.

As we learn more about the human body, it's genetic coding, the structure and function of the brain and how the body reacts to differ chemicals, we will be better able to develop techniques and technology to cure what ails us. Science is at a point where we can dare to questions about the nature of life itself: "Why must we grow old? Why must we die?" Having the courage to ask questions is where advances begin.

Though the hybrid of traditional medicine and new technology has yielded awe-inspiring results, this fusion has a dark side. The co of this issue represents what can happen when technological healing runs amok. The being depicted is the artist's rendition of a medi robot used in some distant future to dispense drugs and surgery to the sick and dying. The fundamental purpose of medicine is to hea person, to care for their whole well being, and not just mechanically rid them of their ailments. If we lose sight of this, and blindly devel medical technology with no regard to it's effect on the human psyche, then we will fail in our mission as healers. The human on the otl side of our machines, in medicine and any other field, must always be considered.

Is this the future we face? What is in store for us beyond the horizon? The rise of nanotechnology will probably play a huge part in futu medicine. The development of machines smaller than most disease-carrying agents will someday open the doors to a new age of hea care. Damaged arteries will be fixed from the inside, and cancerous cells hunted down and destroyed by specially programmed robo The growth of organs and bones, and the repair of individual nerves could help the blind to see and the paralyzed to walk again.

Though such miracles are undoubtedly decades in coming, there are miracles of technology all around us. I'm sure many of you owe yo well-being or the well-being of someone you love to medical technology. If you can read these words, you are alive, and can expect to l longer and longer as science and technology bring us closer to finally conquering disease, and that, in itself, is miraculous.

Chirantan Mukhopadhyay

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Into the Rossman Fold

"You know," the good doctor said to me as I stood up to leave, "you're not a very good reporter. You didn't really ask me a single question."

by Randy Duax

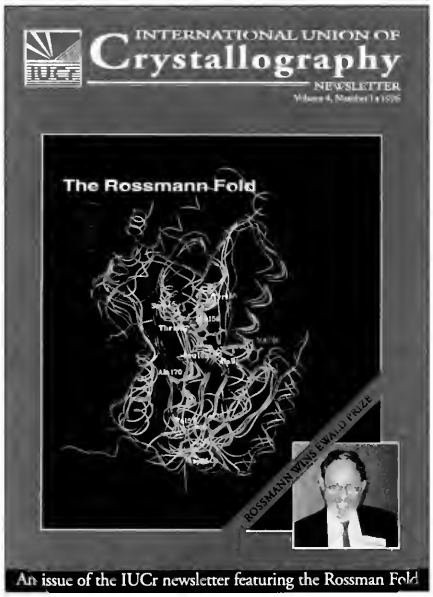
I didn't have to.

At least, that's what I would like to think, in order to save some journalistic face. I *couldn't* ask him anything. I sat down opposite him at a table with a pen in hand and my questions ready, but my eyes glossed over for four early morning hours as I attempted to absorb every word he said. At first I scribbled furiously onto a notepad I brought, but I gave up after eight pages. You can't transcribe raw energy, and that's exactly what crystallographer Dr. Bill Duax is. When he begins to talk about crystallography, life or science, he speaks with the intensity only found in a person who has devoted his whole life to a search for the underlying reality of nature.

"My science is grounded in observation, reproducible observation. Science is not a belief system. If you expose a crystal of a substance to X-rays you get the same pattern of diffracted spots from every crystal of that substance and that pattern reveals the shaper of the molecules in the crystal. The beauty of crystallography is that it provides reliable information about all kinds of materials. It is often the most reliable and detailed information that can be obtained," Duax said.

Dr. Duax received his B.A. in Chemistry from St. Ambrose University in 1961 and his Ph.D. in Physical Chemistry from the University of Iowa in 1967. Since then he has been a member of the Hauptman-Woodward Medical Research Institute (where he served as the Executive Vice President from 1997-2000), given NATO workshops on crystallography in Poland, Yugoslavia, Cuba, Italy, and Hungary, and has been the editor of the newsletter of International Union of Crystallographers (IUCr) since 1993. He has spent time researching breast cancer, polycistic kidney disease and the effects of licorice on blood pressure. Most recently, he studied an ancient family of enzymes called the short chain oxido reductases (SCOR), enzymes that share a common shape called the Rossman Fold. He is also an accomplished photographer, has red hair and is my cousin.

"I've nevet been bored for more than five minutes in my life," he said, as he sifted through dozens of pages of material, searching for a printout showcasing a recent discovery. "A lot of people were very excited when I showed them this printout of 325 unknown structutes from the gene bank," he said pointing to a yellow highlighter streak running actoss a column of numbers in a font almost too small to read.



An issue of the IUCr newsletter featuring the Rossman Fold

"Using patterns like this, I believe I can predict the shape, cofactor, substrate, function and specificity of 1500 hypothetical genes that fall into the Rossman Fold," said Duax.

Breaking down what Dr. Duax does is simpler than it appeats. You take an X-ray of a crystallized substance and map the patterns that result, working backwards from the pattern of spots to the shape of the molecules that produce the pattern. From thete, you can interpret and predict the behaviors of other crystals and substances. It combines chemistry, physics and biology, producing one of the most powerful techniques in the biomedical community. That explains why there are 26 Nobel Prize winners associated with crystallography. The list includes one of the few women to receive a Nobel Prize, Dorothy Crowfoot Hodgkin. She used crystallography to determine the structures of penicillin and Vitamin B.

The Human Genome Project is currently a hot topic. Mapping all of the roughly 30,000 genes in the human genome is a massive international effort that will shed light on disease, simultaneously revealing a great deal about evolution. The project has already

identified genes for cystic fibrosis, neurofibromatosis, Huntington's disease and an inherited form of breast cancer.

"There are about 30,000 genes in the human genome. We only know what 15,000 of those do. Biochemists can spend 10 years studying each gene product and still barely scratch the surface," said Duax.

"And, the Genome project is just the beginning. The next step is the Proteome project, mapping all the proteins in the world. There are already over 500,000 hypothetical proteins in genomes of bacteria, plants, animals acquired so far. We don't know what half of those do. How do we find out? By determining the structure. And what is the best way to determine the structure? Crystallography! We can find the shapes of the unknown gene product, from which we can then predicting the function on the basis of the shape," Duax explained.

Dr. Duax's current research, and what he spent a good deal talking to me about, concerns the SCOR enzyme family. Secondary structural features known as "beta-sheets " and "alpha helices" are the ribbons and coils that combine to create the architecture of proteins, like the Rossman Fold (a sheet of seven beta strands with a helics on either side). The folding of the protein brings critically important amino acids together in an active site where they control the levels of drugs and hormones in the body that are vital to growth, health and combating disease.

"There are 1500 unknown gene products predicted to have the Rossman Fold. 250 have been studied, 20 of those mapped crystallographically leave 1200 proteins of unknown function. If any of the 1200 unknown gene products is linked to human disease, we will detect them, and we will know how to begin to combat that disease. From our prediction practical applications may arrive, even to the extent of tailoring personalized medicines," said Duax.

I did ask him questions, now that I think of it, regardless of the fact that the things he was telling me were so amazing and had such potential for affecting aspects of everyone's day-to-day life. Admittedly, I was spellbound. At least, I can remember asking a *couple* of questions.

"What do you think about cloning humans?" I asked, trying to be topical and edgy but immediately coming to the realization that it was a sophomoric question. I might as well have asked him what his favorite color was.

He replied in such a calm way as to convince anyone in his presence that there was no other plausible answer. "While I'm not opposed to human cloning in principal, I don't think it is a good idea. I don't think we'll ever be successful in creating the perfect man, woman or child. Past efforts along these lines have done for more harm than good."

"Well," I said, trying to regroup, "do you think that science is taking people away from what it means to be human? Breaking things down to such a point that certain aspects of the human experience aren't as important anymore?"

He was excited again. "Not at all! By looking for the underlying reality, I have no doubt that mankind evolved from minerals and from fungus. That still doesn't necessarily mean that there's no God. Crystal structures show me the shapes of molecules that have been there for billions of years, and I get to be the first person to see their shape and question what it means to their function and how they interact with other molecules! It remains to be seen how much we can learn about the prime mover."

"We learned to boil water to destroy germs. Learning new things and putting new pieces into the puzzle is very satisfying. I think people who understand their environment and have some control over their lives lead a happier life. I know those people lead a happier life! If you can label things, you have a measure of control. If you can find out how the machine works, you can get it to work for you," said Duax.

While the interview was winding down and after showing me some jewelry his daughter Julia had handcrafted, he handed me some photographs of a conference he had attended in Poland. I noticed he was wearing a digital watch in the photograph but a blue analog at current. Nothing more than the randomness of the interviewer's thought patterns caused me to point to his wrist and say, "Nice watch."

"Oh, yeah." He held it up to the light of the small wall lamp. "I won this in a contest at the supermarket. There was a big wheel of Jarlesburg cheese hanging on the wall that you had to guess the weight of. There was a small piece of the same thickness on the table where you wrote your guess. So I held the small piece (it weighed about a pound), and then I imagined that the large wheel was a great crystal of repeated unit cells the size of the piece in my hand and I tried to figure out how many of these smaller pieces would fit into the larger cluster. I wrote down my guess, and a week later, I won the watch and the cheese." He clapped his hands together and smiled.

"So, you see," he said, tapping his wrist with his index finger, "this watch is proof that X-ray crystallography works on so many different levels."

We're All Human: The Ethics of Gene Patenting

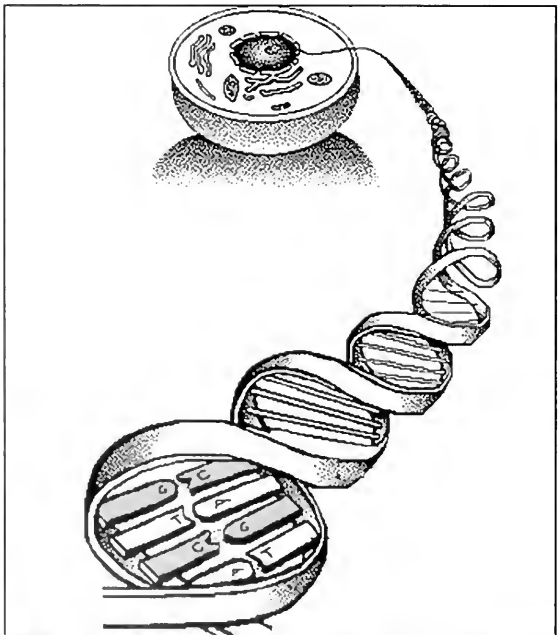
With the recent stunning development of human genome sequencing, biotechnology companies are scrambling to identify specific gene sequences and base pairs causing disease. Scientists hope to create treatments to alter those genes and cure diseases related to genetics. While this type of research potentially offers tantalizing results, there is a downside.

by Jason Wong

Companies wanting to protect their research have begun applying for patents on specific gene sequences. This has created an intense ethical debate of whether or not the very basic building blocks of life - what makes every human human - can be patented and profited from.

