# TABLE OF CONTENTS

## Contents

2  Acknowledgements  
3-5  Introductions by Dr. Ruth Fishbach and Dr. John Loike

### Section I: Mind-Body Interventions

6-8  Time for Pure Cognitive Enhancement  
Authors Authors Authors Authors  

x-x  The Case for “Chemical Castration”  
Authors Authors Authors Authors  

x-x  Un-pausing Menopause  
Victor Chiang  
Zhen Yu (Andy) Zheng  

x-x  The Ethics of a Spotless Mind  
Authors Authors Authors Authors

### Section II: Screening

x-x  The Ethics of Screening Smokers for Lung Cancer Risk  
Anish Shah  

x-x  Behavioral Genetic Testing in the Financial World  
Stephanie Pan  
Alyssa Rios  

x-x  Ethical Boundaries for Athletic Genetic Testing  
Hayley Dirscherl  
Philip Kemp

### Section III: Public Policy

x-x  A Trip on the Drunk Bus  
Authors Authors Authors Authors  

x-x  Heroin Can Help  
Authors Authors Authors Authors  

x-x  Bobbing for Apples Babies  
Leah Peterson  

x-x  Scientific Fraud – A Greater Crime  
Victor Chiang  
Jefferson Lin

x-x  Opt-Out Organ Donation  
Andrew Radoshevich  
Lok-Kin Yeung

X-x  Ethics of International Medical Electives in the Developing World:  
Abby Chiverton

### Section IV: Transnational

x-x  When Life Itself is Out of One’s Price Range  
Kevin Gauvey-Kern Charlotte Blumenfeld  

x-x  World Health Organization’s Rankings  
Hayley Dirscherl  
Layla Houshmand
# TABLE OF CONTENTS (continued)

<table>
<thead>
<tr>
<th>X-x</th>
<th>Organs for Sale-50 cents an Organ!</th>
<th>Steven S. Ko and JungAh Franchesca Hwang</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-x</td>
<td>Eye Care Nightmare</td>
<td>John Allison Scott Pelletier</td>
</tr>
<tr>
<td>x-x</td>
<td>Is It My Decision or the Pheromones in the Air?</td>
<td>Elizabeth Smith Richard Kuo</td>
</tr>
<tr>
<td>X-x</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Section V: BioCEP 2009</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x-x</td>
<td>Cognitive Enhancement or Academic Doping?</td>
<td>Ritzu Fujita</td>
</tr>
<tr>
<td>x-x</td>
<td>Hymenoplasty: Bioethical Issues</td>
<td>Evan Rosenbaum</td>
</tr>
<tr>
<td>x-x</td>
<td>Singing a Song of Death</td>
<td>Emily Kyrillou, Raku Son and Khadijah Chalermthai</td>
</tr>
<tr>
<td>x-x</td>
<td>fMRI Lie Detection</td>
<td>Lie Guo, Sima Patel, Huili Zhu</td>
</tr>
<tr>
<td>-xx</td>
<td></td>
<td>Adam Packer Jaeyoung Han</td>
</tr>
<tr>
<td>X-x</td>
<td>American and Thai Views of Assisted Suicide</td>
<td>Margot Lazow Atthacha Runcharoen</td>
</tr>
<tr>
<td>X-x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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Preface

What are some of the most intriguing and contentious issues in Bioethics? Ask the prescient writers who have submitted their articles for this edition of the Columbia University Journal of Bioethics. And it is not just because the authors have been discerning enough to identify the issues. No, the authors offer us their perceptive opinions regarding not only what we need to be concerned about but what we can do to resolve these issues. Importantly, they also foretell the promises that our biotechnology will offer to promote the welfare of our nation and indeed the world.

This edition of the Journal is replete with issues that make us stop and take notice on a variety of new technologies such as using “smart drugs” to gain a mental edge over other students, or to transplant stem cells into an aged ovary that would fully restore child-bearing potential. The role of cultural in bioethics presents profound dilemmas – hymenoplasty is one of the fastest growing trends in the US, with a hymen implant complete with the insertion of a gelatin capsule filled with a blood-like substance that will burst during intercourse, simulating bleeding, for those who need to or want to suggest virginity. Consider the new pressure placed on surgeons, knowing that this procedure is designed to mislead family members. The brain, our ultimate scientific frontier, raises profound considerations which challenge us when viewing the beautiful images of our brains in action. But have we finally obtained the ability to detect lies directly from the brain that may provide the key that unlocks our most private sanctuary -- our mind?

Our authors discuss fully the interface between science and ethics where lies the notoriously gray area, where the intended and unintended consequences surface. For responsible science to go forward, these consequences must be revealed and confronted. Many of these outcomes are dazzling and sensational. But ultimately, they all will have an impact on our lives and even on our planet. Reading these exceptionally well thought out articles that are balanced to present the pros and cons, the benefits and the harms, the gains and the setbacks, certainly gives me great confidence that this cadre of students is fully aware and ready to take on the challenges that our creativity present. It is a great privilege to promote these discerning critics who will resolve the challenges that will surely confront us as we face the ever-new frontiers in science. They will ensure that we implement the bioethical imperative: it is not what can be done; rather it is what should be done.

Ruth L. Fischbach, PhD, MPE
Professor of Bioethics
Director, Center for Bioethics
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In 2009, the election of Barak Obama as President of the United States and the sharp decline in the American economy had a tremendous repercussion on biomedical research. President Obama re-evaluated how federal funding should be applied to stem cell research and initiated an economic stimulus package to promote biomedical research. While research funding resources have dramatically declined new discoveries in biomedicine continued to develop and advance. Many of the articles in this Journal address some of the most exciting advances in biomedical research and focus on the bioethical issues that emerge from these new discoveries. The authors of papers published in this Journal have voiced their opinions and proposed innovative insights and solutions in response to challenging bioethical issues. The common philosophical foundation of all of these authors is the mantra that “good bioethics begins with good facts”. Once the scientific background is described, the authors then discuss and attempt to resolve the emerging bioethical issues. These student contributors are aspiring scientists, physicians, lawyers, and philosophers whose thoughts and opinions are the heartbeat of this Journal. These students will emerge as the front line of scientific and medical discovery. Their future innovative research and ability to communicate science to the public will elicit and inspire bioethical debates. Furthermore, they will become essential players in helping society resolve many bioethical dilemmas. In addition, this year we have included guest faculty from Columbia University to write for our Journal.

This year’s Journal volume continues its tradition to include a special supplement from university students who participated in an innovative cross-cultural educational program called Bioethical Cross-cultural Educational Program (BIOCEP). In 2009, almost 40 student from eight different countries attended a special two week program at Mahidol University in Bangkok, Thailand exchanging ideas and learning how culture and religion influence bioethical dilemmas. Their articles reflect some of the lessons derived from this program and highlight the importance of cross-cultural humanistic values in confronting global bioethical conflicts.

John D. Loike, Ph.D.

Course Director– Frontiers in Bioethics,
Co-Director of Graduate Studies, Department of Physiology
With all eyes on hero-turned-confessed doper A-rod, there is renewed buzz around the ethics of performance enhancement. Society’s reasons for objecting to athletes’ use of performance enhancing steroids seem simple enough. First, sport should be an exhibition of pure, not chemically-enhanced, talent. Second, drug abuse poses health risks both for the athletes themselves and for awe-struck young fans, who may one day follow their example. The high profile nature of professional sports builds hype around athletic performance enhancement, creating a desire for an edge that extends beyond the playing field.

What argues against cognitive enhancement? The use of “smart drugs” by students and scholars to gain a mental edge is analogous to the way that athletes gain a physical edge with steroid use. Again, the leading arguments come down to health risks and fairness in competition. Among the current smart drugs, prescription Ritalin is abused by students to enhance concentration. New treatments in development to improve cognition in Alzheimer’s patients may also be among the prescription medicines sought by healthy individuals seeking extra brain power in the future. With any such psychoactive agents comes the inevitable unwanted drug effects and of course issues of legality.

But what if the health concerns associated with drug side effects were eliminated from cognitive enhancement? New technologies such as transcranial magnetic stimulation (TMS) demonstrate potential as locally-acting, specifically-targeted tools for cognitive enhancement. TMS was approved by the FDA in October 2008 for the treatment of refractory depression. However, additional effects have been observed in studies of TMS. Sudden-onset savant-like intelligence has been shown as a “side effect” of TMS in some patients. These additional effects seen with TMS have been short term, suggesting the possibility of ‘as-needed’ use of cognitive enhancement in healthy patients.

As scientific understanding unravels the mechanisms of cognition, it will increasingly enable us to control or enhance our cognitive function. If TMS is a foreshadowing of future opportunities for side-effect free cognitive enhancement—we’ll call this potential technology “Pure Cognitive Enhancement” (PCE)—we must ask ourselves now, what are the ethical considerations for use of cognitive enhancement in the absence of side effects? The development and availability of a PCE technology will present opportunities and ethical challenges at both individual and the societal levels.

What does society stand to gain from the range of PCE enhancements in areas of learning, knowledge, decision making, and memory? It would seem we have a lot to gain. Smarter and more alert doctors could reduce medical errors, cognitively enhanced
research scientists could find cures more quickly for devastating diseases, and more attentive economists could have prevented or could mitigate our current financial crisis.

From an individual perspective, students could enhance their ability to learn while worker could improve their productivity and gain more free time as a result. We could all enjoy the benefit of laser beam-like focus in our work and faster achievement of our goals. With this improved performance, we could also improve our self esteem and mood, which in turn could boost our motivation to set and achieve further goals.

What new pressures would individuals face in a world where PCE is available given that access to PCE in our market-driven economy would surely be unequal? Unequal distribution of PCE would have consequences for individuals in both the academic and business environments. Academic competition is a driving force in our education system and an early pathway toward success. On the other hands, business leaders profit from the next most insightful and actionable idea. Unequal access to PCE by students and business rivals could add a new layer of complexity to the paradigm of competition in academia and in the marketplace. Tensions between PCE users and non-users could lead to new forms of discrimination. Pressure to use PCE could become keen if the standard of normalcy started inching up as more and more people use the new tool. For PCE users, reliance on PCE could begin to jeopardize self-esteem, causing personal and social problems.

What we must prepare for then is to

STOP!
Scary stuff!
Chill mom. They’re just SMART’ies.

PAST

Relax! You’re going to be ENHANCED.
Will this damage my brain?

FUTURE

While there is an inherently negative reaction to the idea of manipulating our brains, in fact the value of a truly pure cognitive enhancement technology is positive if it is not misused. So where do we strike a balance between allowing individuals the personal freedom to access PCE and not creating a society in which individuals are at a disadvantage or discriminated against if they choose not to use the tool? Ideally, equal access to PCE would be provided to all individuals to eliminate the key threats to society presented by PCE, inequality and discrimination. Perhaps in five, ten, or twenty years’ time, PCE will be designed as a user-friendly biotechnology, easily accessed by the public at "smart bars"—where we can go and pay a nominal fee to recharge ourselves. However, even unequal distribution of PCE use could offer universal benefit—the cures, solutions, and break-throughs in understanding achieved by a few “enhanced” individuals would serve us all.

What we must prepare for then is to
encourage balance in a potentially cognitively super-charged civilization. We must prevent the glorification of intelligence at the expense of other important human qualities and indeed at the expense of thoughtful study over a quick-fix for learning. Discussion about the opportunities and risks of such technologies can begin from an early age. Schools may play an important role in educating students about the role that PCE can serve in the context of learning to achieve collective goals rather than competition for personal gain. Meanwhile, who knows? A PCE tool may afford some widespread glory to individuals with a superior ability to think, reason and attend to intellectual matters on par with what we give our sports heroes today.
The Case for “Chemical Castration"
Emily Jacobs-Finnegan and Jennifer Salant

In a country that prides itself on its judicial system, recidivism rates for sexual offenders in the U.S.A. remain unacceptably high. In 1994, Megan’s Law was implemented to protect society from convicted sex offenders by restricting their lifestyles after their release from prison. There is debate, however, over just how effective it has been. A recent study by the National Institute of Justice found that Megan’s Law has neither reduced the rate of sexual re-offenses nor the number of victims. If there is another solution, we have the obligation to pursue it.

Fortunately, biotechnology exists to address this problem through a class of drugs known as sexual appetite suppressants (SAS), often referred to by the misnomer “chemical castration.” The DSM-IV - the Holy Grail of modern psychiatry, lists eight paraphilias (including pedophilia and sexual sadism), which are categorized by intense, recurrent sexual urges that cause functional life impairment. While some people can control their paraphilic tendencies within the legal limits, sexual offenders demonstrate the severity of their condition by their distinct lack of control over their impulses.

Testosterone inhibition is a proven treatment for controlling these disorders, as it diminishes the intense urges that drive sex offenders to commit their crimes. A 1963 physical castration study by A. Langelüddeke demonstrated a reduction in twenty-year recidivism rates for a population of 1,036 sex offenders from 80% to 2.3%. Fortunately, pharmacological interventions now exist that produce the same therapeutic effects as physical castration without requiring surgery. With these medications, the patient keeps his genitals, and arousal is still possible, although greatly diminished. Unlike surgical castration, sexual appetite suppressants do not cause sterility and their effects are not permanent; they must be administered weekly. The positive properties of chemical castration distinguish it from physical castration and may make it socially acceptable.

Currently, there are eight U.S. states that use some type of SAS to treat sex offenders, with varying degrees of success. Disturbing and well-publicized instances of sex offenders who have used SAS only to be convicted of new crimes understandably provoke fear and outrage. However, the vast majority of these stories have an important through-line: SAS treatment was terminated prematurely or purposely thwarted. It stands to reason that patients who stop treatment will be confronted with an onslaught of the very urges and impulses that their medication was prescribed to control. Thus, it is poor implementation that has called into question the ability of SAS to effectively protect society from repeat sex offenders. Another problem is how does society ensure that the sex offender will take the drug? Should surgical implant patches that release testosterone inhibitors be given to sex offenders?

What would an effective implementation of SAS look like? Chronic and violent sex offenders, or sexual predators, would be sentenced to prison just as they have always been. In addition, as with the handling of psychotic criminals, they would be required to participate in a monitored, lifelong SAS treatment program. The key to success is that the program is mandatory and lifelong. When patients under treatment
report the disappearance of dangerous urges, it should be taken as evidence of the program’s efficacy, not that they could accomplish the same level of control without medication. Experience has shown that when the meds stop, the likelihood of re-offense is as high as if they had never been taken.

This proposed implementation invites a variety of ethical questions and objections. However, these objections are often rooted in faulty analogies, using uninformed comparisons to physical castration that obscure the reality of the science at hand. Some argue that SAS is unethical punishment for a crime not yet committed. However, our plan clearly designates it as a treatment, not a punishment. Consider the analogy of a schizophrenic sentenced for a violent crime. Do we wait for another crime to be committed before treating his or her psychosis? While this person may not yet have committed an additional aggressive act, the predilection to do so jeopardizes the well-being of others in society. They are considered “a harm to themselves or others,” and are handled as such. In the cases of chronic or violent rapists and child molesters, long-term treatment is the only way to surely protect vulnerable, law-abiding members of society.

The most prominent ethical question SAS raises involves the offender’s right to biological and reproductive autonomy. Some argue that regardless of a person’s prior criminal history, everyone has the inherent right to make decisions about his or her own body. Our response is, “if you use it, you lose it.” When a person uses his or her body as a weapon at the expense of another person’s autonomy, they implicitly relinquish their own. Their body is no longer just their business; it is now also the business of society.