The Basics of Patents

In order to receive a patent, the following specific criteria must be met: novelty (the concept must be unique), inventiveness (the concept must not be particularly obvious at the time of patenting), enabling disclosure (the concept must be able to be described in written language) and industrial applicability (the concept must be useful in some way).



All humans share millions of genes in common. Can they be patented? Would corporations or patients benefit?

If these criteria are met (plus other minor guidelines set by law), then a patent can be granted for a specific number of years, usually seven. After that time, the patent can be re-applied for and re-granted. The entire patenting process is generally carried out by two major authorities - the U.S. Patenting Office and the European Patenting Office.

The Debate

The main portions of the debate lie within the four crucial points of a patent. Opponents to patenting say many companies have simply applied for patents almost psuedo-randomly. More specifically, companies really have no idea what the genes do, but if someone finds out and makes money on it, the company wants a cut of the profits.

Judging by the four factors, any particular gene sequence is a novelty because they've never been patented before, but the inventiveness and industrial applicability aspects of the patent are bought into question. Though not stated outright, inventiveness is not as much about being obvious as it is being about someone getting credit for a moment of ingenuity. Companies just patenting sequences for profit are not being very inventive, opponents say. They're being greedy. If companies are unsure of what the genes do, there may be no industrial applicability, and therefore patents should not be granted.

Those who believe genes should be patented have vastly different views of the patent criteria. The Cancer Research Campaign Technology (CRCT) initiative states, "Patent offices attempt to define inventive step as one which overcomes a technical difficulty in an unobvious manner, or which gives an unexpected result, and thus makes a significant rather than a routine advance in our state of knowledge." They maintain that gene research significantly advances scientific knowledge. The industrial applicability factor, says the CRCT, is too broadly defined and can be interpreted in any number of varying ways.

The Ethical Question

Patent technicalities are something the government needs to work out - what the public needs to discuss are the moral and ethical questions of gene patenting. Genes are very specific - any one change in a sequence can lead to something entirely different than intended. The human genome is made up of millions of base pairs, and all humans have a tremendous amount of these in common.

So the questions is: Can a company actually own the rights to the genes that define humanity?

Proponents (such as the CRCT quoted above) say yes, mainly because, "Materials derived from the human body have been patented for many decades. Many of the world's most effective drugs are derived from natural products of living organisms."

However, opponents say that genes are not derived from the human body - they *are* the human body and an entirely different matter. If companies knew exactly what they were patenting, then less people would have problems with the issue. Companies did the work and found something useful to do with it, and that deserves some kind of compensation. However, companies that blindly patent sequences are greedy and are not inventive, according to opponents.

The US Patent Office has set precedence in gene patenting by saying the patent must be issued for something that has a biological "utility." In 1997, the National Institute of Health applied for patents covering tens of thousands of genome-derived DNA sequences. The application was rejected by the US Office based on the view that no 'utility' was evident. The biological function of the sequences was unknown, and that sets precedence for the industrial applicability factor. However, as more opinions and patents for different things are submitted, the view of the US Patent Office can change.

Another ethical reason opponents to gene patenting use is the fact that if and when drug companies create a useful drug, they will charge high prices for their gene therapies. The high price of prescription drugs is a large issue in itself, and new, high-tech gene therapies can only cause drug prices to increase.

Recently, drug companies have been pressured to allow other companies to manufacture a variety of AIDS drugs and put them on the market at a cheaper price. AIDS patients must take so many pills that the costs quickly add up. Densely AIDS-infected continents such as Africa have people far too poor to be able to afford these drugs. However, drug manufacturers held the patents to produce the pills, and no one could make low-cost alternatives. There was such international pressure and massive protests against these "unfeeling, greedy, capitalistic corporations, according to protestors, that the companies had to share their patents to enable others to produce generic versions of their drugs. The same problem might apply to companies as they start creating gene therapies - creating cures that only the richest can afford.

A Delicate Situation

This debate is something that will not simply disappear. Biotechnology and genetic engineering are still in infancy, and there are many more issues that stem from this new and exciting field. However, early issues must be dealt with delicately in order to ensure that the industry grows in a controlled manner but without suffocation. No matter what happens, biotechnology is here to stay, ready to help us engineer our own future.

WEB LINKS

AAMC - Does the Gene Patenting Stampede Threaten Science?
http://www.runet.edu/~whim/archive/season04/life/stories/bb.htm
National Institute of Health - Gene Patenting & Bioethics Resources:
http://www.nih.gov/sigs/bioethics/genepatenting.html
Cancer Research Campaign Technology's Web Site About Gene Patenting:
http://www.crct.co.uk/pat_matt/pat_genes1.html

The US Patent and Trademark Office will be issuing gene patents, if they allow it.

LASIK: 20/20?

My roommate awoke one morning exclaiming he had miraculously regained his vision. After I pointed out his contacts were still in from the previous night, he sighed and went back to bed. The laser eye surgery techniques that have developed in the past few years could make my roommate's miracle a reality. The most common, and well-known, procedure is known as LASIK. LASIK stands for "laser in situ keratomileusis." The name refers to the use of a laser to reshape the cornea without invading the adjacent cell layers.

by Niraj Nayak

This drawing depicts a LASIK surgical procedure.

LASIK is accomplished through a seven step process.
1. In order to numb the eye, anesthetic eye drops are applied. The surgeon marks the area where the eye will be cut.
2. A suction ring is applied to the eye to hold it in place.
3. The surgeon lifts up a thin layer of the cornea. This is known as a keratectomy.
4. The flap of cornea is folded to the side of the eye.
5. The laser is pointed at the exposed eye and calibrated.
6. The laser reshapes the cornea to an accuracy of 1/4000 of a millimeter.
7. The flap of cornea is folded back on the eye, where it bonds and heals rapidly.

THE TECHNOLOGY

The type of laser being used currently is an excimer laser. This laser is the most accurate used in vision correction thus far. One pulse of a laser can remove as little as 0.25 microns of tissue. A human hair is 70 microns thick.

OTHER CONSIDERATIONS

There are many side effects associated with LASIK, including decreased night vision and dry eyes. Many patients have had to schedule repeat visits in order to achieve the results they want. Contrary to popular belief, LASIK does not provide 20/20 vision. In most cases, the best vision patients can expect to achieve is 20/40. Finally, as with any surgery, there is always a risk for something to go wrong, which could result in severly impaired vision or blindness.

IS IT RIGHT FOR YOU?

Those who do not want to wear glasses, and whose eyes are unable to adjust to contacts, would be good candidates for laser eye surgery. However, people considering laser eye surgery just to make life more convenient would be well advised to wait a few years before undergoing surgery. The technology is improving significantly every year, and the day may be near where anyone can have 20/20 vision.

WEB LINKS

Find out more about LASIK at:
http://www.lasikinstitute.org/

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An Introduction to Biotechnology

A FEW YEARS AGO, THE INTERNET WAS THE NEXT BIG THING TO MAKE PEOPLE RICH OVERNIGHT. NOW THAT THE "DOT-COM BUBBLE" HAS BURST, PEOPLE ARE LOOKING TO FIND ANOTHER TECHNOLOGICAL ENTREPRENEURIAL ADVANCEMENT. SOME BELIEVE THEY HAVE FOUND IT - BIOTECHNOLOGY.

by Jason Wong

By sequencing the human genome and determining exactly what DNA is made of and in what configuration, a whole new world of genetic engineering has opened up. The possible advantages of biotechnology are virtually endless, but the potential harm it can do is also tremendous. As long as this new breakthrough is used wisely, the world can be made a better place in ways we have yet to imagine.

OK, so what is it?

Biotechnology's dictionary definition is simply "applied biology", which is an oversimplification of the field. Biotechnology deals with the biological manipulation of any living thing. Plants, for example, have been biologically manipulated for a long time. The biology of corn has been manipulated to get the best corn and the highest . Hormones have been used to enhance crops, and biological manipulation can even apply to using fertilizer by enhancing soil with nutrients that are not as abundant as they need to be.

In animals, biotechnology has been classified as using hormones to enhance growth and other facets of the animal - until recently. BST, for example, is a hormone used in cows to increase milk production. There has been recent controversy over what the hormone does to milk and its effects on humans, but it is a biological manipulation nevertheless.

However, biotechnology has been redefined by the sequencing of the human genome. Humans now have control of biology at the genetic level. Both a private company, Celera Genomics, and a public project, the Human Genome Project, took part in this venture. The two groups raced to see who could finish first. In the end, the two groups announced their feat together, showing that they have become allies instead of enemies. The entire world was in awe of the announcement, and companies are scrambling to see how they can utilize this new information.

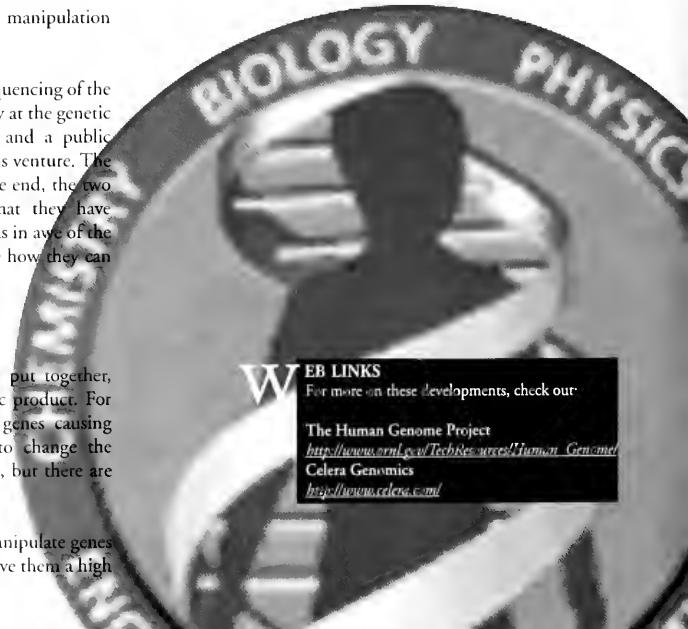
The Good and The Bad

By knowing what our genes are and how they are put together, scientists can change them around to yield a specific product. For example, it is feasible that once the sequence of genes causing cerebral palsy is found, drugs might be created to change the sequence and cure the disease. It is a marvelous feat, but there are many issues resulting from this.

Some believe companies would take this ability to manipulate genes to the point where parents can engineer their kids - give them a high capacity for intelligence, blonde hair, blue eyes or whatever the parent desires. If it is defined by genes, it can be changed. Many oppose this due to societal and creationary reasons. Would a perfect society then exist where all are beautiful, smart and charismatic? Who would do the menial tasks? Would this procedure be so expensive that only the rich could afford it? These are moral questions that are very poignant.

No one can say exactly where the line should be drawn and who should draw it. Some say the government, but opponents say that laws are too black and white to determine such a gray area as this. Others believe companies are responsible enough, but many do not have much faith in private companies and capitalism.

As with any scientific accomplishment, the more potential a breakthrough has, the more dangerous its downsides are. By curing handicaps as Down's Syndrome and countless others. As long as humans are responsible with such power, biotechnology and genetic engineering can bring infinite benefits.



WEB LINKS
For more on these developments, check out:

The Human Genome Project
http://www.ornl.gov/TechResources/Human_Genome/
Celera Genomics
http://www.celera.com/

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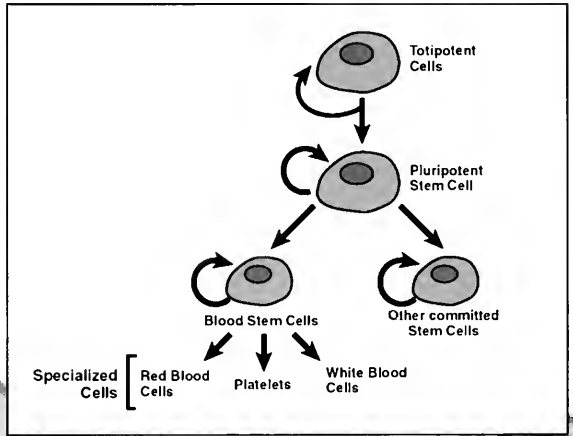
Stem Cells: Ethics and Science Clash... Yet Again

PRESIDENT BUSH RECENTLY RESTRICTED FEDERAL FUNDING TO APPROXIMATELY 60 EXISTING EMBRYONIC STEM CELL LINES. IN ORDER TO UNDERSTAND THE ISSUES BEHIND STEM CELL RESEARCH AND THE SUBSEQUENT CONTROVERSY OVER FUNDING DECISIONS, THE SCIENTIFIC FACTS MUST BE CLARIFIED.

by Niraj Nayak

What is a stem cell?

Stems cells are best understood when put in the context of human development. Human life begins when a sperm fertilizes an egg to form a single cell. This single cell is totipotent, meaning it has potential to grow into a full organism. A few days after fertilization and cell division, the totipotent cells form a hollow sphere of cells called a blastocyst. The embryonic stem cells reside inside the blastocyst. Stem cells are pluripotent, meaning they can develop into any kind of human body tissue. As the embryo continues to grow, the embryonic stem cells undergo further specialization and can become blood stem cells, neural stem cells, skin stem cells or cells used in every other function of the human body. It is necessary for stem cells to be present throughout the human life span, as they replenish cells of the body that might wear out.



The process by which stem cells develop into other types of cells in the body.

What are the potential applications of stem cells?

The most basic application of stem cells would be to help scientists better understand the process of human development. Many serious medical problems, such as cancer and birth defects, result from abnormal cell development. A better understanding of normal cell development could help prevent these abnormalities. Stem cells also have the ability to affect the way drugs are tested. Drugs could be tested on stem cell types before they are tested on animals or humans in research situations. The most powerful application of stem cell research could be the growth of cells and tissue. Currently, a person with a damaged heart must wait for a heart transplant. However, it is possible that scientists could use stem cells to grow muscle tissue to replace the damaged cells in the heart. Other possibilities include growing nerve cells to treat Alzheimer's and Parkinson's disease or transplanting pancreatic islet cells to replace the insulin injections that diabetes patients require.

Has any progress been made?

The most dramatic representation of the power of stem cells was shown by John Gearhart, a researcher at Johns Hopkins Medical Institutions in Baltimore. Gearhart used a virus to induce paralysis in 80 mice and rats. In an attempt to reverse the course of the disease Gearhart placed nerve stem cells in the fluid surrounding the animals' spinal cords. The stem cells spread across the entire spinal cord and diffused through the cord's membrane into the cord itself. Remarkably, three months after the surgery, every

single animal was walking. Although tremendous work must be done before stem cell therapy can be applied to humans, the power of stem cell research was shown in Gearhart's experiment.

What is the decision on funding and the controversy behind it?

For those who believe life begins at conception, using embryonic stem cells for research is viewed as immoral. The stem cell issue has merely added another layer to the abortion debate. President Bush's decision was a compromise between science and ethics. Funds will continue for research on existing stem cell lines, where the life of the embryo has already been decided. However, research that uses new embryos to cultivate stem cells will not receive funding.

Why can't scientists just use adult stem cells?

There are many difficulties in using adult stem cells. The stem cells in adult humans have already been specialized to a particular function. The stem cells for all cell and tissue types have yet to be isolated in adult humans. For example, adult cardiac stem cells or adult pancreatic stem cells have yet to be discovered. In addition, adult stem cells are often present in minute quantities and are often hard to isolate and purify. Embryonic stem cells are much more flexible because they are easy to isolate and have yet to be specialized into specific stem cells.

What will the repercussions of the President's decision be?

Researchers will be competing to have use of the 60 or so stem cell lines that have already been cultivated. Researchers may continue to use frozen embryos for their research, but they will have to do so without federal funding. Many scientists fear the existing stem cell lines will not be enough to develop therapies effectively. President Bush's decision may be an adequate compromise for now, but it remains to be seen if it will be the right decision for the future.

Sources:
National Institutes of Health
Time Magazine

Surfaholics Anonymous

Web sites. Check 'em out. 'Nuff said. *by Sophia Lai*

http://www.justatip.com
If you're bored head on over to "Just A Tip," where you can send your favorite friend or foe an anonymous e-mail telling them about their annoying problems. Whether you're trying to find a nice way to tell your friend that she's got no sense of style, or you want to cut an arrogant ex-significant other down to size, you can find the perfect compliment or critique here!

http://www.ddigest.com
With the different types of media available today, it's easy to get lost in the world of digital things. From DVD to DivX , VCD, AVI, WMC and more, "Digital Digest" is the place to get it all straightened out. From general information to more technical know-how, you can get all your questions answered through the search engine. For those of you into DVD's, I'd recommend taking a look at the region tools they have at.

http://www.ddigest.com/dvd/downloads/firmware.html On this page, there are utilities you can download and use to make your DVD-ROM region-free. That means you no longer have to worry where you're getting your DVDs from, whether they are American, European or Asian. Your DVD-ROM will always be able to play, and you do not have to worry about getting stuck with a certain region. Of course, be sure to read everything carefully first - otherwise you might end up damaging your drive.

http://www.digitaldna.org/garbage
This is the site for all fans of the band Garbage. At "Garbage Multimedia," you can download high-quality MPEG/MPG's of their music videos, concerts and interviews from the past couple years. You will not find a site with sharper or smoother video clips of Garbage than here. I have yet to find another website that matches the quality of the MPEG's here, including sites devoted to other bands. The webmaster here has most of the videos off both the "Version 2.0" and debut albums, as well as recent movie tracks like the theme song from the last James Bond film, *The World is Not Enough* and *When I Grow Up*. Sit back and enjoy.

http://lyrics.astraweb.com
Do you ever get a song stuck in your head without knowing the real words? You know how it is - you end up singing the one line you know over and over? Click over to the "Lyrics Search Engine" to look up the lyrics to your favorite songs. Whether you're trying to figure out the French phrases in *Lady Marmalade* or trying to memorize REM's *It's the End of the World as We Know It*, this site has it.

http://www.usg.edu/galileo/internet/electronic/electext.html
Everyone know research takes forever. It consists of hours locked in a library, hunched over hundreds of different books and eventually walking away with only a couple pages of Xeroxed material that is actually useful. Well, as the Internet takes over more and more of our lives, online books are also growing on the web. The only problem is that it can be difficult hunting down the full texts of books online. Everyone knows the Internet is a powerful research tool. However, search engines are only helpful to a certain extent. It still takes hours of carefully searching hundreds of web pages to locate complete texts. This page has a large collection of links to various archives of e-texts, whether they be literature, history, poetry, philosophy, religion, mythology or law. Many of the archives listed, including Project Gutenberg and the Internet Public Library, contain thousands of e-texts that are available online. With e-texts, you can browse through texts with keywords to cut down your research time. The Internet is a great tool - you just have to know where to look.

Tissue Please

by Aaron Rowe

TEN YEARS FROM NOW, YOU MAY NO LONGER BE ASKED TO INDICATE YOUR WILLINGNESS TO BE AN ORGAN DONOR ON YOUR DRIVER'S LICENSE. IT MAY BE UNNECESSARY. TISSUE ENGINEERING HAS GROWN SO DRAMATICALLY SINCE THE LATE EIGHTIES THAT LABORATORY-PRODUCED SKIN, CARTILAGE AND BONE HAVE BEEN IMPLANTED IN HUMANS, AND BLOOD VESSELS, BLADDERS, AND SPINAL TISSUE HAVE BEEN IMPLANTED IN ANIMALS.

When someone receives a transplanted organ, his or her immune system will attempt to reject it. For this reason, they are forced to take drugs that suppress their immune system. Needless to say, this can be quite harmful. If the organ is grown from healthy cells taken from the recipient, rejection may not occur and no immune system suppressing drugs would be necessary.

In order to transplant an organ, an appropriate donor must be found. In the case of liver and heart transplants some people cannot live long enough to find a donor. Sometimes skin, blood vessels, and cartilage are transplanted from another part of the body. Other body parts such as the esophagus and intestine are difficult or impossible to transplant. By producing these tissues in the laboratory, parts of the body that were previously irreparable could be reconstructed, and anyone with enough money or medical insurance would need wait no longer than it takes to grow the tissue necessary to heal them.

Research conducted by Eugene Bell at MIT in 1979 showed that skin cells could be grown in flat sheets of tissue. Joseph Vacanti and Robert Langer pioneered the technique of placing cells on a spongy polymer scaffold surrounded by a bath of nutrients then placing the cell-impregnated assembly in an incubator. Shaped like the body part that the brothers intend to produce, the scaffold would lend order to the growing structure in a way similar to a fence on which tomatoes grow.

Polymer scaffolds were traditionally made from polyglycolic acid and polylactic acid. Both of these polymers occur in nature. Vicryl, a bioresorbable polymer produced by Ethicon, a subsidiary of Johnson and Johnson is a copolymer of about ninety percent polyglycolic acid and ten percent lactic acid. Bioresorbable polymers were originally used to make sutures that dissolved after about four to six weeks. One of the initial obstacles in the way of engineered tissues was overcome when Joeseph Vacanti realized that in order for cells to grow in the polymer scaffold, it would need to be porous.

Tissue engineers have very successfully made skin and cartilage. Laboratory grown cartilage has even been used to repair the ear of one boy and the rib cage of another. Vital organs such as livers and lungs are far more complicated since they contain wide varieties of highly specialized cells. For this reason, it will be much more difficult to make them.

Stem cells are immature cells, which can transform into nearly any type of cell under the influence of different biological environments or chemicals called growth factors. Stem cell research is one of the most promising topics in medicine because stem cells can be used to grow extremely complicated tissues outside of the body, or be inserted directly into damaged parts of the body in combination with polymer reinforcements. Unfortunately, these cells must be harvested from fetal tissue, and this necessity has created a great deal of controversy in the medical community. With encouragement from his brothers, Marty Vacanti discovered cells in adult tissue that have capabilities similar to those of stem cells. These cells are referred to as sporelike cells. In addition to other successful experiments, the Vacanti brothers have used a polymer mesh covered in sporelike cells to repair the damaged lung of a sheep.