Similarly, does an inhibited sex drive violate reproductive autonomy? By lowering libido, SAS can prevent a person from engaging in socially acceptable sexual acts, such as starting a family. Again, the analogy of mental illness serves us well. Many other medications that treat mental illness, such as Haldol for schizophrenia and Prozac for depression, produce side effects including reduced sex drive. In cases such as these, the potential damage the illness itself outweighs the side effects of the medications used to treat it.

Sexual predators exhibit signs of diagnosable psychiatric illness, the manifestations of which pose a great threat to society. We have in our hands a biotechnology that with proper implementation treats illness, protects our society, and circumvents the ethical mire of physical castration.
Imagine for a moment women possessing the means to delay menopause and preserve their supply of fresh eggs. The scientific dogma that women are born with a finite number of eggs may soon be overturned. A new study challenges the long-held belief that female mammals start life with a limited number of eggs and cannot produce new ones after birth. Dr. Ji Wu’s group at Shanghai Jiao Tong University has uncovered a means of recalibrating the biological clock by prolonging the working life of ovaries via the transplantation of female stem cells that promotes the development of mature eggs. This finding may overturn much of what we thought we knew about female reproduction.

Reproductive biologist Dr. Wu and colleagues have uncovered and established the existence of female germline stem cells (FGSCs) derived from mice. They isolated functional FGSCs from the ovaries of five day old and adult mice and sustained their proliferative potential for many months. After transplanting these FGSCs into the ovaries of infertile mice, the mice were able to produce new eggs and gave birth to healthy and fertile offspring. What is critical about this finding is that these female germline stem cells possess the potential to divide indefinitely, so they can be grown in large numbers in the laboratory and be stored for months or years prior to transplantation.

For the past fifty years, the theory that female mammals cease to produce eggs, or oocytes, after birth seemed to adequately explain reproductive phenomena such as menopause, which supposedly occurs when a woman’s ovaries produces lower levels of natural sex hormones, estrogen and progesterone. Dr. Wu managed to culture FGSCs through a technique called immunomagnetic isolation, where tiny magnetic beads coated with an antibody latch onto a protein expressed only by germline stem cells. Magnetically screening the beads isolates FGSCs to be cultured. The cells can be cultured through numerous cycles of division and were able to withstand cryopreservation without any ill effects. By transfecting the FGSCs with a green fluorescent protein (GFP) reporter gene and transplanting them into the ovaries of sterile mice, Dr. Wu’s group was able to confirm that previously infertile females gave birth to healthy, fertile offspring that carried the GFP reporter gene. In the future, if FGSCs can be found in human ovaries, then it might be possible to isolate these stem cells from a woman earlier or later in life so that she can still conceive children in the event that her fertility is compromised.

Once this new technology matures, it could mean that women are empowered to treat infertility due to cancer treatments, disease, or aging. On a positive note, it offers a chance at motherhood to women who may have missed the opportunity. Innovations made within the field of biotechnology, however, are often coupled with new bioethical issues that require reflection, and it is no different in this instance.

In deciding to move forward with this new technology, we must first consider the consequences of tampering with human biology. From the bioethical standpoint, tampering with human biology or natural law is unethical when it results in harm to individuals or a species as a whole. Over 50
years ago, George C. Williams, an evolutionary biologist, was the first to suggest that human menopause evolved as a protective measure. In 2004, Dr. Kristen Hawkes of the University of Utah originated the Grandmother Hypothesis, in support of how late life infertility confers an evolutionary advantage. According to this hypothesis, older mothers who have lost their fertility are more able to spend time protecting, caring for, and teaching their children and grandchildren through the knowledge they have acquired over a longer lifespan. Behaviorists call this parental investment, and it has been shown that in animals this form of time investment increases the likelihood of the younger members of a species surviving until child-rearing age. In many cultures, grandmothers raise their grandchildren. FGSCs can potentially disrupt the benefits offered by this evolutionary advantage, with detrimental consequences for the future generations.

Aside from the species as a whole, consideration must also be given to elderly or disease-stricken mothers who may want to undergo the FGSC transplant procedure. Pregnancy and childbirth are both risks to the overall health and longevity of women. Especially in older women or those who are immune-compromised, childbirth exposes them to a greater chance of contracting deadly infections and complications. Knowing that the resulting pregnancy and childbirth will likely shorten the lives of the mothers, particularly older women or those with health issues that initially caused their infertility, is it an ethically sound choice for doctors to proceed with the transplantation procedure? What of the case of a couple who love each other dearly, but by old age have never had a chance to conceive children prior to the availability of this new technology? They may express their desire to continue the family line and to let their love manifest itself in the form of a child, even if it risks the mother’s health. What approach should be taken to resolve these ethical dilemmas?

First and foremost, the usage of this potential technology should not be adopted freely. Let us first approach these dilemmas from the stance of a physician, unwilling to proceed with this procedure on a middle-aged, post-menopausal woman who is deemed unfit to bear children. Doctors are sworn into service through the Hippocratic Oath, whereby the emphasis is “Above all, do no harm.” As a health care professional, to knowingly place the woman at risk for such a procedure would be going against the oath. To fully address the ethical repercussions that arise from this new technology, we as a society possess a moral obligation to promote awareness concerning the technology, by having participating hospitals offer courses behind such developing biotechnologies. Let potential mothers know of the risks involved, and let them know that hospitals have the right to reject their requests if deemed harmful. We must keep an open mind and be well-informed of new technologies and any
ethical repercussions that may ensue.

Use of this technology should be limited and offered on a person by person basis. For example, if a young woman had become infertile due to a disease that she has been definitively cured of, and if she is physically fit to carry a child, then her case can be considered. On the other hand, if an 80-year-old woman decides to become pregnant, the procedure would essentially be putting two individuals at risk—the mother and the child.

To play the devil’s advocate, who gets to make that decision whether someone is too old or too sick to carry a child? How old is too old? We’re talking about creating life, something that is meaningful and beautiful. There are mothers who become pregnant naturally much later in life, at ages deemed risky for child birth. Are their cases so different from women who are offered fertility through FGSCs, and can we always convince individuals that their life is worth more than their potential children’s?

The answer lies in the necessity of compromise. If a hospital deems that a woman is not fit to become pregnant and carry a child to term, offer an alternative. We have come a long way in human reproductive technologies. This potential method of restoring fertility in women through FGSCs is just another technique to add to humanity’s repertoire of creating life assisted by artificial means. Rather than using the new biotechnology as an approach to fully restore child-rearing ability within an infertile woman, instead use it to allow them to produce their own eggs that can then be carried to term by a surrogate mother. Surrogacy is not uncommon and it offers an established precedence. Appropriate choice of techniques will allow the birth of children to pass on your genetic information, without the health risk to the mothers.

This breakthrough reproductive technology of un-pausing menopause brings new hope to many prospective mothers. Granting infertile women the ability to bring new life into the world can mean so much to them. However, we must tread these matters carefully and approach these newly formed ethical dilemmas with the conviction that compromise and arbitration are the keys to resolving these issues.

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The Ethics of a Spotless Mind: A Discourse on Tampering with Memory
Joseph Ho and Anish Shah

In the 2004 critically acclaimed movie *Eternal Sunshine of the Spotless Mind*, film stars Jim Carrey and Kate Winslet play a couple that has fallen out of love and separately decide to undergo a treatment that erases all their memories of each other. In predictable Hollywood-fashion, they overcome their loss of memory and unethical abuse of the power afforded by this technology, finding themselves together in the end with a rekindled love. In 2004, this movie was seen as a story testifying to the power of love. In 2009, this movie can be seen as a commentary on the relationship between memory and identity and the implications of treatments designed to delete memory.

Although scientists have not yet found a way to erase painful or bad memories, it seems that this will be possible in the near future. In fact, in October 2008, researchers at the Medical College of Georgia claimed the ability to erase memories in mice. It will be years before this treatment will be ready for FDA approved use on humans, but researchers worldwide have already begun clinical trials to test other treatments that achieve similar "desired" effects in people. For example, in an attempt to find an effective treatment for post-traumatic stress disorder (PTSD), researchers at the University of Amsterdam have found that an inhibitor of specific neurotransmitter receptors involved in the reactivation of fear memories can reduce the anxiety associated with these memories. Fear memory reconsolidation is dependent on select protein synthesis, which is induced by the stimulation of β-adrenergic cell surface receptors by neurotransmitters released during the emotional response to fear memories. The compound propranolol acts as a blocker of β-adrenergic receptors and prevents neurotransmitters from binding to these receptors. By disrupting this receptor stimulation process, propranolol effectively weakens the protein-dependent fear response. These researchers further determined that the interruption of the fear response with propranolol during the memory reactivation process prevents this source of fear from returning again in the future. This property of preventing traumatic memories from recurring may make propranolol a reliable long-term solution for the thousands of patients who suffer from lasting emotional disorders.

Selectively weakening and erasing memories in humans should thus no longer be viewed as science fiction. Current research breakthroughs make this a highly relevant topic and its bioethical implications must be addressed.

The main benefit of having a treatment that allows the selective weakening and erasure of memories is logically the same as the motivation behind the research: it will cure patients suffering from post-traumatic stress disorder. PTSD is a condition in which memories from a traumatic event, such as a rape or the experience of extreme violence, impair a person's ability to normally function in society. Sufferers constantly re-experience the event in the form of flashbacks and nightmares. Naturally, the disruption or elimination of the memory itself would greatly help patients suffering from
this disorder. On the surface, this seems like an effective approach to treating PTSD. Patients would be enabled to continue leading a normal life, as if the traumatic event had never occurred. However, allowing this treatment would raise many questions about the role of memory in forming a person's identity.

Disrupting our past memories would change what we believe in and how we view ourselves and the world. This is the major risk of potentially using memory modifying technologies such as propranolol according to former Chairman of the President's Council on Bioethics Leon Kass, who says, "To deprive oneself of one's memory—in its truthfulness also of feeling—is to deprive oneself of one's own life and identity".\(^3\) As traumatic and painful as some memories may be, we are a product of all of our experiences and often learn from negative events, in the past to grow and make positive changes in the future.

For Holocaust survivor Elie Wiesel, the opportunity to use memory modifying technology would allow him to reduce and erase his enduring traumatic memories from his imprisonment in various concentration camps. However, as therapeutic as it would be to free himself from these horrifying memories, Wiesel's experiences from the Holocaust shaped his influential views on peace and dignity. This gave him the passion to dedicate his life to promoting awareness of his experiences and campaigning against humanitarian injustices such as genocide, which eventually led him to receive a Nobel Peace Prize. Modifying or removing Wiesel's negative memories entirely would change his identity by removing the motivations behind his selfless and lifelong efforts to promote peace and prevent violence. It would not only be a disservice to Wiesel, but also to all of society, if he was not as passionate about his experiences and moral messages to the world. While Elie Wiesel's story isn't typical, it clearly illustrates the far-reaching repercussions that would inevitably result from allowing the use of memory modifying technology.

Another key issue to consider is how drugs designed to erase or weaken memories will affect the world of crime and the search for justice. A rape victim may want to weaken the feeling of the traumatic memory, potentially diminishing her rage against the act to the point that she does not passionately pursue justice. Even worse, she may want to erase the memory completely, preventing her from providing crucial evidence to prosecute her assailants. Conversely, criminals may abuse memory modifying technology to forget their acts and to avoid self-incrimination during interrogations. A potent memory deleting or weakening treatment, fallen into the wrong
hands, can become a tool that is used for a "perfect crime."

A discussion on the role of memory on identity can be seen as an extension of the age-old and still unresolved nature vs. nurture debate. Allowing the use of memory modifying technology to disrupt and eliminate the memories of our experiences would directly challenge the importance of nurture in forming our identities. If used, memory modification would make our identities unstably reliant on our original natures. Only in a fictional story like *Eternal Sunshine of the Spotless Mind* could a happy ending result from memory modification. In reality, this idealized result would be impossible since we are products of both nature and nurture. Playing with this balance that humankind has evolved and benefited from over time is unethical and could only lead to dire consequences.

References

Citing over 160,000 lives in the United States last year, lung cancer ranks as the most lethal cancer, according to the American Cancer Society\(^1\). While there are several possible causes of lung cancer, such as lung disease, air pollution, and exposure to certain radioactive chemicals, the strong causal link between smoking and lung cancer is undeniable. In the United States alone, nearly 85-90% of lung cancer deaths are from smoking. Despite this correlation, scientists have not been able to determine the biological mechanism by which smoking increases the risk of lung cancer in some patients and not others. Such a discovery would be a major medical breakthrough since it would provide researchers with information that could be used for early detection and treatment of lung cancer in smokers.

In an effort to gain more insight into the link between smoking and lung cancer risk, researchers at the University of Minnesota led by Dr. Jian-Min Yuan designed a case-control study that monitored the urinary levels of a tobacco carcinogen in a group of smokers\(^2\). The chemical compound 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), a tobacco carcinogen that enters the body when smoke is inhaled.

To determine whether there is a relationship between urinary NNAL levels and lung cancer risk in humans, Dr. Yuan and his research group evaluated 500 smokers for as much as 20 years. Specifically, they compared current smokers who ultimately developed lung cancer with smokers who did not develop lung cancer. Based on their data, the researchers found that patients who had the highest levels of NNAL showed a staggering 8.5-fold increased risk of lung cancer in relation to individuals with the lowest levels. From these results, they claimed that there is a direct correlation between NNAL levels and the development of lung cancer in humans.

The findings that there may be a way to assess lung cancer risk in smokers based on NNAL levels leads to a possible clinical assay for the early detection of lung cancer in smokers. A major problem with lung cancer until now has been that only 15% of all cases are identified in the early stages of the cancer\(^3\). In patients who are diagnosed with stage I lung cancer, in which the tumor has not yet metastasized, the five-year survival rate is 70%. When lung cancer is in stage IV and the tumor has spread significantly, the five-year survival rate of patients decreases dramatically to 1%. This discovery of NNAL screening clearly has the potential to save many lives and address the long-standing medical problem of not being able to detect and treat lung cancer in its early stages.

While the benefits of the NNAL urine test are unquestionable, the use of this new technology in medicine raises several bioethical issues that need to be addressed. Given the chance to find out whether or not they are at risk for lung cancer, it is safe to...
assume that many smokers would seize the opportunity and be screened for their urinary NNAL levels. Despite this, the actions that smokers may take based on the results of the NNAL test are not so clear. Smokers who get a test result that indicates high NNAL levels and an increased risk of lung cancer would presumably seek more specific testing—imaging and biopsy—to confirm and stage a cancer, if one were present. A high NNAL level is not a cancer diagnosis. Like a high PSA level in individuals screened for prostate cancer, further investigation would be necessary to determine whether a cancer is present.

What, however, would smokers do if they received a negative test result showing relatively low NNAL levels and no heightened risk of developing lung cancer? This question raises the issue of whether or not smokers would refrain from further smoking even if their NNAL test does not suggest any serious lung cancer risk. In other words, for those smokers with negative NNAL test results, is the test simply a license to keep smoking? This is a legitimate concern because it is possible that smokers who find out that they are not at risk for lung cancer will have less reason for breaking the habit. After all, because smoking is addictive, a negative NNAL test result showing no increased lung cancer risk would lower the incentive to face the challenge of quitting.

However, what people who test negative for high NNAL levels and increased lung cancer risk may fail to realize is that there are two major problems with continuing to smoke under the impression that smoking does not harm their health. For one, even if a NNAL test does not show increased NNAL levels in the urine today, it does not mean that NNAL levels will always stay low. This is especially true for those people who continue smoking after the NNAL test since the additional smoking can still result in higher NNAL levels and the development of lung cancer. Thus, the notion that one will never develop lung cancer after a NNAL test does not show increased lung cancer risk could possibly be a major misconception among smokers.