While lab grown tissue could improve or save the lives of many people, it could also be used for cosmetic or other elective purposes. Penis enlargement could get way out of hand, and the phrase "Do you think they're real?" would

Continued on page 26

Full Body CT Scans - the future of preventative medicine, but is it too good to be true?

Remember that pen-sized-laser-thingamabob the doctor in all the Star Trek movies waved over his patients to give them a completely thorough, yet ridiculously brief, exam? Do you ever wonder if it will become a reality? How far will medical technology actually go during our lifetimes?

by Michelle Monnett

Recent medical advancements have accelerated in just the past few decades. Look at how short hospital stays have become. When a woman gave birth she used to stay at least a week in the hospital. Now it is practically an out-patient procedure. Women often stay in the hospital for two days at most. How about laser eye surgery, in-and-out within an afternoon to reshape your eye or remove cataracts? Aside from shorter stays and quicker surgeries, the regular preventative checkup, or physical, hasn't changed much.

Meooow For the New Cat Scan

One of the more recent medical advancements might look like a precursor to the Star Trek physical exam. It is a full body CT (CAT) scan. The procedure uses an angiocat, an electron-beam scanner that works with complex software to provide a three dimensional virtual tour of the body.

Computed Tomography (CT) has been revolutionized by the advent of the volumetric (spiral or helical) CT. Rather than taking images of a slice of the body and incrementally moving the patient to obtain another slice of the body until all images are taken (the process of a regular CT), the helical CT acquires data continuously as the patient travels through the CT gantry. Basically, the scanner rotates around the person rather than having the person moving in order to scan. This saves time as well as makes the CT an easier overall process.

The 10-15 minute procedure, which generally costs around $700-800, is not covered by many insurance plans. It scans patients from the chest to pelvis with an open, dual-slice, helical CT scanner, a high-resolution, high-speed, and costly, machine. The machine alone costs around $1 million. While coronary artery disease is the most common discovery in a CT scan, kidney cancer, lung cancer and breast cancer can also be detected. However, the scan cannot rule out breast cancer, colon cancer or prostate cancer.

Cal-Fornication

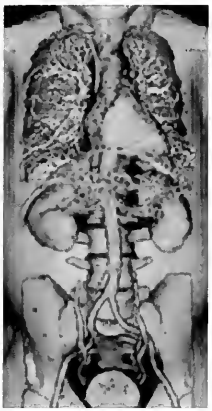
Where would a no-hassle and painless test emerge? The answer to that question is found where there is money and a will to fund it. Where is there an abundant population of rich, healthy people? California, of course. This test has become all the rage this past year in both the medical community and celebrity realm. Oprah even has featured it on an episode of her show. The Healthview Center for Preventative Medicine in Newport Beach,

New Technology to Expect

Over the next few years new generations of less invasive and cheaper laboratory tests and imaging techniques will become available to help doctors screen patients for disease.

Computers and databases may even help doctors analyze test results so fewer patients with diseases are missed.

California was one of the first clinics to offer the high-tech and expensive non-invasive test back in 1998. Another clinic is Parkview Imaging Center in Santa Monica, CA offers its version, called the HealthScan.



Miracle Machine

One of the most talked about discoveries from the scan came about when Healthview's Dr. Harvey Eisenberg scanned Commander Betty Kelepecz, a senior officer with the Los Angeles Police Department. She decided to undergo the procedure when her employer's health insurance company offered to pay most of the $795 cost. Kelepecz told Oprah, USA Today, BBC News and many other media outlets interviewing her that she was in great shape, exercised regularly, and ate healthy meals.

"I had expected to hear that I was perfect — I had no symptoms of anything, I was feeling fine," Kelepecz said.

However, when she had the scan, a large mass was found in her kidney, which was eventually confirmed to be a life-threatening form of cancer. Soon after, Kelepecz had her right kidney removed along with the cancer, which had not yet spread through her body.

"Had it not been for the fact that I had gone in for this CAT scan early in my life, early in the stage of the cancer, and had this cancer metastasized, the prognosis would have been a 10-15 percent chance of living beyond five years," said Kelepecz

There have been other cases where individuals caught medical problems early enough to prevent the disease entirely. However, not everyone is as optimistic that these results indicate a need for the test.

Scan or Scam?

One of those critics is Christine Gordon, a *Time Magazine* columnist. She argues against the full body CT scan in her March 22, 2001, article "Scan or Scam?" Gordon emphasizes the excessiveness of the preventative test. She maintains the scan is people paying just for the reassurance that they healthy, even though many have no present symptoms or reason to worry. Disagreeing with the wide-spread use of this technology, she sees full body CT technology as analogous to the misuse of early X-Ray technology.

Gordon says, "Back in the 1940s, when plain old X-rays were considered high tech, shoe salesclerks would often determine children's shoe size by X-raying their feet. Never mind that the same thing could have been done with a wooden ruler. Fluoroscopes, as the X-ray devices were called, were promoted as the scientific way to guarantee a proper fit. By the mid-1950s, however, it was clear that many fluoroscopes were badly maintained and ended up subjecting customers—not to mention salesclerks—to potentially dangerous amounts of radiation. Soon the machines were banned."

Another concern about the over-use of the test is radiation exposure. If the tests are necessary, then the radiation risk may be warranted, but any amount is bad, especially if it is for a potentially useless test.

Medical Facts:
Heart Disease Is Our #1 Cause Of Death

1.5 Million Americans annually experience heart attacks. 33% result in death. Sudden Death due to heart attacks usually occur with no prior symptoms, 48% are men and 63% are women.

Heart disease mortality in women is about 6 times greater than that of breast cancer.
As much as 85% of heart attacks are caused by the sudden rupture of smaller plaques that are neither large enough to impair blood flow nor detectable by current screening tests (e.g. stress EKG, echo, thallium).

Coronary heart disease can be slowed, stopped or reversed before a serious problem develops.
Symptoms usually do not appear until diseases like arteriosclerosis (heart attacks/strokes), cancer, and emphysema are in their later stages.

Radiation Worry

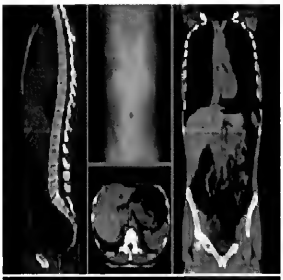
Although the full body CT scan is not likely to harm the patient, it is useful to compare it to earlier reactions to technology. It is a form of X-ray technology, thus also a radiation culprit.The radiation issue is at the center of the debate against the scan. In Betsy Streisand's U.S, News Online article "Profiting from Patient Paranoia," Thomas Behrenbeck, a cardiologist and imaging pioneer at the Mayo Clinic, argues that self-referrals should not be allowed for patient exposure to radiation.

Parkview will not scan people under 25 with no medical history, but anyone else is eligible to go through the procedure without recommendations. Similarly, Healthview accepts self-referrals but recommends the test for "men and women over 30 years of age [with a] family history of heart disease, cancer, diabetes, high blood pressure, chest pain, smoking or a sedentary lifestyle." Patients must be otherwise disease free, symptom free and not pregnant.

Gordon criticized the test saying, "Far from always providing definitive answers, CT scans often produce ambiguity, particularly when healthy people are subjected to them. Most of the time the scans turn up harmless stuff—a little scar tissue, a benign growth. But when they do, doctors have to perform more medical tests; frequently including invasive procedures, just to make sure that the spot is really harmless."

Th is a point which many other experts feel supports

the claim that this test is extraneous and itself only designed to make more money for doctors It may just be a test for the rich. Unless it becomes accepted as a reliable, worthwhile and cost effective medical test, that might not change. However, what happens if insurance companies require the test before you can receive medical insurance? Or if doctors misuse the test just to pay off the expensive equipment they purchased thinking the general population would want to be tested?



The scan produces images from all angles (BBC News)

Of course that is not the only draw back.

What if people are scanned and nothing is found? Suppose a smoker undergoes the scan. Streisand argues that "a clean scan could lull patients into a false sense of security, doctors say, and lead them to ignore symptoms when they do appear. Conversely, the discovery of a minute lesion or mass may set someone on a course of unnecessary and invasive procedures only to discover that there is nothing wrong." This smoker may ignore any future symptoms related to diseases caused by the substances found in cigarettes.

While there are many issues raised by the full body CT scan, one thing that cannot be ignored is the technology behind it. Medicine has come a long way. The noninvasive and potentially beneficial scan is just an

example of the combination of computers and traditional testing. While we might not be able to have a small laser wand waved over our bodies to diagnose us, we are getting closer to producing extremely advanced medical technology once only found in fiction.

WEB LINKS

For more on this issue, check out:

http://webmd.com
http://www.healthview.com
http://www.usnews.com/usnew/issue/990607/nycu/scan.htm

Computer-assisted analyses:

http://webmd.lycos.com/content/article/1728.58102

September/October

Monday	Tuesday	Wednesday	Thursday	Friday
Engineering Expo, Illini Union A, B,C 10	Engineering Expo 11	Engineering Expo 12	Engineering Expo 13	14
Citgo Petrochemical Evans & Sutherland Inktomi Corp. CITGO Petroleum Corp Venzon Westinghouse Savannah River Company 17	Black & Veatch Caterpillar Evans & Sutherland Johnson Controls, Inc Tactica 18	Caterpillar Illinois Dept. of Transportation University of Illinois, CCSO--DUS 19	Caterpillar IBM SEH Turner Construction 20	Caterpillar Colonial Pipeline Company Hughes Network Systems IBM Illinois Department of Natural Resources Kiewit Industrial Modine Manufacturing 21
Fujitsu Network Communications Gas Technology Institute SSI Systems & Synchronous Inc TRC Environmental 24	Arco Construction Argus Systems Group, Inc. Department of Energy Fujitsu Network Communications York International 3M TVA Warehouse Equipment Inc. York International Zenith Electronics Corp 25	Argus Systems Group, Inc. Guidant Illinois Power Raytheon United Conveyor Corp. United McGill Corp. 26	Avanti Corp. BAE Systems KJWW Engineering McDonnell, Boehnen, Hulbert & Berghoff Microsoft Corp. Raytheon Space Systems/Loral US SSC San Diego 27	Air Products & Chemicals CTE Engineers Igen International Microsoft Corp. Siebel Systems, Inc. SRA International WJ Communications Inc. 28
Cicada Semiconductor Cornerstone Partners DaimerChrysler Corp Dietrich Design Corp eServ, LLC Los Angeles County Dept of Public Works Matrix Construction Stanley Group 1	FisherControls Kurt Salmon & Associates Mentor Graphics Corp Strand Associates Telution Teradyne Texas Instruments Wes-Tech Automation 2	Avanade Braun Consulting Chicago Bridge & Iron Farnsworth Group Inc. International Paper Kimberly-Clark Corp. Lockheed Martin LSI LogicMcMaster-Carr Supply Company Molex, Inc. MPC Products Parker-Hannefin Kurt Salmon & Associates Texas Instruments 3	Affiliated Engineers Avanade Cargill, Inc. Crawford, Murphy & Tilly Fathom Solutions FH Paschen,SN Nielsen Flad & Associates Hormel Foods Corp International Paper Kimberly-Clark Corp Lockheed Martin MPC Products McDonalds Corp San Diego Gas & Electric SAS Institute Texas Instruments Wolverine Trading X By 2 4	Accenture Cargill, Inc. Equiva Services Law Engineering & Environmental Services Quaker Oats Samsung Austin Semiconductor 5

All these companies will be visiting and interviewing on campus this fall.

October

Monday	Tuesday	Wednesday	Thursday	Friday
08 Accenture Centaur Technology Citadel Investment Group Cooper Industries Frito-Lay Goodyear Tire & Rubber Company Great Lakes Dredge & Dock Company Manhard Consulting Ltd Microsoft Corp Nooter/Eriksen, Inc PPG Industries Sargent & Lundy Tetrapak Westell Technologies	09 Accenture Aerospace Corp. CNA Corporation DuPont Guilford Mills JDC Solutions Kiewit Construction Microsoft Corp Nalco Chemical Co. Olin Corp. Procter & Gamble Quaker Oats Technology Services Group Tetrapak Tnquint Semiconductor	10 Chicago Trading Company Defense Nuclear Facilities Safety Board DuPont ExxonMobil Corp Hewlett-Packard Company Medtronic Micron Technology Moog, Inc Morgan Stanley Dean Witter National Starch & Chemical Company Procter & Gamble Trinity Consultants West Group	11 Agilent Technologies Aware Braun Consulting Equistar Chemicals ExxonMobil Corp Hewlett-Packard Company Inforte Invocon Medtronic Procter & Gamble Toyota Technical Center	12 ALCOA Agilent Technologies Bose Corp Headstrong Invocon Nestle USA Pioneer Hi-bred Sun Microsystems Tarlton Corp. ZS Associates
15 American Institute of Steel Construction Clarity Consulting, Inc. Honeywell Metropolitan Water Northrop Grumman Realized Technologies Tucker Alan, Inc.	16 Applied Physics Lab/Johns Hopkins Univ Avery Dennison Corp Cingular Wireless Crowe, Chizek & Company LLP Metropolitan Water Raymond Professional Group	17 Analog Devices CNA Insurance Companies Crowe, Chizek & Company LLP General Electric SABRE Inc Shell Trane Company Worldcom	18 General Electric GKN Walterscheid Inc Goldman Sachs M/A-Com MIT Lincoln Lab Naval Research Laboratory Shell Trane Company UOP Visteon	19 AK Steel Factset Research Systems Ganna Construction Verizon
22 E*Trade Frito-Lay Mathworks UBS Warburg UOP	23 Cummins Engine Company EnginPRO General Mills Kennametal Malcolm Pirnie, Inc. National Semiconductor Nvisia PricewaterhouseCoopers United Defense	24 American Management Systems Clark-Dietz, Inc EnginPRO G-Bar Ltd Partners General Mills Mainstream Engineering Corp National Semiconductor Nvisia Shure Inc United Technologies Corp	25 American Management Systems Applied Materials Baxter & Woodman CAP Gemini Ernst & Young Lawrence Livermore National Laboratory Osram Sylvania Inc Patrick Engineering	26 Praxair Qualcomm, Inc. Schulze & Burch Biscuit Co
29 Actuate Corp. bp (Formerly Amoco) Southwest Research Institute Sprint PCS	30 Apple Computer bp (Formerly Amoco) Dolby Labs Green Hills Inc. The Hull Group Jet Propulsion Lab	31 Apple Computer Bain & Company Green Hills Inc KAI Software Norfolk Naval		

For more information or an updated calendar, please see the Engineering Career Services web page at *http://ecs.cen.uiuc.edu/*

The Life of an Engineer - Not All Lessons are Academic

As an engineering student at one of the most rigorous universities in the country, your life is challenging. However challenging, it is important to remember that, ultimately, your life is unique. You are not like every other student. You may complete the same coursework as thousands of others, but you will not excel in the same areas, fail the same classes or learn the same lessons as another. Recently, students shared their perspectives on life as an engineer in an essay contest about what they have learned as an engineering student. Here are excerpts of the lessons they have learned. Keep them in mind, and be prepared to learn your own.

Compiled by Joan Wagner

This first excerpt won first place in the essay contest. In May 2002, at age 29, Douglas Campbell Britton will graduate with a Bachelor's degree in Computer Science/Engineering. Why so late? Douglas came to the University with everything going for him – strong grades and a strong support system. However, the University became too difficult and Douglas withdrew. He decided to start over. He applied his computer skills to the work force successfully. At 23 he was named assistant vice president at First Chicago NBD. His diligent work showcased his remarkable skills, but it did not determine the exact path Douglas' life would follow. He then joined the service and excelled in one of the most difficult programs available. He shares his invaluable lessons learned from his many life experiences in the following excerpt.

…There are many parallels between the work of a soldier and the work of an engineer. A soldier is a person with a strong sense of duty and integrity. When a soldier is given an order from a sergeant or officer, that soldier promises on his or her life to accomplish the given task. An ancient army proverb says, "The maximum effective range of an excuse in the military is zero meters." That means you can't give excuses for being late or for not accomplishing the given task... You must strive to be successful at every task. This strict training helps build in you the confidence that you can accomplish any task, from reading a manual to engaging a hostile enemy under heavy fire. The training and the drill sergeants helped me realize I am far more capable than I had ever imagined. I received the training I was missing in personal discipline. I could stick to a tedious task and see it through to the end. I could follow the arbitrary, often silly and self-contradictory rules of the drill sergeants because I had discipline. Discipline was a choice I made…

…How does this tie into my engineering education? All of it was indirect training in how to be an engineer. The army trains in pro-active leadership, creativity, attention to detail, self-discipline and teamwork. These are also very venerable qualities in an engineer…The engineering standards that some learned in college, I learned in the military….

…An engineer with a wide base of experience that reaches far beyond their everyday subject matter is a wiser engineer. I know that all of us padded our resumes and college applications with examples of extracurricular activities in order to display our diversity and leadership. Don't expand your horizons for the sake of a college or employer. Do it for yourself. Do it for the challenge of sharpening your mind at a completely different discipline. In that discipline, search for ties to the mindset of an engineer. If you can't find them, then you aren't really looking. Ask yourself, are you really a good engineer? Challenge yourself…

…You might be capable of making it through an engineering program at the U of I, but make sure that it is what you want to do. When you are picking your options and paths, ask yourself why you are choosing engineering… In the course of learning other disciplines and hobbies, you will discover other things you like and other skills you have. Take the opportunity while you are young and without ties to see enough of life to be sure you have a solid idea of what you want to study. There is nothing lost if you truly invest yourself in a discipline and that leads you to a new endeavor. These learned lessons will carry over to the new field of study. I was a better soldier because I had been a student of engineering. I was better at studying languages because I had the systematic discipline of a soldier. And now I will return to be a better engineer…

…To you, tomorrow's engineers, have the courage and confidence in yourself to pursue your own life for your own reasons. Pick what interests you. If that means leaving the field of engineering, so be it…

… Do not believe anyone who says you don't have what it takes. Teachers that cannot help students understand concepts are weak teachers…

…Trust yourself. Trust your instincts and your emotions. Don't let decisions be made for you. Actively make your choices. Solve problems in a creative manner. That includes solving your own personal problems in a creative manner. If you hurt, get help. If you are unsure, ask a question. If you are scared, call your parents or friends. After all, what is the work of an engineer? Engineers solve problems. Be an engineer.

- Douglas Britton

...I have learned... the importance of using our engineering training to benefit our community. One professor I had was going to testify to the Champaign City Council about the Boneyard Creek project, suggesting improvements and questioning their proposed design. Another engineering professor was instrumental in getting Champaign and Urbana to start a curbside recycling program by collecting data on trash generation from his own house. I have seen aeronautical engineering professors quoted in the local newspaper when the Concorde airplane crashed, and I have seen engineering professors acting and setting up pyrotechnic stage explosions for the Champaign-Urbana Theatre Company. I even met one faculty member at a volunteer workday repairing a roof. From all these examples, I have learned the importance of being active in the local community, and how our training goes farther than just the work we do for our job.

- Brandon Field

...Questions are more important than answers. I know this probably goes against what the school system has ingrained in your brain, but ask any intelligent person and they'll tell you the same thing. Answers are just starting points for better questions. Questions fuel the process of learning. You want to be really, really, ultra smart? Ask really, really, ultra smart questions. Right now if you asked yourself, "What kind of questions is he referring to?" you're well on your way.

Boredom is caused by a lack of questions. Curiosity will cure any boredom. Find yourself not enjoying lecture? Whip your lazy mind into shape and think of some interesting questions.

You cannot learn anything without first learning something related that topic. Either relate the topic in some way to what you already know, or be prepared to sit in a zombie state for 50 minutes each lecture. The easiest way to relate a new lesson to prior knowledge or experiences is to ask yourself, "What does this remind me of?"

Galileo once said, "You cannot teach a person anything. You can only help him to find it within himself." Realize that the learning process is not something that someone does to you, or that you get from just sitting in lecture... In order to learn anything, you must take an active role. You must almost literally grab the knowledge, mush it, twist it and play with it until it fits into your brain. Keep asking questions and keep finding ways to look at knowledge from different perspectives.

So you just learned a new topic and you're sure it's going to be on the exam. What's a great way to find out if you've really learned it? See if you can teach it to someone else...

- Matthew R. Miciek

...I ended up enjoying my time as an undergraduate at the University of Illinois enough that I decided to stay and pursue a graduate degree in mechanical engineering. The department I work in is flooded with international students. In fact, I am one of seemingly few Caucasian-Americans in the program. One of the people in my laboratory is a man working on his post-doc from Korea. His English is limited to the point were I can barely understand him. But in the time I have spent talking to him in the lab I have learned much more about life in his homeland than I could learn from any book. With a concerned look on his face, he tells stories depicting the vast lifestyle gap between the rich and the poor. He conveys to me how he wants to succeed and witness his son succeed. He also discusses his experience here in the states. Despite the prosperity of the U.S. compared to Korea, he is not nearly as happy here because language barriers are holding him back from connecting with others.

As a freshman, I merely tried to survive in the diverse environment here. By now, I have realized we can do much better than congeniality in relating with the diverse environment that surrounds us. We can become people who are willing to take the time to listen and encourage people of all different backgrounds without being held back by our fears. We can be people who positively affect others' experiences at this school and allow them to affect ours.

- Brad Robinson

"I'm sorry, but your daughter will need to pick up her packet herself."

These words, spoken to me as I tried to retrieve my orientation materials soon after being accepted into the College of Engineering, threw my nagging doubts about returning to school... Here I was, a 37-year-old mother of three, standing shoulder-to-shoulder with the other transfer students, many of whom were young enough to be my children. Was it any wonder the volunteer assumed I was trying to collect materials for my daughter?

...My code of behavior for getting along on campus is simple: keep out of classmates' faces until they're ready to interact; never use age or life circumstances as an excuse for failing; never, ever make "old" jokes about myself; ask for special consideration from the faculty as infrequently as possible; [...] ask all those "dumb" questions that used to make my eyes roll; and aggressively pursue all the opportunities available to my younger colleagues.