It is also important to remember that the NNAL test only evaluates the lung cancer risk in smokers. While lung cancer is the chief consequence of smoking that receives the most attention in the media and among researchers, smoking still contributes to several other health conditions such as emphysema and coronary heart disease. In this sense, a major potential flaw in the application of the NNAL test technology is that it may give some smokers who test negative less reason to stop smoking and as a result increase their risk for developing other smoking-related health problems. Thus, while the NNAL test does have the potential to detect lung cancer early, it may also give rise to a moral hazard problem by discouraging some people from making good decisions for their health.

Because the NNAL test is a new technology that is still being optimized, it is reasonable to question its accuracy in assessing lung
Cancer risk. A significant bioethical issue with new biotechnologies like this is whether or not the results they produce are reliable indicators in healthcare. For instance, what if it is later discovered that high NNAL levels are not a perfect indicator of lung cancer risk? If so, many useless CAT scans and lung biopsies with their attendant risks and expense may be in store for smokers with high NNAL levels, but without lung cancer. Before the NNAL test is accepted as a reliable indicator of lung cancer risk, the accuracy of the test needs to be further validated in order to prevent the possible problem of misdiagnosis.

The problem of misdiagnosis that stems from the application of the NNAL urine test technology requires a creative solution. One potential solution is that anyone who wants to be screened for lung cancer through the NNAL test should be required to go through a seminar that informs the individual about the many long-term effects of smoking. Such a seminar could be sponsored by an organization like the American Cancer Society, which devotes its efforts to cancer research and awareness. Being required to complete an educational seminar about smoking would not discourage smokers from applying to be screened since the potential benefits that can arise from detecting possible lung cancer with the NNAL test and subsequently taking the steps to treat the cancer far outweigh the burden of having to go through the awareness seminar. The ideal result of such a system would be that smokers who are educated about the dangers of smoking through the seminar break their habit of smoking and do not put their health at more risk, even if their NNAL test results are negative and are not indicative of increased lung cancer risk. Such a solution would be an effective way to give smokers the incentive to make healthier decisions and thus mitigate the key ethical dilemma that may stem from using the NNAL test for screening lung cancer risk.

While an awareness-based system certainly solves some lingering bioethical issues related to the new NNAL test technology, another solution needs to be established for making the test a more reliable medical indicator. More research efforts should be directed to finding other carcinogens like NNAL that appear in elevated levels in smokers who develop lung cancer. The ability to link elevated levels of multiple tobacco carcinogens to lung cancer risk as opposed to just one carcinogen of over 60 potential carcinogen found in tobacco would increase the reliability of screening for lung cancer risk using tests like the NNAL test. While there is no proof that other carcinogens strongly correlated to lung cancer risk actually exist, such a finding would reduce the problems stemming from the NNAL test possibly producing false results. Although the NNAL test appears to be a major medical breakthrough which can help smokers determine their lung cancer risk in the early stages of the cancer, addressing the problems of this technology with the proposed solutions would go a long way in making the test more ethically acceptable in society.
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Behavioral Genetic Testing in the Financial World
Stephanie Pan and Alyssa Rios

As our country faces its worst economic downfall since the Great Depression, one cannot help but wonder if this could have been prevented. President Obama, who has on a variety of occasions blamed the economic crisis on the “many Wall Street executives [who] made imprudent and dangerous decisions, seeking profits with too little regard for risk”, may actually have scientific support. A recently published article1 titled, “Genetic Determinants of Financial Risk Taking”, by Camelia Kuhmen and Joan Chiao of Northwestern University, shows that “genetic variations [particularly those of the serotonin transporter polymorphism (5-HTTLPR) and the dopamine D4 receptor (DRD4) exon III polymorphism] lead to individual differences in financial risk taking preferences”. Such results will no doubt impact the global financial industry, which will use the genetic testing of behavior as a powerful tool to screen people, especially for employment.

Genetic testing has generally been widely used to test for debilitating diseases such as Huntington’s. What is new in Kuhmen and Chiao’s work1 is testing for a gene that may be associated with a wide-impacting behavior in human, the ability to take risks. Unlike genetic diseases, the genetic underpinnings of human behavior are more difficult to isolate since there are more confounding variables. As such, whenever studies of a behavioral gene arise, it is important to assess the validity of the research.

Kuhmen and Chiao structured their experimental design to be as close to a real-life financial investment situation as possible. They used two ways of presenting the payoffs of risky investments (one focusing on probability and the other focusing on expected returns) to ensure that both ways produced similar responses. The subjects were also genetically tested only after completing the investment game to prevent the subjects from biasing their responses in the game. Kuhmen and Chiao’s experimental results1 are further validated by studying the correlation between a behavior and specific genes rather than an indirectly related molecule like testosterone.

For corporations, it is highly advantageous to use genetic testing to screen out employees with “bad genes”. For potential employees, there are two sides to the coin. Genetic testing allows them to identify their traits and pursue jobs that match their genetic strengths. However, genetic test results may backfire for some candidates by defining them as genetically unsuitable for some careers. Thus, there are several ethical issues that must be considered concerning such technology.

The first issue is: How do you distinguish a “good” gene from a “bad” gene? For instance, sickle-cell disease causes horrible symptoms such as stroke and renal failure, but it also protects against malaria. Similarly, the lack of a gene for risk taking may prompt an investment banker to play it safe but cause the banker to be more vulnerable to anxiety or depression.2 In the case where there is no need for aggressive investing, the lack of a risk-taking gene is “good”—or is it? Unlike the case for a disease gene like sickle-cell, there is an added complication for behavioral genes. Society’s opinion of appropriateness of a
behavior may be fickle and context dependent. For example, how do you establish a stable criterion by which to decide between those who call for more aggressive, risky investments, or those who advocate for a more cautious approach in order to screen out the “bad” gene?

If the criteria for a “bad” behavioral gene are established, the next step is to devise a method to screen out these “bad” genes. Many genes have incomplete penetrance and/or variable expressivity. Therefore, not all people who carry the gene for risky behavior will express this behavior, and not all who express the risky behavior will do so in the same fashion. How does one account for these variances without wrongly harming someone? The simple answer would be to design better tests. However, we currently do not have the technology or understanding to predict a person’s true phenotype based only on their genotype.

When the appropriate and reliable tests have been developed, use of these tests could lead to prejudice and discrimination by health insurance companies, employers, and society in general. Fortunately, the Genetic Information Nondiscrimination Act passed in 2008, requires health insurance companies to provide coverage for all persons regardless of their genetic disposition. However, health insurance companies can still charge a higher deductible for persons with higher risks. For corporations, genetic traits can also be a cause for concern since they are the ones paying for employees’ health insurance while seeking to maximize profits. Finally a person with a “bad” gene is often socially stigmatized. For behavioral genes, however, these stigmas have the added danger of reigniting old prejudices against racial groups who were victimized in the past. Thus, people who undergo genetic testing for employment will unnecessarily suffer from more than a half-page letter of rejection.

Potential employees who are told they have a “bad” gene may also inflict unnecessary
pain on themselves through self-fulfilling prophecy. Research has shown overwhelming evidence for these negative effects on employees, such as decreased performance and self-esteem, when an employer expects his employee to perform poorly. These negative effects may intensify via the “Pygmalion Effect” in which a group of people succumb to a false picture espoused by others, in this scenario based on prejudice against a “bad” gene. It has also been shown that those who are uncertain of themselves are often more susceptible to these effects than those confident of their abilities. In the case of genetic testing, where scientific “fact” is often viewed as more valid than a person’s belief, both employees and employers can become easily entrapped by these effects, causing great psychological harm to the employees.

Even if regulations are enacted to prevent U.S. companies from mandating genetic screening as a prerequisite for employment, companies could still legally gain access to an applicant’s genetic results by “strongly recommending” the applicant reveal his test results to determine if his qualities suit those of the company. Additional regulations could, of course, prevent such underhanded dealings.

To address these ethical issues raised by genetic screening for behavioral traits, we propose the following solution that balances the employee’s desire to keep his records secret and the company’s desire to mandate genetic tests in order to protect their interests. Our solution involves a genetic testing company and a company psychiatrist. If the company does not have a psychiatrist, they cannot mandate genetic testing of their applicants. For a company that requires genetic testing for employment, the testing would be performed by an independent genetic screening company. The results will be given to the company’s psychiatrist who will disclose the results only to the applicant. The psychiatrist will only notify the company about whether or not the applicant has completed the test. If the test is not completed, the company can refuse to hire the person.

If it is determined that the applicant is predisposed to behaviors that can harm the company, he will be notified by the psychiatrist. The applicant must then agree to undergo weekly meetings or treatment to ensure that his actions would not be harmful to the company. Current employees would also have to undergo the same screening since every individual can affect the company. A large company should therefore have more than one psychiatrist to decrease the patient load and to give employees a choice in psychiatrists since they cannot see outside psychiatrists (this will prevent employees from trying to evade visits to the psychiatrist). With this solution we believe that many of the aforementioned ethical concerns can be resolved or averted for the long-run.

As Kuhnen and Chiao point out, their results on behavioral genetic screening only suggest causality and do not imply a true cause and effect relationship. Thus it is clear why such genetic screening cannot be currently implemented. The time when this technology would be ready to use, in our opinion, is when there has been sufficient understanding of the link between genetics and behavior. Only then would we be able to produce a treatment to correct a “bad” behavior and also a reverse treatment to undo the changes we have made when our fickle society no longer considers the behavior “bad”. Nonetheless, we believe that even if such powerful screening technology would be developed, it should
never be mandatory for employers.

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Ethical Boundaries for Athletic Genetic Testing
Hayley Dirscherl and Philip Kemp

What if it were possible to know if your child had the potential to be a professional sprinter, football player, or swimmer long before they stepped onto a track, picked up a ball, or learned to swim? As we discover more and more about our human genome, we are beginning to answer questions about physical traits that aren’t apparent until later in life, such as genetic disorders or even athletic ability. With the advent of direct-to-consumer genetic testing, parents with high hopes for their child’s sports future can send some of their youngster’s blood or saliva to a lab, and according to advertisements from testing companies, learn which sports their child is likely to excel at later in life.

Yet along with many benefits, such as the ability to identify and understand the cause of disease, new technologies can often have unintended consequences or questionable uses. Companies that sell genetic tests to consumers may advertise tests without giving full explanations of what the results really mean. One such company, the Colorado-based Atlas Sports Genetics, offers a screening for the ACTN3 gene, for the price of $150. The ACTN3 gene codes for the protein a-actinin 3, which plays a structural and regulatory role in the Z-line of skeletal muscle. According to the several studies Atlas supplies as validation for their test, elite athletes who excel at sprinting, strength, and power sports are much more likely to possess normal versions of the ACTN3 gene. In contrast, the majority of elite endurance athletes are shown to possess 2 copies of a variant of ACTN3, the R577X allele (XX genotype), which makes them unable to produce a-actinin 3. It has also been suggested that the a-actinin group of proteins plays a role in muscle fiber-type: ACTN3 expression may cause higher percentage of type II (”fast-twitch”) muscle for sprint and power, and individuals with no ACTN3 expression may be predisposed to develop more type I (”slow-twitch”) muscle, benefiting endurance performance.

The Atlas First test, as the company’s website claims, “[I]s geared specifically to show athletes, trainers or anyone where their genetic advantage lies. Atlas First looks at only genetic markers, specifically the ACTN3 gene.” As their advertisements subtly suggest, the results of the test may give parents an early hint about what type of sports their children are ideally genetically suited to play. However, according to a paper recently published in the Journal of Applied Physiology, the role of a-actinin 3 in determining the power, fatigability, or fiber-type of skeletal muscle might not be as significant as Atlas wants its consumers to believe.

Curious to see whether ACTN3 might play a crucial role in differentiating sprint from endurance athletes, the authors of the paper subjected groups of well-trained, but not professional, athletes to a battery of tests to assess muscle power, strength, fatigability, and fiber type and the association of these traits to ACTN3 genotype. The researchers failed to detect any difference in power or sprint performance across the three ACTN3 genotypes in the initial phases of testing. However, one interesting speculation that came from further testing is that a-actinin 3 might have a boosting effect on a muscle’s performance in response to repeated exercise or training, due to its ability to stabilize the Z-line and speed the recovery of type II muscle fibers. Nonetheless, the
authors conclude that a variety of factors influence muscle power and fiber-type, such as nutrition, sex, and age, and the frequency, intensity, and type of training. At the highest level of competition, where every small advantage counts, it might be possible that an athlete’s particular type a-actinin is important. However, the idea that one or two genes can predict a child’s future talent is misleading, when it has been found that over 200 genes affect athletic performance.

While few would protest the right of companies like Atlas to sell their product, the manner of their advertisements and their targeted group of consumers raise concern. Atlas dangles a tantalizing lure in front of these customers when they first come to the website: “Finding any great Olympic champion normally takes years to determine. What if we knew a part of the answer when we were born?” While Atlas and similar companies are careful to point out that the genetic profiles they offer are only a piece of the proverbial puzzle, advertisements like this play subtly on the desire of the parent to shape their child into a world class athlete. Companies offering genetic screening for only one indicator of athletic ability are attempting to distract consumers from what the tests results really say by flashing the idea of potentially lucrative success in professional sports.

This issue of false advertising goes hand in hand with another ethical concern: the ramifications of what parents decide to do with the results of the test are potentially alarming. Chances are that the parents who decide to choose this type of genetic testing, despite disclaimers against its reliability, are also the type of parents that will pressure their children to fulfill their supposed athletic potential.

According to The New York Times, Atlas focuses on genetic testing of subjects between infancy and eight years of age because during this period, physical tests of future athletic talent are unreliable. At such a young age, children are extremely impressionable and subject to the will of their parents. The president of Atlas Sports Genetics, Kevin Reilly, has himself expressed concern about the parents who will take the results to the extreme by forcing their children to specialize too early and with unrealistic expectations. The bias that is created not only affects the family involved, but can also influence the coaches, recruiters, and teammates of the rumored gifted athlete.

We must ask ourselves what is the purpose of placing such high importance on children’s sports that we are willing to subject them to genetic testing for specific aptitude at an early age. Youth sports are meant to be fun, but when parental expectations are reinforced by scientific data, this fun is severely threatened. Organized children’s sports offer an environment for developing critical social skills, discipline, healthy exercise habits, and, most important, for having fun. Yet somehow, in the interest of profit, the focus has shifted away from teaching positive
values to our children to how to best prepare them for a Division 1 athletic scholarship.

With or without genetic testing for athletes, success at an elite level of sports will only come to a small percentage of people after years of practice and focus, and perhaps with a little help from muscle biochemistry. Meanwhile, there is little evidence to suggest that α-actinin genotype will have any quantifiable effect on the average athlete at the youth or amateur level. Why should kids be steered away from a sport that they might love and excel at because of the over-hyped results of a dubious genetic test?

It is possible to deal with this ethical issue in a way that allows Atlas to stay in business but prevents the abuse of young athletes. Research suggests that there is no way for this company to sell their product to their current target audience through completely honest advertisement. However, the company’s product could be useful to elite athletes to improve their training. For example, if an athlete is partaking in a power sport but has a genetic predisposition to be successful in endurance events, knowledge of this disposition may help the athlete to adapt his or her training in order to gain the necessary edge. Atlas should be prohibited from testing minors. It should instead target autonomous individuals who are already on an athletic path of their own choosing and who have the ability to process the results appropriately.