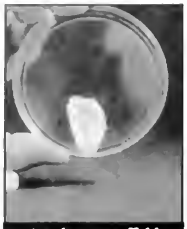
Development of this plan for survival as a non-traditional was an important exercise, but it hasn't been altogether necessary. I've been pleasantly surprised to find that by and large, the students sitting around me are far more accepting than I had ever been...

...It's occasionally taken an entire semester of quiet competence to convince some of the young men around me that I'm not their mother come to clean up the classroom and keep watch over their language and dress, that I am – like them – a student. In the end, though, we develop a unique type of friendship that defies generational differences. I am neither peer nor den mother, but a blessed combination of the two. My friends have come to me for advice on how to handle social situations or what to do after graduation, and they've enlightened me on the ways of a college student, from hangover remedies and basketball point spreads to where to go for the best Chinese food on campus. The richness of life that comes from crossing the generations rivals the thrill of succeeding academically...

... Yes, I'll walk away with a prestigious degree and probably a guarantee of a good job somewhere, but I'll be carrying much more. The friendships, the confidence bred by success, the hope that my children will learn from my experience to open themselves to opportunities, no matter how improbable they seem, all come wrapped in the package. Little did I know at my orientation session three years ago that the packet that young volunteer hesitantly presented to me would carry such weighty materials.

- Ann-Perry Witmer

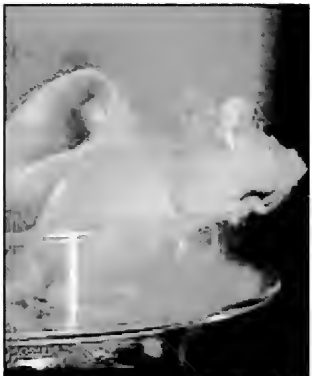
Continued from page 1



A polymer scaffold which has been formed into the shape of an ear.

take on a whole new meaning. David J. Mooney at the University of Michigan at Ann Arbor is researching that very topic, but he intends to produce tissue for women who have had surgery that has left them without their original figure. The same personalities which get body piercings and tattoos in the world of today may get surgically implanted fangs as suggested by William Gibson in his visionary novel Neuromancer and his short story Johnny Mnemonic. Horns, claws, and other curiosities not bestowed upon us by Mother Nature may all become parts of the human body. Athletes may improve their own abilities by replacing their own tissue with improved ones that would enhance their abilities.

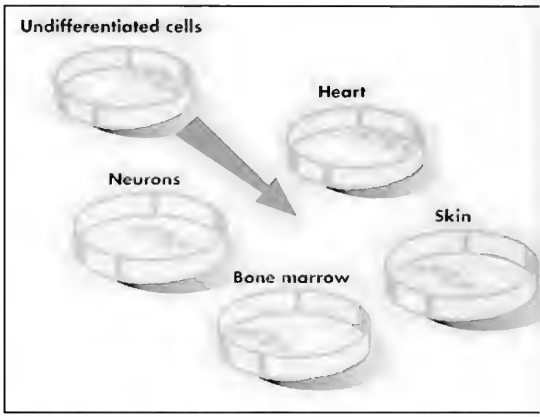
Outside of the human body, engineered tissue may find a variety of applications. Electronically controlled muscles and sensors could be integrated into high tech machinery. Artificial muscles could be used in everything from door openers to earth moving equipment. Sensors made from biological material could determine whether water is safe to drink and possibly whether someone is under the influence of drugs. Perhaps some day animals will not be raised and slaughtered for meat. Their tissue could be grown in vats and specially engineered to be both appealing and nutritious. While this is not cost efficient today, wealthy people may pay large sums of money to sample laboratory grown meat simply because it is unique.



A mouse with a human ear growing under it's skin. The ear is made from a polymer scaffold which is impregnated with human cartilage cells. It can be removed without sacrificing the life of the mouse. Some people have mistaken this picture for a genetically engineered mouse. Most tissues are not grown under the skin of laboratory animals. They are grown in incubators which are sometimes called bioreactors.

Doctors are not the only scientists working in tissue engineering. Chemical engineers, cell biologists, electrical engineers, and materials scientists are among the many specialists that have played a pivotal role in the development of current tissue engineering technologies. Robert Langer and David J. Mooney are both trained as chemical engineers. Many materials science departments have a biomaterials program or participate in an interdisciplinary bioengineering and tissue engineering program. Electrical engineers and computer scientists are working on rapid prototyping methods to produce the polymer scaffolds, which will support laboratory grown organs.

Research laboratories are not the only source of engineered tissues any more. Many companies throughout the country produce polymer scaffolds, skin, gum tissue, and cartilage. Others are anticipating the development of more complicated tissues. Integra Life Sciences in Plainsboro, New Jersey is researching general methods for the production of tissue using collagen products. Creative Biomolecules in Hopkinton, Massachusetts uses a protein called OP-1 and a polymer mixture to regenerate dental bone. Advanced Tissue Sciences of La Jolla, California has a large part of the market for the production of engineered skin and possibly cartilage for knees and other joints.



At present, tissue engineering could hardly be called more than a fledgling field, but someday it may be as significant as chemical or electrical engineering. Perhaps our children will consider majoring in tissue engineering in college. Terrifying and miraculous things will doubtlessly be seen as a result of tissue engineering research, and as is the case with most new technologies, tissue engineering will open new doors and pose new questions for generations to come.

WEB LINKS

Massachusetts General Hospital Tissue Engineering Page
If you only visit one site, visit this one:
http://www.mgh.harvard.edu/depts/tissuelindex.html
Tissue Engineering Pages:
http://www.mgh.harvard.edu/depts/tissuelindex.html
Carnegie Mellon Tissue Engineering Tutorial:
http://www.cs.cmu.edu/People/tissue/tutorial.html
Pittsburgh Tissue Engineering:
http://www.pitt.edu/~cbh-tissue.net/index.html
A list of sites about Tissue Engineering:
http://dmoz.org/Science/Technology/Biomedical_Engineering/Tissue_Engineering
Subscription Information for a Tissue Engineering publication:
http://www.liebertpub.com/TEN/default1.asp
Information about Robert Langer
http://web.mit.edu/afs/athena.mit.edu/user/r/l/rlanger/www/
Discover Magazine
The article Brothers with Heart is available online in the July 2001 issue of Discover:
http://www.discover.com/recent_issue/index.html
A Business Week Article about Tissue Engineering
http://www.businessweek.com/1998/30/b3588061.htm

Discovery LS: A Revolution in Medical Imaging

On June 21st, 2001, GE Medical Systems showed the world the future of medical diagnostic imaging. At a gala press event at the Waldorf-Astoria hotel in New York, GE unveiled its new Discovery LS hybrid CT/PET system to over 500 media agencies.

By Chirantan Mukhopadhyay

On hand were Jeff Immelt, president and chairman-elect of GE, Joe Hogan, president and CEO of GE Medical Systems, and Beth Klein, VP and global general manager of functional imaging. Dr. Ralph E. Coleman, vice chair of the Division of Nuclear Medicine at Duke University Hospital, Dr. Gustav K. von Schulthess, director, Division of Nuclear Medicine at Zurich University Hospital, and Dr. Homer A. Macapinlac, Associate Professor of Radiology, Director and Section Chief of PET MD at Anderson Cancer Center, amongst others, represented the medical community.

Why the Discovery System is Important: The Impact of Cancer

Cancer is a pervasive problem that effects nearly 10 million people around the world, a figure that includes incidence, prevalence and mortality rates for the disease. Asia reports the overwhelming majority of cancer cases at 4.4 million. By comparison, Europe reports 2.8 million, North America 1.4 million and Africa 627,000. Developing countries, including those in Asia, lead the world in lung, oral and colon cancer and Hodgkin's disease cases while North America suffers the most skin cancers. Given the burgeoning populations of many developing nations and the probable increase in the incidences of melanoma due to the thinning ozone layer, cancer will continue to be a serious problem for millions in the years to come. Given these sobering figures, the medical establishment is understandably optimistic about GE's new machine, a device the company and medical professionals hope will greatly improve cancer treatment.

Hospitals, doctors and medical experts the world over are very optimistic about what the Discovery system can do for the diagnosis, tteatment and prevention of cancer. Physicians believe this system will give them a powerful new tool and may help alleviate the sufferings of cancer patients and hopefully someday prevent cancers from developing.

CT-PET: The Next Generation of Imaging

The Discovery LS, GE's newest image fusing device, has also become its new flagship product. Combining two existing technologies, CAT or CT scanning, and PET scanning, the Discovery LS, which stands for Light Speed, promises to greatly enhance a physician's ability to diagnose and determine proper treatment for cancer.

How CT Scanning Works

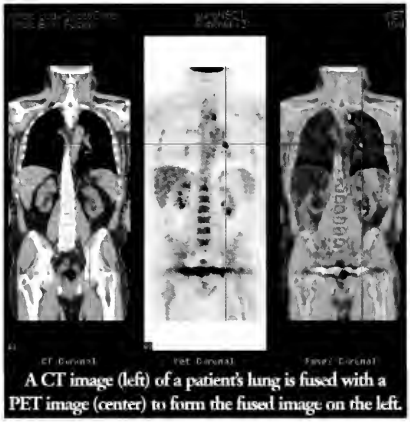
GE's new flagship product - the Discovery LS fused image scanner

CT stands for Computed Tomography and uses X-rays to provide detailed anatomical information about a patient. During a CT scan, the patient lies on a table while an X-tay tube and detector array housed in a gantry revolves around them. During the scan, the X-rays emitted by the device are absorbed by structures of varying densities in the patient's body. After multiple revolutions around a "slice" of the patient's body, the CT scanner has acquired enough data to generate an anatomical image of the patient, including organ and bone structures.

This aspect of the procedure is the tomography. The computer comes in when the raw data is processed and displayed as an image showing density gradients in the body, and, hence, anatomical structures. Newer CT scannets not only revolve around the patient's midsection. They spiral up and down the length of their body, thereby providing a detailed image of a patient's anatomy, a process analogous to putting slices of bread together to create a loaf.

PET, or Positron Emission Tomography, works on a similar principle, but provides metabolic rather than anatomical information. Doctors can use this chemical and physiological information as an early

warning system to detect the development of certain diseases before they manifest themselves anatomically. Prior to a PET scan, the patient is injected with mildly radioactive substances which act as tracers as they work their way through the body. The most common of these is a sugar called FDG. As the body's cells metabolize this sugar they give off energy that the PET scanner detects and, after some processing, displays as diagnostic images. Specifically, cancerous cells utilize sugar much more rapidly than normal cells, so the scan picks up these cancerous regions and displays them as "hot spots" in the image. A PET scanner is specifically tuned to detect such "hot spots," making it an essential part of cancer diagnosis.



A CT image (left) of a patient's lung is fused with a PET image (center) to form the fused image on the left.

The Fusion Technology

By themselves, CT and PET technologies are powerful tools and greatly aid in the search and detection of cancer. However, there are significant disadvantages to using separate scans to provide anatomical and physiological patient information. The biggest disadvantage is the length of time required to complete both sets of scans. First, a patient must get a CT scan, await the results, then get a PET scan and await those results. With the Discovery LS system, patients and doctors get the information from both scans in one 30-minute procedure, instead of having to wait 2-3 weeks for a separate CT and PET scan.

Another disadvantage with two scans is the difficulty in trying to exactly correlate the anatomical data of a CT with the physiological information from a PET scan. During both scans, as the patient lies on the table, they make slight movements of their bodies that show up in the images. When doctors later try to combine the images to determine exactly where in a patient a cancer has developed, they find it difficult because the images from the CT don't necessarily line up with the images from the PET.

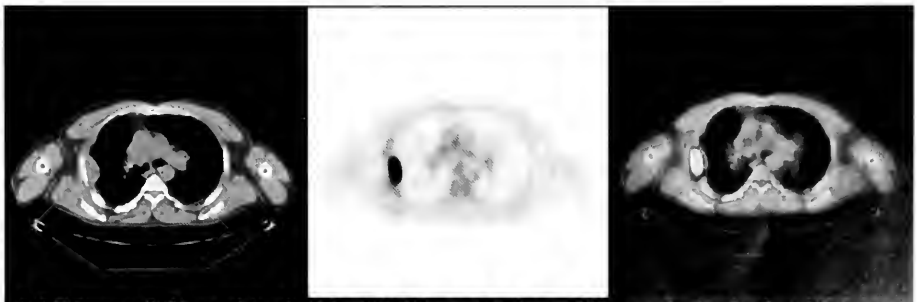
The Discovery system gives doctors both structural and metabolic information for a patient at the same time, greatly increasing the accuracy with which they can detect and pinpoint cancer. According to GEMS, the images from Discovery can be thought of as radar images shown on TV weather reports. The PET shows concentrations of cancer cells in a color spectrum, like radar shows concentrations of precipitation. The CT provides the "map" in the weather report analogy, showing doctors precisely where the cancer is located. The Discovery truly provides the best of both worlds by fusing images from the GE LightSpeed Plus CT scanner and the GE Advance Nxi PET, the fastest, most sophisticated CT and PET devices that GEMS manufactures.

Genesis of Discovery

According to GE, development of the Discovery LS was prompted by customer demands for a fast, all-in-one system that would combine the accuracy and information of both CT and PET scanners. The system represents the next step in GE's already advanced line of image fusing technologies.

A physician's need to detect, diagnose and treat cancer more effectively led to the development of the Discovery LS system. For years, medical professionals such as radiologists, nuclear medicine professions, radiation oncologists, surgical oncologists and referring physicians have been looking for reliable answer to questions like, "Does a patient have cancer? Is a legion benign or malignant? Where is the cancer? Is it spreading? How large is the cancer? What is the optimal therapy? Is the therapy working? Is there a reoccurrence of cancer?"

The Discovery LS helps doctors accurately locate legions, identify those legions as benign or malignant and differentiate them from scar tissue. The system also boasts excellent sensitivity and specificity, resulting in clinical confidence and the reduction of false alarms and missed detections. Perhaps most importantly, fused images help guide a physician's treatment of cancer patients. It lets them identify the stage of the cancer, plan radiation treatment and monitor the effectiveness of that treatment and make dynamic adjustments if necessary.



A CT Image (left) combined with a PET image in the middle, results in the fused image to the left. This fusion process gives doctors greater insight as to where a tumor, visible in the center image as a dark spot, has developed in a patient.

Early development of the system began in the mid-90s. Since then, GE has spent $50 million on the Discovery, plus another $80 million on research and development of the LightSpeed CT and Advance NXi PET systems. In order to develop these devices, the company utilized it's highly-touted Six Sigma quality control methodology, specifically, a process called "Design for Six Sigma" or DFSS.

Earlier Image Fusing Technologies

Discovery LS is the latest in GE's long line of image fusion technologies. After last year's purchase of SMV, a small but technologically advanced medical imaging firm, GE has been hard at work incorporating SMV's product line into their own image fusing machines. For example, GE's Discovery VI, currently in the development phase, uses a six-detector design pioneered by SMV in their Positrace hybrid CT/PET scanner. GE innovations to the Positrace design include the use of one-inch sodium iodide detector crystals, called Starbright. Also, GE has fused SMV's PET system with their HiSpeed CT scanner and sped up acquisition times. The system, priced at $1.3 million, will begin shipping in the fourth quarter.

GE also upgraded its popular Hawkeye system with the Discovery VH, a multipurpose scanning device. The Hawkeye has already established a strong foothold in the global imaging market. The system has been installed at 75 medical centers and has serviced approximately 5000 patients since it's introduction last year. The Hawkeye also features optional software packages that can correct attenuation for enhanced image quality or improve localization of pathological findings. GE is also planning to release a Hawkeye system to be used for nuclear cardiology that will cost under half a million dollars.

Looking beyond image acquisition, GE has plans for several enterprise solutions for enhanced hospital connectivity. New software for their eNtegra and PowerStation workstations will improve workflow and networkability. Currently in the works is a system that would bring eNtegra to a pocket PC environment, thereby allowing doctors access to images, scheduling, patient studies and workflow from anywhere. GE Medical Systems Information Technologies, a division of GEMS that specializes in information systems and systems integration, also has plans to create services that will enhance doctor access to clinical information and images. The creation of such workflow and enterprise solutions specifically for Discovery LS images will be greatly eased since the entire system is digital.

Outlook for Discovery and Response of the Medical Community

Unfortunately, as with any new medical technology, the initial use of the Discovery LS system will be very limited due to its cost. The unit, which is manufactured at GE Medical Systems World Headquarters in Waukesha, Wisconsin, boasts $2.7 million price tag, and will be installed in 30 metropolitan areas by the end of next year, says GE. By 2003, GEMS hopes to ship 500 Discovery systems. Hopefully, as the price of the system declines, the system will be used in more a preventative function. According to Dr. Coleman, "I think that in the future, we will see this being used more and more in screening modes. I think it'll be particularly helpful for patients that are a high risk for having a cancer."
Currently there are three units operational in beta sites around the world: Zurich University Hospital Zurich in Switzerland, Johns Hopkins Medical Institution in Baltimore, Maryland, and Rambam Medical Center in Haifa, Israel. The orders for new units are already coming in - the day after GE held their press conference, a New York hospital placed the very first order for an LS system from GE's web sales center, according to Beth Klein. Despite the unit's hefty price tag, Joe Hogan is hopeful that hospitals will acquire the Discovery, stating that institutions can break even economically with a scan volume of 5 patients a day.

Likewise, at the Waldorf, other GE officials expressed their optimism about the development. According to Immelt, "Discovery LS will help pave a new frontier in patient care as advanced medical imaging becomes the eyes to help new drugs and other innovative treatments precisely target disease." Beth Klein looked to the future: "This is only the beginning. It can revolutionize cancer care. We will continue to expand."Dr. Coleman shared her positivity, "In years to come fused imaging systems could become as popular as magnetic resonance and CT scanners because of their ability to detect disease earlier and optimize treatment." Dr. von Schulthess was also optimistic, stating, "This translates into better-tailored therapy for patients."

The response from others in the medical community has been similarly optimistic. "The opportunity to aid doctors in diagnosing cancer more accurately and monitoring response to treatment earlier means that these new anti-cancer drugs may be utilized properly to have a greater chance of working," said Dr. Macapinlac.

Dr. Schulthess perhaps best sums up the impression of doctors around the world: "The Discovery LS may be the most significant development in cancer detection and diagnosis in the last 20 years."

As other forms of cancer treatment become more effective, including cancer-blocking drugs, the Discovery LS system and it's successive iterations of fused imaging technology should prove invaluable in the treatment and eventual prevention of cancers around the world. By giving doctors a map of the human body and indicating which areas are trouble spots, Discovery will aid significantly in the development of targeted treatment options.

WEB LINKS
For more on this issue, check out:
http://www.gemedical.gems.com/pr-rsm/usmi/discovery_facts.html
http://ll.iz.yahoo.com/bwl/010621/2251.html
http://www.jconline.com/bzm/news/jun01/ge210621a.asp

Top Eleven Tips for Buying a New Computer (And One For Bringing Old Computers!)

So you're going to college and don't want to have to deal with your family's ten year old Apple IIe. A perfectly reasonable request. Here are tips on buying a new computer from someone who's done it recently.

by Jason Wong

1.) Laptop vs. Desktop
A desktop is cheaper, more powerful and less likely damaged. But a laptop is, well, portable. Feel like going to the library to study but still need Internet access and don't want to sit in a lab? Bring your laptop and an Ethernet cable, and you're set to go since the libraries have Ethernet ports. During finals week, I went to the library to study and my laptop became my MP3 player - very convenient. And security for a laptop? Just buy a decent quality lock, or something that beeps when you try and move it - you'll feel better. Laptops are definitely more expensive, but if you (your parents?) can afford it, it's well worth it.

2.) Choose RAM over processing power
So you have an option - get 128 MB of RAM instead of 64 MB, or stick with 64 MB and get that faster processor. GET MORE RAM! I cannot emphasize that enough. The jump from 1 GHz to 1.2 GHz will not matter as much if you don't have at LEAST 128 MB of RAM - the newest version of Windows, Windows XP Consumer, requires at least that much. For a laptop, get the most you can afford, and, for a desktop, 256 MB would be ideal.

3.) Get a big screen
Since you are an engineer, a healthy portion of your day will be spent staring at a monitor. So spend a little more and your eyes will thank you. For laptops, I'd recommend at least a 14" LCD screen, and, for a desktop, at LEAST 15", but a 17" monitor will make you much happier. 19" is overkill, but it's fun! Good luck fitting that on your desk, though!

4.) Get more hard drive space than you think you need
CDs are a great thing, but MP3s are better. Are they illegal? Well, yes... But, nevertheless, if you do break the law, playlists of MP3s are like listening the radio without the commercials. And, you can burn your favorite tracks off your CDs and create a gigantic mix. MP3s are small compared to WAV files, but you ended up ripping so many off CDs and downloading them from other places that it adds up. Also, you may be downloading video files (episodes of the Simpsons, for example), and while 10 GBs will do, 20 GBs and over will be best. This is more of a laptop concern, but it's a worthwhile tip nevertheless.

5.) Get a printer
Yes, all the computer labs have printers. But laser printing costs 8 cents a page. Yes, the dot matrix printers are free, but the dot matrix printers also suck. They are slow, have low quality, and the paper is virtually see-through. You will need to print a lot more than you expect - class notes, multiple drafts of papers and e-mail as an abbreviated list. It's far more convenient to print in your dorm room. It's a heck of a lot cheaper than 8 cents a page too!

6.) For laptop users: Get a port replicator

So, if you're like me, you have a lot of gadgets - USB, serial, maybe even an old parallel port widget sitting around. First, imagine plugging all that into the back of your laptop (speakers, a couple USB connections for a printer and CD-RW drive, serial port for an organizer, a parallel port connection for an old Zip drive). Then, imagine trying to bring the laptop somewhere, having to disconnect approximately 500 connections, then having to reconnect it all once you return to your room. Not fun. A port replicator will give you more ports than the back of your laptop, and all you have to do is connect or disconnect your laptop to the replicator! Instant connections/disconnections! Highly recommended.