The fly in the ointment of this resolution is that New York and California have banned all direct-to-consumer genetic testing, no matter how old the consumer is. Do they have the right idea, or are their residents missing out on valuable opportunities? In New York the logic is that only physicians and other persons with the authority to interpret the findings of laboratory examinations can order medical tests, and the tests must be FDA approved. Massachusetts has similar restrictions but makes exceptions for tests that promote health awareness among the public through early detection of disease or risk factors. The test offered by Atlas doesn’t seem to fall into this category as it not helping to prevent disease, but it seems unfair that high-performance athletes should be precluded from the knowledge of their natural athletic strengths based on their state of residence.

No matter how much research is done to prove the association of the ACTN3 genotype with muscle power, the complication of parental influence will still exist if testing is done on young athletes. If people under the age of 18 need parental permission to become an organ donor, than similar rules should apply to genetic testing. Our novel solution maintains free will for aspiring athletes, encourages honest advertising, and gives athletes the opportunity to exploit their natural talent when need be.

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Many college students may not realize that a night of quietly sleeping off too much to drink can lead to a lifetime of being labeled a substance abuser and potentially limited life choices. My own university’s student health policies illustrate one way that good intentions for student care and opportunity can go badly wrong and, as such, need to be reexamined in that light.

It was a typical Friday night on the Columbia campus—I was in my room cramming for a barrage of exams coming up the next week while the majority of the student body were up partying. Famished by the hours of mental toil, I made my way through the inebriated crowd swarming the security desk to go to the deli when I noticed a student who appeared to have partied a little too hard. Perhaps it was his birthday, or perhaps he just had a very stressful week. Regardless of the reason, he was now being detained by the security guard for attempting to enter the dormitory—or so it seemed. Despite his friends’ insistence that he only needed a place to rest, the guard proceeded to make a call to our university’s student-run EMT squad. Within minutes, the squad showed up ready to deal with anything the sleepy, but conscious student, can throw at them. Without hesitation, they hoisted the new “intox” patient away on a stretcher, and delivered him swiftly by ambulance to the hospital one block over.

The medical treatment at the hospital can be, at times, non-existent. This is not to say that there aren’t abundant capable healthcare providers buzzing about the ER, checking on every patient. It’s just that drunk college students prefer to sleep at 4:30 in the morning, and they don’t need a doctor’s prescription for that. After a few hours rest, the student returned home, with nothing but a hangover. As far as the University is concerned, the student did the right thing by utilizing this service. He will get an email in the next few days with an appointment to meet with an administrator so the student can explain how he will never drink too much again. An extra “health-services” charge might go on the student’s tuition bill, but nothing outrageous. Most students will only suffer a temporary blow to their pride.

Many will be surprised to learn, however, that while they may only remember bits and pieces, the night was exceptionally well documented, and this record will stay with them forever. Intoxication requiring hospitalization would shout substance-abuse to any doctor unfamiliar with life on campus. Very often doctors will alter their treatment for patients with history of substance-abuse, withholding or under-prescribing pain management drugs for example. Beyond this possibility, there are other options that a student with this label will lose. All branches of the United States Military – as well as many government agencies – follow Department of Defense directives barring enlistment or employment of anyone with a history of substance-abuse that required professional care. Anyone seeking a private pilot’s license must also be at or above these medical standards. Often these regulations can be worked around with waivers, but the frustration resulting from a trip on the drunk bus is sure to be
great.

With these consequences in mind, how does a university EMT service in New York City fit into the picture? After all, with a hospital-run ambulance system available right across street, student EMTs mostly end up handling cases of allegedly excessive alcohol consumption on nights such as the one described earlier. Many would argue for continuing the program simply as a means of broadening pre-medical students exposure to medicine. However, at what costs are we to provide this experience to these aspiring healthcare professionals?

There is a fundamental conflict between the success of the student EMT program and the interests of the student body it serves. Without a continuous supply of drunken classmates, the EMT squad would be jobless for weeks on end. Because of this, there is an increased incentive for the EMT squad and the school administration that pays for the operation of the EMT squad to catch as many cases of “intoxication” as they reasonably can. This can lead to students are not quite “intoxicated” to be monitored and questioned by the EMT squad when the student is refused access to his dorm by the security guard. The choice is simple—sleep outside or agree to be taken to the hospital. The prospect of having nowhere to sleep is usually motivation enough for the student to agree, whether or not he or she was truly in any medical danger. However, more often than not, students do not even realize that they have the right to refuse the service and agree to be taken to the hospital for fear of running into trouble with the school administration and risking their academic future. The student’s right to autonomy is never explained to them. In addition, students know that the university may refuse them access to the dormitory should they refuse to board the drunk bus.

The practices and policies of the campus EMT squad can, at times, limit personal autonomy. Mental institutions are often criticized for the use of coercion to force treatment on patients. Whether dealing with mental patients or drunken students, this coercion may be done for the safety and well being of the individual being considered. Indeed, it could be said that an intoxicated student and a mentally ill patient both lack the clarity of judgment to make the best decision themselves. This, however, raises questions as to how far someone can go in taking away patient autonomy before crossing the line. Additionally, this apparent altruism can be quickly contaminated by ulterior motives. In the case of the student EMT service, such a motive can include the desire to provide the EMT students with ample subjects upon which to practice their skills. So, while the University ambulance service helps buff the résumés of medical school applicants, the current program proves to be infringing heavily upon the autonomy of the student population.
Although Howard Pyle’s classic tale of Robin Hood has long conditioned us to mistrust the Sheriff of Nottingham, perhaps we would do well to listen when he advocates the legal prescription of heroin. While seemingly radical, this is exactly the policy recommended by Howard Roberts, the current Deputy Chief Constable of Nottinghamshire, England. In 2006, Mr. Roberts—who is also a member of the Government’s Advisory Council on the Misuse of Drugs—stated that the expanded use of heroin prescriptions might result in more effective treatment of patients as well as significant reductions in drug-related crime.\(^1\)

While England’s heroin treatment methods are historically radical—doctors were freely allowed to prescribe heroin for unsupervised use until the 1960’s—the UK is not alone in its push to examine the use of controlled medical prescriptions\(^2\). In clinical trials performed in Switzerland and the Netherlands, it has been shown that prescribing heroin to heavily addicted users in a clinical setting can lead to marked improvements in a variety of areas. When combined with regular psycho-social counseling, patients’ physical and mental health improved significantly, as did treatment durations and retention rates. In terms of harm reduction, patients’ use of all illicit drugs decreased greatly and the risks of overdose—from using street heroin of unknown purity—and disease transmission—from the sharing of dirty needles—were eliminated almost entirely. Patients reported stronger interpersonal relationships than ever before, as well as increased rates employment. Societal benefits were also observed, including a drastic reduction in patients’ criminal behavior\(^3\).

At the same time, it must be acknowledged that heroin use and treatment are much different in the United States. Compared to the European nations mentioned above, the U.S. is afflicted with a significantly greater number of heroin users. According to the National Survey of Drug Use and Health, over 3.8 million Americans have tried heroin at least once during their lifetime. Of these, 335,000 are actively receiving some form of treatment for heroin addiction. However, the 1914 Harrison Act (and the subsequent Webb v. United States Supreme Court ruling) forbids physicians from prescribing narcotics for addiction maintenance or mitigation\(^4\). Recently, the clinical success of the drug methadone has led to the passing of the Drug Addiction Treatment Act (2000). Now, physicians are allowed to prescribe less potent Schedule III-V drugs, and FDA-approved narcotics for detoxifying treatments\(^5\).

Thus, in the United States, substance abuse and correctional facilities are limited to prescribing methadone and buprenorphine. These synthetic opiates, which are far less powerful than heroin, are used to reduce the symptoms of heroin withdrawal without providing the “high” of euphoric feelings. Although methadone treatment has been proven to be more effective than drug-free treatment, heroin addiction and its intense withdrawal symptoms—drug craving, restlessness, muscle and bone pain, and vomiting—are still very difficult to
overcome\textsuperscript{6,7}. In many cases, patients’ addictions are so strong, and withdrawal symptoms so intense, that they relapse long before their treatment programs are complete. Even in the most favorable circumstances, patients often undergo lifelong counseling and methadone treatments lasting up to several years before they are fully recovered from heroin addiction.

Consequently, in an effort to combat this addiction, improve the lives of long-term users, and reduce drug-related crime, the U.S. Government should consider the use of heroin prescriptions in a clinical setting. In order to examine the efficacy of such treatment, the Government must first establish a limited number of clinical trials. However, given the controversial nature of heroin prescriptions, extreme care—both in terms of policy as well as scientific rigor—must be taken to avoid serious bioethical concerns. Chief among these concerns is the fear that heroin prescription may be construed as tacit indifference by the government—or worse yet, end up fueling the habits of unrepentant addicts. In addition, critics argue that such experimentation creates a slippery slope that may lead to liberal distribution or even legalization of drugs. Finally, given the current economy, hard questions must also be asked about allocation of resources. Heroin prescriptions, clinical supervision, and counseling services are expensive treatments, and many believe that the manpower and money might be better spent elsewhere—such as universal healthcare or cancer research.

In order to avoid these pitfalls, it is important to stress the difference between legalization of a drug and its use as a rehabilitation treatment. As with methadone treatments, careful screening must be applied so that only the most heavily addicted patients—who are still attempting to recover—are accepted into the heroin-prescribing treatment program. Professional referrals, previous demonstrations of commitment to rehabilitation (even if the patient has relapsed), vigilant security measures, and careful record keeping must all be made mandatory to ensure that patients cannot take advantage of system\textsuperscript{8}.

In addition, because there is a legitimate ethical concern that clinical prescription of illicit drugs can spiral out of control, specific goals and other criteria must be explicitly stated before undertaking any study. For example, the FDA could set clearly defined, quantifiable requirements, such as physical intensity of withdrawal or measurements of mental dependency. These criteria must be met in order to gain clearance for even a pilot study. From there, specific benchmarks of patient progress could be required for expansion into larger studies or general practice. Finally, the initiation of clinical trials would also allow an in-depth cost analysis of the program. According to examinations of various European studies, the annual cost per patient varied from approximately $20,000 to $36,000 (2008 values),
depending on the size of the clinic. While seemingly expensive, these studies found that savings from decreased medical costs, law enforcement overhead, and drug-related crime were actually twice as great as the costs of the program. So, while the financial costs of the program would likely require Federal funding, they appear to be justifiable.

In the end, it must be acknowledged that there is no perfect solution to fighting heroin addiction in the United States. While a variety of treatment options exist, heroin addicts—even those who want to recover—remain a marginalized population. If, however, we are able to look deeper and attempt to treat addiction as a medical condition that can be overcome, it will become clear that heroin prescription may present innovative new options. Although this radical program will require time, money, and no small amount of courage, it may improve the lives of thousands of Americans.

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**Bobbing for Apples Babies**
Leah Peterson & Levy Amar

Have you ever gone bobbing for apples, where you dunk your head in a barrel of water with hands tied behind your back, in hope of surfacing with an apple in your mouth? You can imagine the difficulty of succeeding if only one apple is bobbing across a large surface area. It's not impossible, but after laboring for so long, it would be easy to give up. However, if ten or twenty apples are added to the barrel, one would logically expect the chance of catching an apple to increase. And if two, three, or more people can help you, multiple apples could be pulled from the surface at once—**even greater success!**

But what happens to the apples at the end of the game? Do you have to eat all of the apples? Or can you just throw away the extras? Is it more economical to store them for later, or rather share them with others? While the value of apples and embryos cannot be compared, fertility clinics around the U.S. are facing analogous problems involving *in vitro* fertilization (IVF).

During IVF, the number of embryos transferred to the mother's uterus is controlled, leaving the decision of how many are used to the doctor and patient. The American Society of Reproductive Medicine (ASRM) set national guidelines in 2008 that recommend the transfer of one, or at most two, embryos into women under the age of 35, and at most five for women over 50, but these guidelines are not binding. Despite these standards being practiced at most IVF clinics, there are a subset of physicians who choose to implant more than the recommended number of embryos. These physicians hope to increase the chance of pregnancy (as well as their clinic's success rate), as seen in the recent case of the octuplets born to Nadya Suleman. Her doctor, Dr. Michael Kamrava, implanted six embryos during IVF. It is this "freedom" of embryo implantation that causes one to ask, are we just bobbing for babies? The use of multiple embryos inevitably raises many ethical issues when deciding how, or if at all, IVF should be regulated.

The Center for Disease Control and Prevention reported that about one third of assisted reproductive technology (ART) result in multiple births. Twins. An important development in both medical procedure and popular perception is that multiple pregnancy is increasingly seen as a complication or dysfunction rather than a success or unavoidable incident of IVF.

Multiple-fetus pregnancies are at high risk of early miscarriage and premature birth, placing the health and well being of both mother and children in jeopardy. Premature babies are more likely to face serious, chronic health problems, such as underdeveloped organs, birth defects, cerebral palsy, and language and learning disabilities, many of which are not detected until several years after birth (Dickens). The physical, emotional, social, and economic stress that multiple-birth pregnancies place on mothers and families are significant. In addition, such pregnancies add an additional burden on healthcare facilities and health service systems. For these reasons, better evaluation of the patients undergoing IVF and better regulation of IVF physicians are in order.

Currently, there are no legislative guidelines at the federal level to regulate IVF medical
practices and procedures, therefore state medical boards and state laws are left to regulate IVF physicians. Generally, fertility clinics oppose government intervention, claiming self-regulation has been effective in maintaining the integrity of the industry.

However, there are areas of ethical concern surrounding IVF where Federal or State regulation could prove to be beneficial. The question that should be asked with every case of IVF treatment is, “Are the safety and well being of multiple-birth babies being risked for the benefit of others?” Proper regulation could help ensure that the answer is “no,” but enough evidence of IVF being abused through an absence of regulation suggests the answer is “yes.”

Nadya Suleman’s case in which she already had 6 children, all born through IVF, while rare and unexpected, should not undergo further IVF treatments. This case highlights the “greedy, single, unemployed” mothers or the desperate-for-a-large-family couples who are prepared to do anything to get pregnant, even if it means implanting more than the recommended amount of embryos.

As Ms. Suleman asserted in an interview with NBC News, “Those [embryos] are my children, and that’s what was available and I used them. So, I took a risk. It’s a gamble. It always is”. This kind of reckless, unreasonable approach puts the wishes of the mother or couple before the safety of the babies. While her actions and reasoning do not represent all patients seeking IVF, they do raise awareness of the fact that there are no formal rules that currently outlaw this kind of “gambling” with embryos.

What is the role of the doctor when patient-doctor interests conflict? Should he or she be ethically obligated to intervene when a patient is being unreasonable? Or should a physician do only as the patient wishes, without imposing his or her own judgment?

The problem with finding an answer arises from the belief that medicine is an “art” and every doctor practices according to his or her own knowledge, background, and experience, thus one may advise differently than another. But if the responsibility of the medical profession is to do no harm, it seems contradictory to risk the possibility of delivering prematurely born babies with the likelihood of accompanying health problems, for the fulfillment of the dreams of the parents. While “fetal reduction therapy” is available and advocated by many infertility experts to limit the number of pregnancies, the legal reality is that once the patient refuses the treatment, there is little else a doctor can do to prevent a woman from attempting to carry an inordinate number of embryos.