7.) Also for laptop users: Buy an external mouse!

I got SO frustrated with my touchpad that I ran out an bought a nice, high-quality mouse. Touchpads get annoying, as do those pointing sticks some laptops have in the keyboard. Go for a good mouse. Believe me on this one. You can thank me later.

8.) Spring for the Microsoft Office software

Microsoft Word is obviously crucial when it comes to surviving academically. Most systems will come with at least that. Computers that don't come with Microsoft Office, though, are missing pretty crucial college software - namely Excel and PowerPoint. Excel is just really useful in automating GPA calculations (you're an engineer - you know you'll do it) and PowerPoint is useful academically. Many classes use PowerPoint notes, and higher level classes will require that PowerPoint presentations be given. Yes, the computer labs have them. And yes, the computer labs are extremely inconvenient to use. You're a college student now, so you can get a discount on the software - it's worth it.

9.) Your computer will become your entertainment center

Get good speakers - you will need them. A desktop system with satellite speakers and a subwoofer will be a great thing. Built-in laptop speakers suck, believe me - no bass whatsoever. Invest in a pair of speakers - it doesn't have to be a great pair, but anything will beat the internal speakers. And reconsider that stereo that you've been thinking about hauling down to U of I - the radio will be rarely used, CDs can be played on your computer, and do you really have tapes that you listen to anymore?

10.) Make friends with people with CD burners

This goes back to the digital entertainment center. Not everyone has a portable MP3 player, and it's far cheaper to burn CDs from MP3s. Either get a CD burner yourself or find someone who does. Then transfer your MP3s, convert them to WAVs and then create an audio CD. Your Discman will thank you.

11.) Go With A Quality Company

Yes, a big name will be good, unless you know lots of computer hardware guys that you can call at the drop of a hat OR can fix it yourself. But with a big company, web-based tech support, 24/7 phone help and quick parts exchange will be very reassuring along the way. Don't immediately go with the cheapest company - talk to others, see what they have to say. Especially with laptops - you just can't crack open the case. Though, with desktops, you can void the warranty if you open the case, and that's also bad. So get some recommendations, and make good friends with hardware geeks.

Still thinking about that Apple IIe? Well, here's my one tip:

1.) *For an old computer, make sure the most updated Internet tools work well*

U of I does a LOT of things through its network - class registration, e-mail communication and even online homework. Download the best web browsers available on the computer you are thinking about bringing, along with Adobe Acrobat, U of I Direct, Windows Media Player and RealPlayer. As long as these software packages can function fairly well, your old computer will do. It may not be the best, but it'll do.

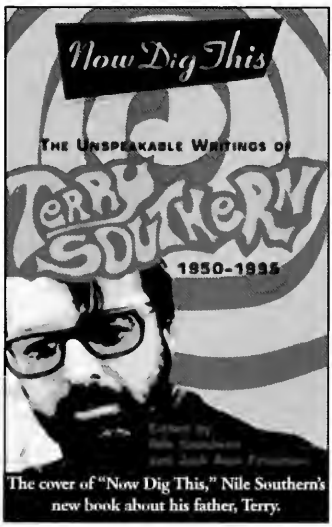
An Interview with Nile Southern

I'm not comfortable writing this piece because Terry Southern is my favorite writer. So I'm going to be honest with you. After you're done reading this, I want you to go out and buy all of Terry Southern's books. I want you to read them, live them and give them to your friends and family members. I want international Terry Southern Day. I want everyone walking around speaking ultra-fab slang to each other. I want a society that not only admits we all hide dark parts in our souls, but a society that teaches us we can make the dark part weak through laughter.

by Randy Duax

For starters, however, I'd be happy with everyone giving Southern the credit he deserves. Southern passed away in 1995 leaving behind a massive amount of unpublished work. Hollywood hadn't called on him much in the last decades of his life, even though he'd written *Dr. Strangelove*, *Easy Rider* and *Barbarella*. Literary circles had snubbed him for giving screenwriting a go, ignoring his critically acclaimed masterpieces *Red Dirt Marijuana and Other Tastes*, *Candy* and *The Magic Christian* (my favorite). He was the godfather of the beat poets and the beginning of New Journalism. For those of you still unimpressed, take a look at the cover of *Sgt. Pepper's Lonely Hearts Band*. See the guy in the shades? Yup. Terry Southern.

Luckily, for those of us who've exhausted our resources and needed a fix, Terry's son Nile released *Now Dig This: The Unspeakable Writings of Terry Southern, 1950-1995* on June 1st, 2001. I've been chomping at the bit waiting for this collection, and after years of visiting Terry Southern's website (*http://www.terrysouthern.com*), I e-mailed Nile with a few questions about the upcoming book and Terry.



The cover of "Now Dig This," Nile Southern's new book about his father, Terry.

Randy: What would you say Terry's philosophy on writing was? Who were the writers that he looked up to?
Nile: Terry was out to "smash smugness." He told *Time Magazine* in 1964 that "the world has no right to complacency whatsoever." He looked up to Edgar Allen Poe and some of French existentialist writers, like Celine and Camus. His philosophy and technique merged when he discovered that the great writers (like Poe) spent a lot of time getting the audience to believe in them as an authoritative and credible witness—once you have that, Terry said, you can go as far out as possible—which he often did.

R: (I have to ask 'cause this is a technological magazine) What were his views (if any) on technology?
N: He felt that systems whose creators believed they were foolproof really weren't. *Dr. Strangelove* is a good example. Terry loved the line he wrote for James Earl Jones when he's about to release the bomb which blows up the earth. All he says as he flicks the switch is "Second safety..." Terry wrote a screenplay about arms merchants selling weapons of destruction to the third world. He took a very dim view on military technology and profiteering as well. He was primarily a progressive humanist – someone who believed that man was basically corrupt, but that art could liberate...

R: What do you think is a good work of Terry's for the uninitiated to start with?
N: *Now Dig This* is a perfect starting point.

R: Did he have any personal conflicts in preferring to write films more than 'quality-lit' or vice-versa?
N: Yes - but it was too late to do anything about it. When Hollywood abandoned him, the literary world had already been sort of offended by his going over to the 'other side.'

R: What was Terry's most lasting contribution to American culture?
N: His characters, his unique prose style, his outrageousness and also the way he lived his life - true to his beliefs and uncompromising, despite the terrible hardships of being a neglected but important artist. He also coined or made famous many phrases: "Easy Rider," "Dr. Strangelove " and "fan-#*ing-tastic!"

R: What kind of audience does Terry's work most appeal to? (My brother Joey actually asked this, except he said, "How come girls never understand *The Magic Christian*

when I give it to them to read?!")

N: That is a very funny one because I have letters in Terry's archive from guys reporting the same thing and saying they dumped their girlfriends because they didn't think it funny! I guess guys like the excitement of messing things up, and that is what Guy Grand does - on a big scale! *The Magic Christian* shows you what Terry thought people who have tons of money ought to do with it: create pranks that expose the whole arbitrary nature of the human construct - one which currently serves the rich, and serves up the poor. We shall see which audiences Terry snares this generation. From what I can tell, he is being discovered by academics aged 20-50 (professors and students of literature and American Studies), screenwriters of all ages, pop culture people, journalists (aspiring and established - he is the reason many of them get/got into writing to begin with), and, of course, the counterculture (As a journalist for *L.A. Weekly* recently said, "Terry Southern invented the 60's").

Now Dig This was released June 1st.

WEB LINKS
For more information on Terry Southern and *Now Dig This*, visit:
http://www.terrysouthern.com
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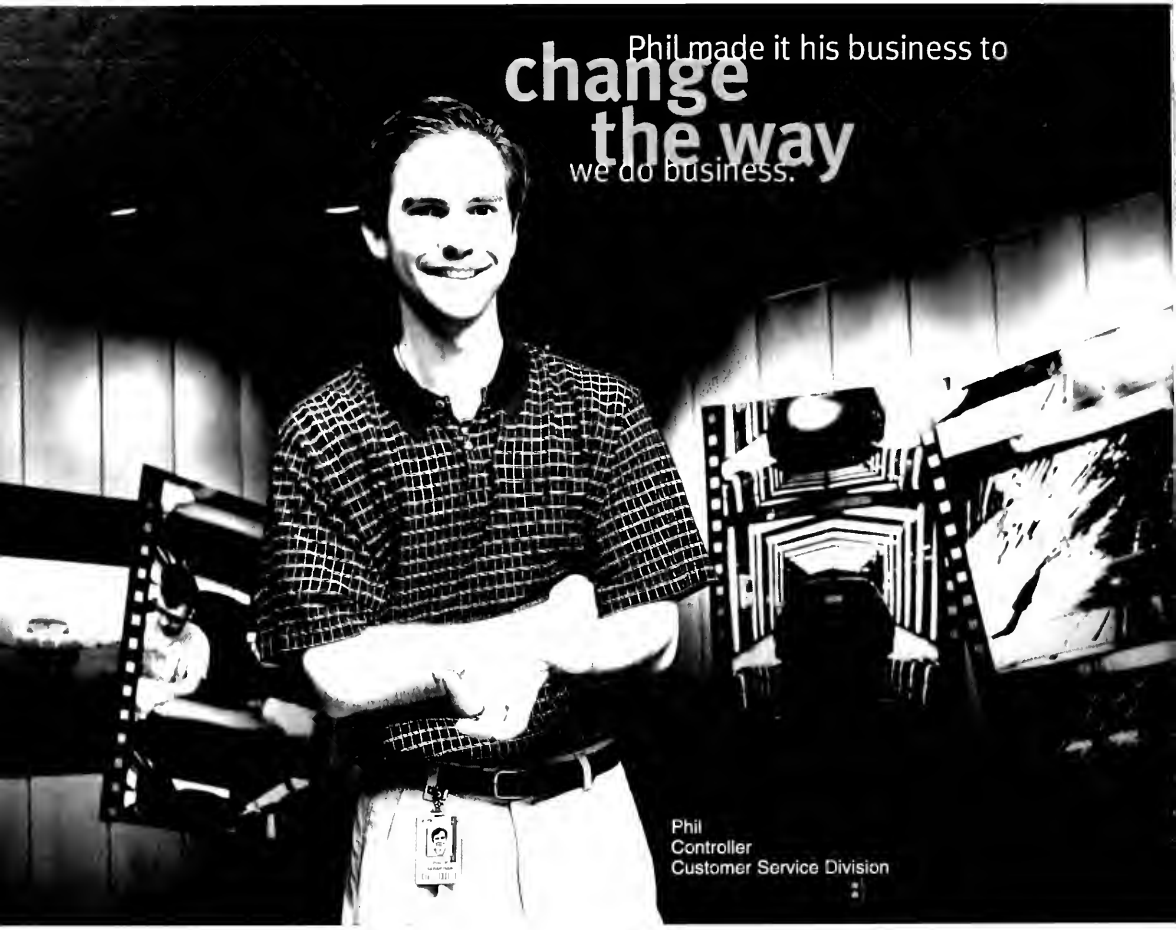

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