Assistive reproductive technologies, such as IVF, are advancing at such high speeds that they seem to be escaping the bounds of proper regulation. The religious, moral, and political issues linked to the destruction of
multiple embryos continue to overshadow the bioethical issue that should be a taking center stage: Is the health and safety of the babies the true priority of all parties involved? Or are we letting the current U.S. cultural climate mandate how IVF is regulated in order to avoid getting tangled in the thorny mess surrounding abortion, desperate infertile parents, and a capitalist society?

No simple solution presents itself, but the search for one must continue in hope of improving the current health care system of infertility therapy.

References

Imagine for a moment that you have millions of dollars of taxpayer money at your disposal. As a tenured Professor of Medicine at University of Vermont College of Medicine (UVM) your reputation precedes you. You’ve acquired prestige as a preeminent researcher and leading authority on human obesity and the metabolic changes that come with aging. Credited with hundreds of publications, you smugly accept an invitation to speak at an upcoming conference. You do this, all the while knowing, that you’ve come this far through lies and deceit. This was the case of Dr. Eric Poehlman1,2.

To this day, Dr. Poehlman remains the first and only academic in the United States to be jailed for falsifying data in a grant application. Using over a decade’s worth of falsified data, Dr. Poehlman defrauded agencies out of $2.9 million. Given the sheer scale of the time and funds involved, Dr. Poehlman was only sentenced to serve a meager one year and one day of jail time. In comparison, in 2007 15 individuals were indicted and sentenced to serve up to thirty years in federal prison for attempting to defraud a Medicaid plan, potentially costing the government $3.9 million3. Clearly, this discrepancy of punishment is in need of further reconciliation.

Scientific fraud is not something new. Since 1992, there have been more than 2,700 allegations of possible misconduct, resulting in over 160 findings of actual scientific forgery. The National Institute of Health (NIH) polices the findings of investigative science through its ORI—the Office of Research Integrity. Created as a sort of FBI for the scientific community, the ORI oversees investigations of cases of scientific misconduct in research supported by the NIH. Until recently, these offenses were punished with nothing more than a slap on the wrist. Many of alleged wrongdoers were given the chance to resubmit their grants or papers without any further repercussions.

Siphoning off millions of dollars of government money to generate falsified data should, in my mind, lead to conviction of a greater crime. Again imagine yourself in Dr. Poehlman’s shoes. Not only do you jeopardize your own credibility, that of your collaborators, and hundreds of others who cite your findings, but, by scientific forgery, essentially steal taxpayer money.

Especially in this economic climate, the temptation to falsify results to stay afloat financially looms larger than ever. Many researchers agree that these cases are extreme versions of scientific fraud. A good portion of the cases uncovered by the ORI include adding names to a paper where they had made little or no contribution, changing...
Despite the “lesser offenses” classification of these deeds, scientific fraud is nonetheless wrong and needs to be reduced and eliminated entirely.

Some researchers have proposed a research program focused on preventing ethical mistakes and identifying them when they occur. By getting researchers involved in the ethics of reporting findings and removing preconceived expectations of experiment results, the ORI believes it can alleviate some of the pressure to conform to expectations and accept results as they arise. Also, by highlighting cases of fraud, researchers can improve awareness and help fellow scientists recognize the moral wrong in deceiving others for individual benefit. Other researchers believe in careful selection of recruits to work in the lab. While this may discriminate against certain personalities, scientists are becoming more and more careful in their selection of recruits.

Ultimately, the best policy to check for scientific fraud is the researcher conducting the experiment himself. By performing experiments with an unbiased view and objectivity, scientists can produce clear results untainted by conflicts of interest or other influences. The ethical education of these researchers and establishment of self-regulation and self-correction is an integral component to the future prevention of scientific fraud.

The ORI and many institutions could implement programs for researchers on limited grant funding to continue their research without the fear of losing financial support. Additionally, scholarly journal editorial review boards should perform exhaustive reviews before publishing articles regardless of the reputation of the author or institution submitting it. Most journals utilize peer review to evaluate whether a scientific study has scientific validity and importance. Perhaps the reviewers of these submitted manuscripts should also be trained to detect potential fraud. While it may take time and resources, the guarantee of accuracy and objectivity results merits rigorous standards before put into public view.

In today’s increasingly morally gray society, researchers, institutions, and regulatory agencies alike are required to vigilantly stand their ethical ground by establishing appropriate standards of objectivity. Not only does this preserve the respectability of the scientific profession, but also it promotes the free exchange of information without distortions by special interests and may lead eventually the elimination of scientific fraud from the academic community.

References

Opt-Out Organ Donation
Andrew Radosevich and Lok-Kin Yeung

According to the Organ Procurement and Transportation Network (OPTN), there are currently 108,981 Americans anxiously waiting for an organ transplant. While this is already a huge number of people, the list continues to grow. From January through November of 2008, just 25,630 transplants were performed. During the same period, nearly 50,000 names were added to the waiting list. With a continually growing waiting list, the number of Americans that die while waiting for an organ transplant (over 6000 last year) is likely to increase.

So, why is there a scarcity of organs available for transplant? According to the National Center for Health Statistics, nearly 2.5 million Americans passed away in 2005. Even if only 5% of them donated organs, we would have enough to go around, right? Furthermore, for those who have died and are candidates for organ donation, their families must agree to the donation (as many as 35% of families do not) before their organs can be donated.

One often proposed solution to the organ shortage problem is to legalize the buying and selling of organs. The argument is that the free market is the most efficient way to solve shortages by creating incentives for suppliers and offering them to whomever is willing to pay the highest price. Unfortunately, this also creates a huge ethical problem: the people who would be most willing to donate their organs would be those that needed the money (the poor), and those most capable of paying for them would be the rich. Essentially, this practice would result in the exploitation of the poor in order to extend the lives of the rich.

Aside from the ethical problems, there are also other practical problems. For example, those who are most able to pay for organs may not necessarily be those who need them the most. Furthermore, people desperate for cash may hide conditions that make their organs unsuitable for transplant. More problematically, this practice would provide an incentive for the criminally inclined to con, rob or kill people for their organs.

An alternative solution to the organ shortage problem is much simpler, switch to an opt-out organ donation system. Under the current “opt-in” system, individuals must register to become an organ donor. With an “opt-out” system, individuals are assumed to be organ donors, unless they register to opt-out of organ donation.

An opt-out system would provide three distinct advantages over market based buying and selling of organs. First, the number of organs available for transplant would dramatically increase. A 2003 study by Eric Johnson of the Columbia Business School and Daniel Goldstein of the London
Business School showed that organ donation rates doubled from 40% to 80% when moving from an opt-in to an opt-out system. This gain was even larger when the effective consent rate (that is, the percentage of people who have consented to donate their organs) of countries with opt-in organ donation systems was compared to those with opt-out systems. Opt-in countries had relatively low consent rates: the UK had a rate of 17%, Germany had a rate of 12%, and the Netherlands had a rate of 27.5%. In comparison, opt-out countries had uniformly high consent rates. For instance, Sweden had an effective consent rate of 85%, while Austria, France and Hungary all had consent rates greater than 99.9%. Second, an opt-out system would preserve an individual’s choice of whether or not to be an organ donor. As with the current opt-in system, individuals could still choose to refuse to donate their organs. Third, the opt-out system would retain the main advantage of the current system: people would continue to receive organs based on need, rather than economic status.

The most important issue with any “opt-out” system is ensuring that people give their informed consent. People must be aware that they will be presumed to be organ donors unless they opt-out, and be given the opportunity to do so at any time. Currently, we are presented with the choice to become an organ donor when we renew our driver’s licenses. This reaches most Americans, but it may take several years before a person could change his status, for instance, if you just renewed your license. If the United States were to switch to an opt-out system, all Americans should be informed of the change, and offered a chance to opt-out. Further, it would be necessary to offer the choice to opt-out to each American as they came of age. This is not as difficult as it may seem—the opt-out choice could simply be tacked onto Selective Service, or registration for voting.

It is important that opting out of organ donation should be easy and accessible. Otherwise, we would lose our freedom to choose not to donate our organs. In any event, even countries that practice the opt-out system continue to ask the family of organ donors to obtain their consent before proceeding with organ donation. This is the exact same process that currently takes place in the United States. Even if we were somehow unable to opt-out of organ donation through the usual means, we could simply tell our families that we do not wish to donate our organs.

Since the ideal opt-out system would retain all the rights that we currently have under an opt-in system, we must ask why an opt-out system would actually produce more organ donors. The immediate, cynical answer presumes that such a system would deceive the lazy into becoming organ donors because they wouldn’t know any better. It’s more likely that the opt-out system simply circumvents the current difficulties of becoming an organ donor. A well-cited Gallup poll showed that while 85% of Americans would like to be organ donors, just 28% had filled out organ donation cards. With an opt-out system, those remaining 57% would become organ donors without having to take any other action. Imagine that you are one of the over 100,000 Americans currently waiting for an organ transplant. Wouldn’t you want to make it easier to acquire organs from donors who are already willing to give them by using an opt-out system?
Growing interest in global health in the last decade has led to increased opportunities to participate in international medical electives while in medical school. Of the 129 accredited allopathic medical schools in the US, about half (60) indicate on their website that they have an initiative, institute, center or office for global health. In a 2007 survey of all US medical schools, 90 (87%) stated that they offered international clinical electives to their students. At Columbia, the website of the Office of Student Affairs currently lists 41 countries in which senior medical students may do electives. The countries available to work in vary from highly developed (France, UK, Germany) to developing (Ethiopia, Thailand, Dominican Republic). At Columbia, about a third of the graduating class participates in one of these electives each year. This phenomenon is not limited to the US and is even more common in Europe where most medical schools have an international elective requirement. Worldwide, these electives result in thousands of American and European medical students travelling abroad each year to developing nations as part of their medical education. This influx of students into resource-limited settings is not trivial but has garnered little attention as to its effects on those involved.

From the students’ perspective, these electives are usually highly regarded opportunities to expand one’s clinical knowledge, understand medical practice in resource-limited settings, serve the underserved and improve one’s general cultural awareness. Although many of these goals are achieved for the student, the consequences of these electives must be considered from the perspective of all of the stakeholders involved: the home school, the host institution, the patients, as well as the student. Ethical considerations are often overlooked by some who see these electives only as opportunities to promote global health, provide medical services to the underserved while simultaneously improving education for the student and increasing the prestige of the home school. Although this win-win scenario would be ideal, a fuller understanding of the ethical challenges involved is necessary to determine who is really winning and, if possible, how everyone can win.

Whenever a medical professional works abroad in a developing country, either in a research or clinical setting, one must consider whether they are exploiting the particularly vulnerable situation of people living in poverty to attain their goal. In the case of medical students working in these resource-limited settings, it can be easy to view one’s self as having more skills and thus, taking on more responsibility than one would in the US. Since medical students are not fully licensed physicians, they, legally and morally, continue to require the supervision of a physician whether they are abroad or at home. In developing countries this supervision may be less than in the US which may stem from differences in training practices between the two countries or beliefs of the host institution staff regarding what medical students do in their home countries. A study done by Radstone in 2005 found that the vast majority of healthcare staff in a hospital in the Solomon

**Ethics of International Medical Electives in the Developing World: Helping those in need or helping ourselves?**

Abby Chiverton
Islands thought that English medical students could diagnose, treat, and prescribe drugs without direct supervision from a qualified doctor. Most, although a smaller number, also thought that the medical students could do all of these things without supervision in England. This lack of knowledge of the appropriate role of medical students contributes to the overstepping of responsibilities that accompanies international electives. This may even be construed as taking advantage of the situation and “practicing on the poor”.

Additionally, regardless of the setting, patients deserve to know that they are being treated by a student and to decline from that provider if they desire. In resource-limited settings, this may not be possible at all times, as the student may be the only person available. Some argue that some help, in the form of a student, is better than nothing at all. Unfortunately, this may be the case; however, full disclosure is still important. The patient should know that the person taking care of them is a student and the student should know, prior to arrival, what role they will be expected to perform.

For the student entering this situation of extreme resource poverty for the first time and having a heavy burden of responsibility placed on them, the whole experience may become overwhelming. They may make decisions in patient care which result in long-held feelings of guilt and inadequacy.

Other considerations for the students’ well-being must be addressed. Students traveling to developing country must be educated regarding the risks of communicable diseases as well as the political and social dangers that may be present. The student’s home school should provide them with vaccines and HIV, Hepatitis C, and malaria prophylaxis as dictated by their travel. Students also incur significant risk outside the hospital setting due to political unrest and other dangers, such as traffic accidents, which occur at much higher rates in developing nations. The safety of the student must be better considered and emergency plans must be better established. The home school should incur the responsibility of ensuring that the students are relatively safe and well-provided for as well as for possibly defraying some the cost of these, often expensive, electives.

There is a natural and important urge to explore when traveling aboard. This is to be expected when students do international medical electives. However, there is a danger that the elective in a foreign land will be viewed as a vacation rather than rigorous educational experience. This view may also detract from the student’s ability to contribute to the group with which he or she is working. To balance both the needs of the student and the elective, sight-seeing should be integrated into the rotation with weekend trips and time in the evenings for exploring the surroundings.

When considering the electives from the perspective of the host institutions, it is important to ask what they hope to get out of hosting medical students. They may assume that collaborating with a school in a resource
rich country will allow them access to
donations of equipment or money. These
collaborations may also improve training
opportunities in the form of physicians and
nurses traveling there to teach or their own
physicians and nurses training in the home
school’s hospital for advanced training. This
may or may not be the case depending on
the home institution. According to the 2007
survey by McKinley only about 57% of the
medical schools surveyed offered clinical
rotations to medical students from abroad.
The terms of the elective must be explicitly
defined so the host institution knows what to
expect from the agreement.

The host institutions may welcome the
chance to have medical students from
abroad, but it may result in further draining
of already limited resources. Often, the
home institution relies on people in the
country to find the student housing, arrange
for transport and visas, and set up
translation services. These extra burdens
may or may not be worth the benefit of the
student who arrives. Often the students are
not familiar with the local language or
customs and are there for a limited time.
Therefore, it takes time for them to
contribute to the clinical settings. Once
these students leave, the clinical services
provided may be impossible to replace until
the next student arrives.

The home institutions are often the clearest
winners in these electives. They enjoy being
able to offer many international electives
which can then be used to recruit top
students who are interested in global health.
Although they carry some burden of
responsibility to the student to help defray
cost and to ensure safety, they often expect
the student to shoulder most of the cost
while continuing to charge tuition during the
student’s absence. However, they also have
a responsibility to the student to ensure an
adequate educational experience. Pre-travel
preparation should also fall to the home
institution to assure that the student is
equipped for the tasks ahead and
understands the expectations. Unfortunately, this preparation is done with
varying degrees of thoroughness and
consistency. The McKinley survey of 103
U.S. medical schools found that only 32 of
90 schools offering international medical
elective had pretravel preparatory courses
for their students².

Despite the hurdles to ensuring a safe and
ethical international elective, the benefits
can be tremendous. The students who
participate demonstrate increased
knowledge of tropical medicine, improved
communication skills and cultural sensitivity
as well as a better appreciation of resource
utilization and public health. The knowledge
better equips these students to practice not
only abroad but in the US as well. With the
increasing mobility of the global population,
practitioners in any major US city will be
faced with diagnosing and treating “tropical”
diseases in recent immigrant populations.
Also, an appreciation for cultural differences
in health and disease are essential to the
effective practice of medicine in any
population. The electives provide a unique
opportunity to see medicine practiced in a
completely different setting.

These students also enter primary care
fields at higher rates than their peers⁵. This
may be due to a self-selection bias but
international electives may still serve as a
tool for recruiting others into a career in
primary care or in working in an underserved
area. This is important to consider since the
numbers of primary care physicians
continue to decline despite their need.
Additionally, these electives allow those
interested in global health to experience
what that career choice may entail.
Throughout medical school, the clinical electives are designed to impart the fundamental knowledge of the main specialties of medicine, but they also serve to allow students to try out these different career choices. Providing more access to international electives may encourage students to pursue this field of medicine.

International electives will likely only continue to grow in the coming years as will health disparities. By considering all of the stakeholders at hand, these electives can be conducted in an ethical manner with equally distributed burden and benefit across the parties. They should be undertaken with a clearly delineated plan of who will be supervising the student, what the student’s role will be, and what the host institution expects to receive from the relationship. The home institution should solicit feedback from the host institution regarding the difficulties and benefits of hosting their students. There should be open communication so the host institution has a means to stop the elective if they feel it is too burdensome or is no longer a beneficial relationship. The student should also have a method for providing feedback to both the host and home institution. The home institution also should be required to offer pre-travel preparatory courses for their students going abroad to ensure adequate language, cultural, and medical knowledge prior to departure.

Although it is impossible to require students participating in these electives to pursue a career in global health, a component to the curriculum should encourage them to return to the country they visited as a student when they are a physician. The elective could eventually incorporate some of these returning physicians to supervise the students thus reducing the burden on the host institution and providing a mentor who is familiar with the role of the medical student. This would provide an opportunity for the student to eventually truly give back to the community that taught them. It is also important that the flow of medical students does not remain unidirectional. As developing nations build their medical education infrastructure, more of their students should be afforded the opportunity to learn in our institutions. Through a building a cross-cultural exchange international electives will become a winning endeavor for all participants.

References

Section IV: Transnational and Translational

When Life Itself is Out of One’s Price Range
Kevin Gauvey-Kern Charlotte Blumenfeld

The World Health Organization estimates that over ten million people die in the developing world yearly because of a lack of access to medications and vaccines that are readily available in the first world. The principal problem? The price of patent-protected drugs.

The antifungal drug fluconazole is a life-saving treatment—the only life-saving treatment—for AIDS patients with cryptococcal meningitis. In the United States, fluconazole is marketed as name-brand Diflucan to treat toenail fungus, yeast infections, and other inconvenient but minor conditions. Until 2005, the pharmaceutical giant Pfizer held fluconazole’s exclusive patent and made about $1 billion a year in profits from the drug, selling it wholesale for about $10 a pill (at retail, $25-$40). In Africa, 10% of the millions of people with AIDS develop cryptococcal meningitis, but Pfizer’s patents kept the price at $18 a pill, a price that is effectively a death sentence for most infected Africans. This profit margin is the silent executioner of millions in Africa (and elsewhere). In India, the generic fluconazole can be produced for 5 to 50 cents a pill, but Western-style patent laws make such sales illegal in other developing countries.

This story is perhaps not altogether surprising to Western readers who are accustomed to hearing of the countless poverty-stricken Africans without access to necessary medicines. But curable blindness is often untreated in the United States. Xalatan, an eyedrop for glaucoma manufactured by Pharmacia Corporation (now part of Pfizer Inc), costs patients $45-$50 for a tiny bottle lasting about 6 weeks. This price puts it out of reach of Americans like Albert Russell, a retired optician and part-time blues singer, who lives on $832 a month from social security and whose glaucoma has left him almost blind. The key ingredient in a daily dose costs pennies, but Pharmacia maintains the market price is fair because of the innovation it brings and the money it invested in research and development.

Indeed, many Americans accept the high prices of prescription drugs and pharmaceutical companies’ claims that the prices are necessary to pay for the research and development of new medicines. But is the current drug patent system really the best or only way to fuel innovation in drug development?

Patents may be a good way to reward innovation for authors of books or for inventors of consumer goods, but drugs—which so often have life-saving potential,
are inherently different. The objective of pharmaceutical companies is to maximize profit. These publicly-held companies are investor-owned and beholden to their shareholders to generate returns on their investments. Based on their incentives in the marketplace, pharmaceutical companies are acting the correct (and some argue the only) way they can. While industry drug pricing strategies are lucrative, they are very often in conflict with the health care needs of the public, on a national or worldwide scale.

Not only are essential drugs out of the reach of many in both developed and developing countries, but many essential drugs don’t exist at all. Though the pharmaceutical industry invests about $27 billion in research yearly, most of these funds are allocated to the development of drugs to be used by relatively healthy people. Among the biggest sellers are drugs to treat hair loss, and to relieve impotence. Meanwhile, outdated drugs which often have serious side effects are the only choices for many diseases that inflict the poor.

Pharmaceutical giants acknowledge that the situation is unfortunate but fall short of accepting any responsibility. “Access to medicine is a human right,” said Alain Aumonier, director of international corporate policy for Aventis, a French-German pharmaceutical company, “But it’s a right that should be enforced by the whole community...the health care system, the social system, even the patient...” Yet some of the same patients unable to purchase needed medications actually helped fund pharmaceutical companies’ research and development (R & D) operations – without getting any return on their investment. That’s right—American tax dollars support the development of countless drugs, but taxpayers get no financial return on this investment. The development of Xalatan — the glaucoma drug we mentioned earlier — was supported with $4 million from the National Institutes of Health (the equivalent of 80 million therapeutic doses of the drug at cost). In addition, the pharmaceutical industry receives tax credits when they spend their own money on R+D.

Is research and development really so prohibitively expensive that the pharmaceutical companies couldn’t bring down their prices? The industry claims that the cost of a major drug discovery is, on average, $500 million. However, such a claim is hard to verify as the secretive industry won’t reveal how much it has spent on the R+D of any particular drug. Even if industry reports of R+D spending were correct, there is definitely room for cutting costs. The pharmaceutical industry has been America’s most profitable industry — more profitable even than the computing, entertainment, or real estate industries—for years. Reexamining the system of compensation for drug innovation is no longer a philosophical issue to be debated by academics, but an action that must be necessarily taken, and taken immediately, if we are to avert a national crisis of epic proportions.

To optimize the system’s ability to provide the best medical outcomes, and not the best industry profits, would require a major restructuring of incentives. One viable option is to instigate a kind of prize system. Under such a system, drug manufactures would compete for a set pool of funds. Whoever is the first to develop an effective drug (as evidenced by clinical trials) that can be used in the treatment or cure of a given condition will be given a predetermined financial prize by a national governing body. The goals of such a prize system would be not to demonize or control drug companies but rather to use the competitive market system
to reward development of pharmacological therapies that have the potential to do the most good and alleviate the most serious physical suffering.

Given the potent influence of industry lobbyists and widespread American fears of too much government regulation, such a prize system might not be in our near future. With the rising cost of healthcare, however, and the added pressure exerted by the nose diving economy, increased governmental pressure on drug prices and regulation throughout the healthcare system will be unavoidable if we are to make strides in maintaining and improving the quality of life (and indeed, ability to live) of our citizens. Because of the American employer-based health care system, many industries are likely to show support for increased government involvement if it means a downward push on health costs.

Many relevant laws are, in fact, already on the books though not currently enforced. For example, according to the Bayh-Dole Law, once an invention that has received government funding is on the market, the government has the right to buy it without paying royalties. The government can also put government-funded inventions to competitive bidding, giving another company the opportunity to manufacture and sell the drug at a lower price only to the government. Since the Bayh-Dole bill became law in 1980, however, the government has barely taken advantage of these provisions.

In coming years, we are likely to see increased government regulation of pharmaceutical companies and enforcement of existing laws to reign in soaring healthcare costs. In the long run, however, regulating a system with strong incentives that are severely misaligned with the public’s interest will be more labor-intensive and yield less societal benefit than redesigning the system to properly serve those interests.
Citing World Health Organization rankings and anti-profit propaganda, Michael Moore and others want us to believe that our healthcare system is irretrievably broken and should be socialized. But as biomedical engineers, we understand and believe in the value of statistical analysis. The extreme claims by Moore and his ilk simply do not stand up to the facts.

Methodologies for calculating infant mortality rates, a statistic which is often correlated with quality of health care, are not standardized across nations. The rate should be calculated as the number of deaths of infants less than one year old out of every 1,000 live births. Doctors in the United States strictly adhere to the suggestion of the WHO that all babies showing any sign of life at birth be counted as a live birth. In Austria, Canada, and Germany if your baby weighs less than 500 grams at birth, he or she is not considered a live birth and does included in calculating the infant mortality rate. A study showed that a baby born with a weight under 500 grams has the best shot of surviving in—you guessed it—the United States. Other countries choose not to count the birth of an infant as live if they are too small, or shorter in length than 30 centimeters. These countries, mostly socialized, report the deaths as stillbirths or miscarriages in order to keep their numbers low. Wouldn't you rather have your child in the United States where doctors rely on advanced technology to try to save premature babies rather than cover up the problem with semantics to maintain their reputation?

Life expectancy rates, another statistic correlated with quality of health care, are also misleading. Cardiovascular disease alone accounts for a significant portion of early deaths in the United States. Lack of exercise and poor eating habits account for this, and those are behavior problems. The best health care in the world cannot promise a normal life expectancy to a morbidly obese individual. The same goes for homicide and automobile accidents. Recklessness and violence have nothing to do with the fairness or quality of a health care system.

It is easy, as Michael Moore has shown with his movie "Sicko", to pander to people's emotions regarding those who lack health insurance. Nobody wants millions of people to be without access to health care, so the knee-jerk reaction by many is to insist upon the goal of universal health care. But why should we listen to them? We live in the country where the free market is still king, even if he collapses every now and again. Isn't agreeing to a monopoly disastrous for all of us? Competition never made any market less efficient, more costly, or lower in quality. There are already innovative people...
providing more, not fewer, options for how we could restructure health care, and we should pay attention to them. In 2002, the CEO of Whole Foods initiated a new high-deductible health care plan for his employees that is maintained in a Health Savings Account (HSA). About $1500 is deposited into the account annually that is used exclusively to pay health care costs. Funds remaining in this account roll over to the next year. Treatments for major diseases are covered in full. While some employees initially were upset about losing their full coverage, the system has proven to be a success. When the individuals become responsible for paying for their ordinary health care costs, they tend to search for the best value before choosing. This causes health care providers to compete for business, driving down costs and increasing quality.

It was John Stuart Mill who once said that if Government mandates that every citizen have education, that they might save themselves the trouble of providing it. Nearly 150 years later, it is time to apply his wise words to our health care system. With a new administration and the promise of change, we must urge our elected officials to listen to the facts and be careful in their health care reform proposals. Let's instead start by mandating that people should have health care, and let the free market create competing lower-cost health care plans. Relying on our government should be the last resort.

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Every year in the state of New York, more than 1,500 people receive kidneys, livers, and hearts that have been donated for transplantation. However, with more than 8,000 New York residents still on waiting lists, it is evident that the need for organ donations far exceeds the supply. The development of artificial organs has provided an alternate way of restoring a specific organ function or a group of related functions. However, current artificial organ technology falls short of providing a total replacement for an organ that would allow a patient to return to a normal life. For example, a dialysis machine can perfectly replace the duties of a kidney but a successful portable, self-contained artificial kidney is yet to be developed. Organ transplantation remains the most reliable means of saving the lives of patients suffering chronic organ failure.

The severe imbalance between supply and demand for organs around the world gives rise to crimes and misdemeanors. Furthermore, organ shortage fuels illicit trades in human body parts and organ transplant tourism, creating critical moral and legal problems. In order to deal with the shortage of organs in a more ethical way, an ethical model of organ donation should be promoted.

China is a central market for illegal organs. In April 2007, BBC News covered China’s transplant industry and highlighted illegal practices, especially organs procured from executed prisoners without consent. The speed of matching donors and patients, sometimes as quickly as in a week, suggests that executions are performed based on the need for organs. The BBC further reported that organ harvesting and selling has been a lucrative and thriving business for the military and China’s under-funded health system.

The Chinese communist regime has thus resorted to unethical means to obtain organs from executed convicts. This means of harvesting organs from criminals completely disregards the principle of voluntary organ
donation. Furthermore, state exploitation of prisoners and convicts, who belong to the most vulnerable social stratum, suggests that the donor’s autonomy is entirely ignored and their fundamental human rights are violated in the process of acquiring organs.

Inappropriate, and illegal sourcing of organs for domestic use is not the only problem in China. In February 2009, International Herald Tribune expressed a concern over organ transplant tourism in China. The government of China banned transplants to foreigner “organ tourists” on May 1, 2007. An estimated 1.5 million Chinese people are on waiting lists for transplants and the government decided that priority must be given to its citizens in urgent need of organ transplantation. The article, however, covered a story of 17 Japanese tourists who received illegal kidney and liver transplants in China at a cost of 87,000 U.S. dollars for each operation. The article exposed continuing organ tourism in which more affluent people, especially foreign patients, are secretly moved up to the top of the waiting list, simply because they were willing to pay for the organs.

The idea of selling and buying human body parts threatens the conventional view of an organ donation as a “gift of life” that was never meant to be a commodity. By assigning a monetary value to a human organ, the possibility arises that a donor’s decision may be based on their financial circumstances, rather than on altruism. Thus, the organ donation will no longer be rooted in a completely voluntary, selfless sacrifice.

Moreover, a market for organs will cause chaos for patients. If the organ sales were ever to be legalized, given the high demand for healthy organs for transplant and a shortage of supply, prices will undoubtedly skyrocket. Consequently, organ sales would only solve the problem of the supply shortage exclusively for the wealthy, leaving other patients with no organs. Patients in critical conditions might not receive their transplants simply because they could not afford organs or because they have been outbid by a wealthy patient who could be in a less fatal condition.

By using money to lure people into giving up their organs, the wealthy, as well as the healthcare providers, who will benefit monetarily from the operations, will be taking advantage of another human being’s desperation for financial stability to satisfy their own needs. While some may argue that sale of one’s own body parts is considered a fundamental human freedom, this right will be exclusively exercised by the poor. It is crucial that living donors, indigent or wealthy, consider the value of their donations beyond any monetary compensation. This consideration should ultimately prevent the inappropriate distributions of available organs.

Organ transplantation, a wonderful achievement in medicine, allows tens of thousands of people to be given a new lease on life through the selfless efforts of donors who literally give of their own bodies to save others. However, under the surface lurks a morass of ethical dilemmas and controversies, which have threatened to undermine the practice of organ donation. Furthermore, the increasing gap between the supply and demand gives rise to unethical and illegal practices of acquiring organs. What are the eligible sources of organs for transplantation? How can we determine whether or not one is eligible for an organ transplant, and who should be given priority if at all possible? What is the solution to the shortage of organs? These are some of the questions that need to be
addressed for the righteous and ethical practice of organ donation to flourish. The foundation for these solutions, however, remains firmly rooted in the fact that attaching a price tag to human body parts is simply immoral and more importantly, that human organs are not for sale.

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Age-related macular degeneration (AMD or ARMD) is a chronic eye disease in which the part of the eye responsible for central vision, the macula, gradually deteriorates. This causes blurred central vision or a blind spot in the center of the visual field\(^1\). AMD is considered the leading cause of blindness for patients aged 65 and over, with an estimated 8 million people in the US affected by the disease\(^2\).

AMD is a progressive disease, marked by the start of early exudative form or Dry AMD and generally continues to the late stage non-exudative form called Wet AMD. The Wet component is marked by development of Choroidal neo-vascularization (CNV) or leakage and bleeding of the retina, as its name implies.

The exudative form of AMD is responsible for more than 80% of the legal blindness (20/200 or worse) caused by the disease. Choroidal Neo-vascular Membranes (CNVs) appear by seeping through breaks in the Bruch’s membrane and proceed to grow under or through the Retinal Pigmentary Epithelium (RPE). As the new vessels move laterally and mature, they form a more developed vascular system by feeding off the choroid and fibrous tissue\(^3\). However, these newly formed and superfluous blood vessels are prone to vascular leaks. Ultimately CNV leakage leads to a scarring of the retina and a permanent loss of central vision.

The most successful and recent treatment for AMD has been Vascular endothelial growth factor (VEGF) inhibitors\(^4\). Researchers have concluded that VEGF plays an active role in the instigating growth of the abnormal blood vessels prone to leakage\(^4\). The gene for VEGF(-A) has six isoforms produced by alternate splicing; they are 121, 145, 165, 183, 189 and 206 amino acids respectively\(^2\). VEGF 121, 165, 189 and 206 are the most important to the eye’s angiogenesis cycle\(^4\).

Macugen (Pegaptanib Sodium Injection) was found to specifically bind to VEGF\(_{165}\), and became the first anti-VEGF treatment for Wet AMD. Macugen had limited clinical success\(^3\). The replacement for Macugen, and the next step in anti-VEGF progression, was Lucentis (Ranibizumab Injection or rhuFAB VEGF). The development of Lucentis is interesting and starts with Bevacizumab (Avastin), a mouse derived monoclonal antibody to VEGF, commonly used to treat cancer. Avastin was designed to bind to all isomers of VEGF, not just VEGF\(_{165}\). Avastin, as a monoclonal antibody, has a relatively large molecular
weight of 150,000 daltons and (at the time) was thought to be too large to pass through the retina into the subretinal space or under the RPE.

In further development, researchers created Lucentis by cleaving the antigen binding portion of the antibody from Avastin. At 18,000 daltons, Lucentis is able to penetrate the retina and subretinal space to inhibit the CNV’s VEGF of all isoforms. The MARINA and ANCHOR trials of Lucentis have shown overwhelmingly positive results compared to previous treatment options. 90% of patients have been reported to have maintained or improved vision.

Clinical data surprisingly revealed that even the large Avastin molecule could penetrate the subretinal space. Today, both Avastin and Lucentis are widely used to treat Wet AMD, but only one is FDA approved. Lucentis at $2,200 a dose is the FDA approved treatment, while Avastin at $60 is considered off label. However, recently Medicare has approved Avastin as a treatment for Wet AMD.

The socioeconomic impact of AMD is much larger than one would think. Australia’s Centre of Eye Research has recently published financial projections concluding that AMD costs 2.6 billion dollars a year and will grow to 6.5 billion dollars in 2025; that is 59 billion dollars over the next 20 years. Extrapolating from this to fit the US population, AMD would be projected to cost the US 900 billion dollars over the next 20 years. The 35 times higher cost of Lucentis suddenly becomes a much bigger number and issue.

An ethical dilemma emerges because the pharmaceutical company, Genentech, is the owner of both treatments. Genentech has not supported clinical trials for FDA approval of the lower cost drug because it would greatly affect their profit margins.

Despite the price differential between these two drugs, physicians treating macular degeneration would make the same amount of money irrespective of which drug they prescribe. The reason is that physicians are reimbursed by insurance companies for the price of the drug and therefore they only see payment for the services rendered, no matter which drug they prescribe. However, physicians can be financially burdened as well with the high price of Lucentis. They pay for the drugs up front. Turn around on insurance reimbursement is seldom less than 45 days or about 7 weeks. If a physician treats 10 patients in a week, he’s writing a $20,000 check for Lucentis and over 7 weeks and has invested $140,000. This money will be reimbursed, eventually, but the weekly Avastin check would only be $600 or $4,200 over the 7 weeks. The latter option certainly seems more convenient and comfortable, especially in times like these.

A difficult decision has to be made by an eye doctor each time they see a patient with Wet AMD. As a physician they are likely a patient’s only source of information and they are burdened with an intrinsic trust by their patient. The course he or she recommends will, in most cases, be what the patient chooses. The physician has several tough ethical issues to consider. Do they offer all patients the same options and give them all the same explanation? Are choices different for a poor lower class patient and a wealthy middle class patient, an insured versus an uninsured patient? If a patient believes the expensive option is “better” because it’s FDA approved he may be willing to spend his life savings in order to have the best chance to retain his sight. Should physicians even offer the expensive treatment, knowing their influence on the
patient and the resulting financial hardship that the patient may be left with? In essence the question becomes how far does the role of a physician extend past the science and medicine into the humanitarian side of things. Does a physician hold a financial responsibility to his patients, all other things being equal?

What about Medicare and in turn the government, who approves and pays for both treatments? Medicare’s motive for approving Avastin reimbursement is questionable. Medicare will save if patients begin using Avastin instead of Lucentis, but is it right to insure an off label drug just to save money? Most private insurance companies have not yet followed suit in approving Avastin reimbursement. Like physicians they are most likely worried about becoming responsible for any problems that may arise.

Genetech holds the key in all of this mess. By not submitting Avastin for approval they have placed a stranglehold on the eye care and insurance industries, all to protect their profit margin. Already having a product fitting that niche, it would not make sense financially for them to undercut themselves with a cheaper drug. However, does Genentech have a moral obligation to go forth and seek FDA approval for Avastin or do they have a right to profit off of Lucentis? It seems Genentech has taken the less noble path. Without any outside pressure, Avastin will never be presented to the FDA.

More awareness over the issue needs to be raised. This responsibility does not fall onto one party, but to everyone affected: physicians, patients, and government should all play a role in this effort. Physicians can stop taking free lunches and hand outs and raise awareness of the problem by being active advocates for their patients and making the problem better known. Patients should be more vigilant in making this issue known publically, outside of eye doctor’s offices and into the public’s eye. The government should be more involved and force Genentech to submit Avastin for FDA approval. The Medicare approval of Avastin is a step in the right direction, but more needs be done.

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Two Students, Two Perspectives

Jeff is an American pre-medical student at a prestigious undergraduate institution who routinely gets four hours of sleep a night. He is overloaded with coursework and, as a result, rarely hangs out with his friends on weeknights. Jeff's parents prod him to become a straight ‘A’ student with excellent extra-curricular activities, so most of his free time is spent volunteering at a nearby hospital and doing biology research in his professor's laboratory. In order to balance his schoolwork, volunteer activities, and social life, Jeff takes Adderall to stay awake longer and increase his focus.

As a Japanese exchange student at an American university, Ichiro discovers that many of his classmates pop pills the night before an exam. When he decides to stay up all night in order to finish his term paper, his fellow classmate offer him Ritalin, claiming that it eliminates drowsiness and enhances clarity of mind. Ichiro refuses the medication because he does not want to cheat, but contemplates bringing a bottle of pills back to his friends in Japan to see how they might react.

The Present and Future of Neuroenhancing Drugs

A host of surveys has confirmed that the use of cognitive enhancing drugs is widespread in both American secondary and post-secondary schools. One poll reports that up to 10% of high school students and 20% of college students have illegally used prescription stimulants. In contrast, Japanese students have yet to adopt cognitive enhancing tendencies.

Adderall and Ritalin, the two most popular stimulant drugs among students, are only the tip of the iceberg when it comes to neuroenhancers. Many other drugs originally proposed for therapeutic purposes have researchers questioning whether they can be used by healthy individuals as well. For example, Donepezil has been shown to improve the learning ability of pilots undergoing training. Modafinil, a drug already approved by the FDA for the treatment of narcolepsy, may enhance attention and concentration in healthy subjects. In the future, scientists may be able to pharmacologically alter cognition, so as to affect, memory, movement, and creativity. Who knows, in a few years Jeff might be able to swallow a memory pill.
before class and never have to worry about studying again, while Ichiro may take a medication that will enable him to master the piano in a matter of months, instead of years.

Ethical Issues from a Cultural Standpoint

When treating diseases, doctors are willing to tolerate side effects in the hope that a patient’s illness can be cured. Without the looming threat of disease, doctors may find it morally difficult to prescribe a medication with harmful side effects. Most neuroenhancing drugs are in the preliminary stages of research, and their side effects are largely unknown. Very few controlled studies have examined the effects of stimulants, for example, on healthy students. This may explain why stimulants have yet to be abused by Japanese students. Japanese culture tends to be hesitant and skeptical of foreign products or practices until their benefits and effects have been scientifically proven. Americans, on the other hand, “believe that the pursuit of happiness is an unalienable right. This belief assumes we have the wisdom to know what constitutes happiness.” As long as there are warning labels, many Americans believe they have the right to engage in any behavior that contributes to their definition of happiness.

Even if scientists prove that cognitive enhancers are completely safe, it may take decades until Japanese society fully embraces them. The use of stimulants and other neuroenhancers may stymie character development and erode integrity. Ichiro declined the medication because he viewed it as improper gain without the input of pain. Japanese parents traditionally instill within their children the importance of demonstrating will power and effort. The Bushido tradition, a code of the ancient Japanese samurai, emphasizes rectitude, honesty, and loyalty, among other traits. To stand out and be different in Japan is an insult to the harmony that is so cherished within the culture. Any breach of honesty or loyalty in order to gain superiority is viewed as a shameful act.

In the United States, capitalism has developed a cutthroat marketplace that encourages bold business moves and risky financial investments. Reality television shows, such as Survivor and American Idol, demonstrate the country’s belief that only the fittest or most talented persevere. Pre-medical students are told that their applications should “stand out” from the rest, and many parents encourage their children to be unique. America pioneered fast food meals, microwave dinners, and minute rice. It is not surprising that neuroenhancement issues have been catapulted into the limelight by students themselves. Pills offer a quick and easy way to survive in a competitive environment. In fact, one survey suggests that four-fifths of Americans believe that healthy adults should be able to take neuroenhancing drugs if they choose to.

The Japanese and American perspectives might be reversed in the case of coercion, however. If medications are proven to enhance job performance, organizations might mandate the use of prescription enhancers by all employees. For instance, if studies replicate Denepezil’s ability to enhance flight performance without causing significant side effects, the Federal Aviation Administration could theoretically force all pilots to take the medication before they fly. Americans, in principle are autonomous libertarians who believe in “Life, liberty and the pursuit of happiness”. It is not clear that the benefits of a medication would convince them to legally authorize drug coercion.
Unlike the United States, Japanese society is socially oriented, and values the status of the community over individuals. Neuroenhancing drugs taken for the benefit of society as a whole may very well be accepted, rather than shunned. In addition, Japanese professionals pressure themselves to excel in their careers so as not to shame themselves. Maintaining honor and avoiding shame are fundamental principles of Bushido teaching. Pilots would be willing to take medication, if it guarantees that they make no mistakes while flying. Ancient samurai committed suicide if their honor was lost, and sensitivity to shame is maintained in modern Japanese culture.

On the Horizon

As Jeff's story illustrates, the United States appears to be on its way to accepting some form of neuroenhancement. Many American scientists agree that the emergence of this technology is inevitable, and embracing it at an early stage is the wisest course of action. Ichiro’s ambivalence hints that the future of brain enhancing drugs in Japan is less predictable. It is clear that more studies will be needed and more reliable results gathered, before Japanese scientists sanction their use. While drugs for the individual may be discouraged, new medications that can benefit society as a whole could be widely accepted by the Japanese community.

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Gender inequality is still a deeply rooted facet of many cultures. In many societies there is a belief that having a son is a blessing, an honor to the family, while daughters are a burden that comes with great responsibilities. Muslims living in the Middle East, Pakistan, Afghanistan, and India and even those who have immigrated to Europe or to the USA have the misconception that the bleeding from the ‘intact hymen’ on a wedding night signifies the loss of a woman’s virginity.

The hymen is a thin delicate membrane partially covering the opening of the vaginal membrane. Most women are born with it while some are not. While some scientists believe that the hymen is used to protect the vagina from infection in infants and children, there is no clear data indicating that the hymen serves any biological function. Since the hymen is very delicate, it can be easily torn during a woman’s first sexual intercourse. Also, it can be torn during a variety of non-sexual activities such as horseback riding, gymnastics, bicycling, or even through the use of tampons. Sometimes a woman may not be aware that the hymen has broken as there is little or no blood loss or pain associated. The bleeding often stops soon after the hymen is torn. In some cases the hymen may not be lacerated even with repeated sexual intercourse due to a more elastic hymen. In addition, there have been reported cases of pregnancy in women with “intact” hymens.

In today’s world, the freedom of many women is still dependent on how different cultures define virginity. If a girl breaks her hymen through the use of tampons or during heavy exercise, is she still considered a virgin even though she never had sex? Technically, a virgin is defined as one who never had sexual intercourse. However, in some cultures particularly the conservative Islamic one, a girl who has ruptured her hymen but never had intercourse might face future problems with her own family or with future in-laws.

Why is so much emphasis placed on a thin membrane? To answer this question, one needs to understand both the religious and cultural viewpoints regarding sex and virginity. From the religious point of view, Islam requires both men and women to remain chaste before marriage, otherwise they will receive punishment from God in the afterlife. To quell sexual urges, Islam promotes early marriage. Even though the religion stresses that both sexes remain chaste before marriage, men are punished less or judged less harshly for sexual indiscretions than women. Islam does not say that the importance of women lies in the basis of virginity, but the culture does. Nonetheless, Islam provides equal rights.
and treatments to both men and women, stresses honesty and forgiveness, and condemns the killing of humans in any situation, including what are known as “honor killings”.

Christianity also emphasizes the importance of virginity. To have premarital sex, or even have sexual thoughts, is considered sinful. One must fight sexual urges by resisting the temptation from Satan or by indulging oneself in a useful or religious activity. Buddhism in Thailand also has strong sexual ethics, but at the same time does not condemn premarital sex. Buddhists believe that as long as love and respect towards the partners exist and that sex is not used for selfish means, enlightenment can still be achieved. However, adultery, rape, and sexual assaults are condemned by society and will add to the person’s negative karma. In Japan, premarital sex is quite openly accepted, yet still taboo to openly discuss.

In many cultures, virginity signifies family honor. This is still strongly believed and practiced in many parts of the world such as the Middle East, Pakistan, India, Afghanistan, and by Muslim immigrants to Europe and North America. Many conservative parents believe that virginity is the key to obtain husbands for their daughters. Young women who adapt quickly to Western ideologies such as being too independent, too westernized, or who even lose their virginity bring shame to the family. To regain their honor, male family members may kill these daughters or wives. Such acts are usually supported by other family members or their communities. According to United Nations Children Fund (UNICEF) more than 5,000 brides die in India annually in order to restore family honor.

As a result, many young women fear for their lives. Even though some of them are highly educated, they cannot break away from these rigid cultural beliefs. It seems that the only option available for self-protection and to regain family honor is to choose hymenoplasty. Hymenoplasty is a cosmetic surgical procedure, performed in one to two hours under local anesthetic, which serves to restore the broken hymen. The hymen is reconstructed by attaching the remaining segments of the hymen, restoring it to its original appearance as a circular membrane. If the hymen is torn beyond repair, a hymen implant is inserted. The surgery can also include the insertion of a gelatin capsule filled with a blood-like substance that will burst during intercourse, simulating bleeding. The costs of the operation varies depending on location. In US, such hospital packages range from $1,800 to $5,000. In Thailand, it is offered at Yanhee International Hospital at the price of $1,200 and entails a four night stay.

In any operation there are always risks involved. In the case of hymenoplasty, this may includes sudden excess bleeding, infection, discoloration around the treated area, swelling, and increased pain and numbness. Typically, the patient should refrain from sex for about 4-6 weeks depending on the case. However, there is
no guarantee that the surgery can improve sexual pleasure for either partner. In addition, there are no actual statistics on how many women obtain the surgery because they remain anonymous and most of the operations are performed discretely in private clinics. In many countries, hymenoplasty is not covered under the tax financed insurance plans.\(^1\)

According to the American Society of Plastic Surgeons, hymenoplasty and other forms of vaginal surgery is one of the fastest growing trends of cosmetic surgery in United States.\(^2\) Currently, the feminist movement is raising concerns. Does hymenoplasty lower female status? To some people it is definitely an unjust act. For centuries, feminist movements have tried to bring equal rights to women in terms of politics, education, and freewill. If women wish to have premarital sex, it is their own choice. No one should dictate how they should live their lives. In fact, hymen repair would only make women subservient to men and thus suppress women’s rights.

However, surgeons are facing a dilemma. Should surgeons contribute to misleading family members? By doing so is it reinforcing the belief that women are subservient to men? Hence, the burden is on the female and not the male. The culture seems to ignore the virginity status of men as there is no way to prove their virginity. In many cases, family members or future in-laws take the bride-to-be to the doctor to check their virginity status. If their hymen is torn, whether by accident or sex, women from conservative families might have their marriages annulled or even become victims of honor killings. Often the importance of a woman is determined by whether bleeding occurs on the wedding bed.

On the other hand, hymenoplasty is a ray of hope to rape victims.\(^3\) Many rape victims suffer psychological trauma and have low self-esteem. Hymen repair is a way to return something that has been forcibly taken away and helps them to regain confidence.

Another demand for hymenoplasty in the United States, Japan, and Thailand concerns its application for recreational purposes. Some women undergo the surgery as a Valentine’s Day gift for their husbands and to improve their sex lives. In Thailand and the US, heavy advertising can be observed on the Internet, and in other mass media, resulting in an increase in medical tourism and a decrease in the price of this procedure.

Hence, hymenoplasty is one option for many desperate young women to save themselves from disappointing their husbands and families. To some it helps to regain confidence and self-esteem. On the other hand, hymen repair has become a pathway to obtain a very expensive gift for lovers. Whatever purpose it serves, the status of women depends on how different cultures, religions, and individuals define virginity and sex.

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Cherry is a hard-working and obedient girl. She always does what her boss requests, and her customers are very satisfied. Cherry is twenty-two years old and works in a karaoke bar in Ayutthaya, a well-known tourist destination for visitors to Thailand. She is not the owner, a waitress, or the bartender. Rather, Cherry “sings” and works as a sex worker in this brothel disguised as a karaoke bar. Similar establishments can be found throughout Thailand, especially at the infamous red light districts. It is a Friday night, and Cherry arrives at her shift as usual. Sadly, Cherry’s client refuses to use a condom during sexual intercourse. He could easily be carrying the human immunodeficiency virus (HIV) and pass it on to her, leading to a deadly disease. Because Cherry’s employer requires her to always comply with the client, she must engage in unprotected sex, thus putting herself at significant health risk. Moreover, she dare not go against her employer in fear of losing her only source of income. Such instances are prevalent in Thailand and result in the spread of Acquired immune deficiency syndrome (AIDS).

As sex tourism has become increasingly popular in Thailand, the incidence of AIDS has also skyrocketed. AIDS is caused by the HIV virus and can be transmitted through bodily fluids such as semen, vaginal fluid, blood, and breast milk and if untreated will lead to death. Thailand’s Health Ministry has warned that the country faces up to 12,000 new infections in 2009, with the most vulnerable being women and homosexual men. Currently, Thailand has more than 516,000 adults living with AIDS, while the death toll from AIDS has numbered more than 613,000.

Contrary to common belief, there are distinctions between prostitutes and sex workers. Prostitutes only work for themselves or with a pimp, and may choose how they want to engage with their clients. Sex workers, however, work for an employer who dictates their job requirements and must abide by the regulations set by their employer. Furthermore, these prostitutes are likely to spread HIV to many future partners. While condoms seem like the simple solution to preventing the spread of AIDS, the truth is that they are not readily used.

Why are women and homosexual men especially prone to contracting AIDS? Although prostitution and sex work are illegal in Thailand, in practice they are tolerated and the laws are not enforced. The "Entertainment Places Act of 1966", still in effect today, makes it possible for Thais to render "special services." This act was designed in order to allow brothels to operate under the guise of "massage parlors", "karaoke bars", "night-clubs", and "tea-houses". On one hand, condom usage has been widely promoted and some basic
knowledge has improved the situation. For example, the Thai government has recently launched the “100% condom program”, which entails the use of condoms during commercial sex and the right of sex workers to refuse intercourse without condoms. On the other hand, violence against sex workers often goes undocumented and unnoticed. Threats to their lives and health as well as threats to control of their work and financial security often plague sex workers\(^2\). With growing awareness of the dangers of AIDS, the Thai government is enforcing new policies in an attempt to both protect the safety of sex workers and control the incidence of contracting AIDS.

How women engage in commercial sex differs in other countries such as the United States and China. Prostitution in the United States can be divided into three broad categories: street prostitution, brothel prostitution, and escort prostitution. In the United States, each state has the right to decide if any type of prostitution is legal or illegal in that state or part of that state. In all but two U.S. states, Nevada and Rhode Island, the buying and selling of sexual services has been illegal and is usually classified as a misdemeanor. Only recently has Rhode Island joined the majority, and approved a bill to prosecute indoor prostitution. Previous laws only prohibited soliciting sex outside, meaning the streets\(^3\). Currently, brothel prostitution in 8 of Nevada’s 16 (rural) counties is legal. Prostitution outside these brothels is illegal throughout the state, including in major metropolitan areas. Also, a cervical exam is required for workers in brothels in Nevada, preventing men from working as prostitutes.

Although laws against prostitution are more regulated and enforced in the U.S. as compared to Thailand, it is still widespread. According to the Prostitutes’ Education Network, it is difficult to estimate the number of persons who currently work, or have ever worked as prostitutes in the United States due to the many definitions of prostitution. However, The National Task Force on Prostitution suggests that over one million people have worked as prostitutes in the United States, or about 1% of American women\(^4\). National arrest figures for prostitutes are over 100,000. Although prostitution is illegal and well regulated, human trafficking is very high within the U.S. The fact that the incidence of AIDS in American prostitutes remain high, suggests that condom use is not widespread.

Whereas there are sex workers in Thailand and prostitutes in the United States, China has both. Since the first reported incidence of AIDS in 1985, the number of cases in China has dramatically increased. There are currently approximately 840,000 people diagnosed with AIDS, in addition to the 240,000 people already bedridden by the disease. China ranks 14\(^{th}\) in the world with this astonishingly high number. The number one reason that AIDS has become so prevalent in China is due to the high level of unprotected sexual intercourse or refusal to use condoms. In 2002, nearly 36% refused to use a condom when engaging in sexual intercourse. The second main reason is that there are more and more sex workers, despite the fact that sex work is illegal. Between 1995 and 2000, the number of total sex workers increased sixty six fold. Sex work in China includes prostitutes and sex workers. Sex workers usually work for employers in bars, beauty parlors, spas, dance clubs, and even hair salons. Prostitutes work for themselves and have the freedom of doing whatever they please. However, because prostitutes work alone and are easy targets, they are often the victims of rape. Nevertheless, most sex workers consent to perform sexual
intercourse, due to their poor socioeconomic backgrounds and lack of sex education. In cases where clients refuse to wear condoms, they still carry out their work with little knowledge of the danger of AIDS. Therefore, the most effective solution is to broadcast safe sex practices by developing sex education programs. Currently, students do not learn the basic elements regarding safe sexual behavior or how to put on a condom. This should be changed in order to halt the spread of HIV.

In all three countries, many bioethical issues have arisen. For example, whose responsibility is it to ensure the usage of condoms during sexual intercourse? Should prostitution/sex work be legalized to give both prostitutes/sex workers and their clients more rights, and if prostitution/sex work is legalized, should prostitutes/sex workers be required to undergo AIDS screening? In the first question, clients often refuse to use condoms. Therefore, is it the prostitute/sex worker or the employer’s responsibility to ensure safe sex? Next, regarding the legalization of prostitution/sex work, this indeed can be extremely controversial due to the moral concerns of the issue. Many argue, however, that legalization will provide safety to prostitutes especially because they work alone and are subjected to sexual abuse or rape. Moreover, legalization would give rights to both parties to sue. Lastly, if HIV screening tests are enforced, then what is to prevent clients from choosing and rejecting prostitutes/sex workers who test HIV positive? Does this not place a disadvantage upon these workers? On the one hand, the clients deserve the right to know whether they are putting their health at risk. On the other hand, many prostitutes/sex workers may be forced out of their jobs as a result. Furthermore, these workers’ poor socioeconomic backgrounds put an even larger emphasis on their only source of income. They cannot afford to lose their jobs.

Overall, whether in Thailand, the United States, or China, legal regulations of prostitution and sex work should be better enforced. The similarity among the three countries is that prostitution/sex work is technically illegal, however laws are frequently broken. There should be constant management of the karaoke bars, dance clubs, spas, and beauty parlors to maintain sanitation. Strict enforcement of the law must become a priority. Moreover, both sex workers and prostitutes should acknowledge the importance of getting timely physical check-ups for their own health and their clients’ health. When these policies are put into practice, perhaps the incidence of HIV/AIDS will decrease.

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In this paper, we will discuss the scientific basis of lie detection, its limitations, and the ethical issues that arise from this controversial technology in the context of both Korea and America.

Lying can be found universally in all human societies, regardless of age, culture, and ethnicity. This deceitful nature of human beings and their relative inability to discern verbal deception has led to the development of objective techniques to determine the truthfulness of statements. Such advancements are of particular importance in the courtroom where verifying the veracity of each party’s claim is paramount given that the outcome can irrevocably alter lives. In the early 20\textsuperscript{th} century, the polygraph, an instrument that measures and records physiological reactions such as respiration, pulse rate, blood pressure, and sweating, was invented for use as a lie detector. The application of the polygraph as a lie detector is based on the fact that when lying, a subject will show some degree of fluctuation in his or her physiological response compared to normal resting vital signs. However, the validity of this detection method is still controversial because of its widely varying accuracy ranging from 50\% to 95\%, depending on the subject\textsuperscript{1}. Because of this relatively low accuracy and lack of scientific validity, the results of polygraph testing are not admissible in the courts of some countries, such as the United States, Canada, Israel\textsuperscript{2}, many European countries\textsuperscript{3}, and Korea.

On the continuum of this endeavor to develop objective and scientific lie-detection techniques, a new neuroscience-based lie detection technology has been introduced recently. Compared to the polygraph test, which measures the peripheral nervous system’s physiological arousal that “might or might not be associated with lying”\textsuperscript{4}, fMRI lie detection monitors the most fundamental level of truth suppression and formation of deception in the brain. However, this technique relies upon controversial technology.

Magnetic Resonance Imaging (MRI) works by aligning all of the protons in the body into a similar energetic state with a large magnetic field. Then, radio waves change some protons to a different energetic state, from which they then relax, emitting energy also in the radio frequency range. The energy from these protons can be measured and subsequently analyzed by a computer to determine the static physical composition of an object in three dimensions. Functional
magnetic resonance imaging, or fMRI, is performed in an MRI machine and measures brain activity over time. When a specific part of the brain is active, oxygenated blood is recruited to that region to provide metabolic and energetic support. Thus, the signal picked up by the MRI machine changes in a blood oxygenation level dependent (BOLD) manner. Thus, when a given brain region is active, an fMRI scan can pick up the increase in blood flow to that region, called the BOLD signal. It is important to note that the source of the BOLD signal and thus the accuracy of the fMRI technique is controversial. In addition, the computational analysis and statistics required to compute the dynamics of brain activity from the raw fMRI data are substantial and also controversial.

Despite the controversy over the validity of fMRI, researchers have dived into the practice of scanning human brains. Certainly, the prospect of ‘reading minds’ is both fascinating and frightening – but can it be applied to lie detection? A lie is, most simply, a statement that someone claims to be true while knowing it is false. Many scientists have published that the presence of such a lie condition can be determined in a laboratory setting. fMRI scans reveal increased activation of prefrontal cortices during confabulation, presumably because additional mental energies are required to produce a story of sufficient detail to pass off as truth.

The intricacies of the technological advancement do nothing to combat the complex nature of lying. Imagine the simplest case where a subject has simply forgotten a fact—would its omission be considered a lie? What if the subject unconsciously reconstructed his or her memory of the original event, influenced by the question or the environment? Human memory is quite malleable and people often fill in gaps in their recollection with seemingly correct but completely erroneous details, often without knowing it. In this case, given the subject believes his or her story to be true, a lie would not be detected, despite the fact that a lie, as determined by outside evidence, has been told!

This highlights the major issue with lie detection: there are multiple levels of truth. There is the objective truth of what actually occurred in the world. Then, there is the subjective truth of what a subject perceives. In some abnormal psychiatric conditions, the subjects may show a notable discrepancy between objective and subjective reality perception. Take the case of delusional patients who believe outlandish and impossible events to be true. For example, paranoid schizophrenics truly believe that everyone is actually out to get them. Lie detection would not reveal their stories to be deceptions because the subject believes them to be true— they are delusions, not deceptions. There may also be an unconscious level of truth of what the subject perceives without becoming aware of it, which will be discussed later.

There will certainly be cases in which a healthy subject tells a partial truth, uncertain of the right answer, or changes his or her mind quickly. Will fMRI technology be sufficient to delineate these cases? Current evidence is based on laboratory settings, not real-world situations, and may not fully account for the complexity of human experience – especially in a criminal setting.

Another major concern that arises from the application of fMRI lie detection is the admissibility of the result as evidence in a court of law. Currently, there are two American companies, No Lie MRI, Inc., and Cephos Corporation, which have
commercialized the fMRI lie detection technique in 2006 in order to replace other lie detection technologies. They aim to submit the results of the technique as evidence in U.S. courtrooms, claiming that the detection results “are likely admissible”\(^{15}\) and are presently working to prove admissibility\(^{16}\). Surely, the courts would be the largest consumer of such a technology. Although the technique is promising, according to the companies, judging from most courts’ rejection of the previous generation of lie detection methods, considerable judicial resistance is projected.

fMRI lie detection will probably be unable to meet the conditions of scientific evidence in courtrooms in the U.S. set by the landmark case of Frye \textit{v. United States} (1923). In the Frye case, the federal court denied the admissibility of the unigraph test (the predecessor of polygraph) and established a standard for scientific evidence: “the technique must be sufficiently established to have gained general acceptance in the particular field which it belongs”\(^{17,18}\). This Frye standard was applied nationwide for seven decades until 1993\(^{19}\) and is still used by half of all trial judges\(^{20}\). More recently, in 1993, there was another milestone case that established the standard called \textit{Daubert}\(^{21}\). While Frye takes “general acceptance” as the only standard, under the Daubert standard, the Supreme Court suggested four “guidelines”\(^{21}\) to determine scientific validity of the evidence as follows: whether the evidence is based on a tested theory or technique; whether the technique’s possible error rate is known and the standards of controlling it has been established; whether the theory or technique has been peer reviewed; and finally, as in Frye, whether the underlying science is generally accepted in the related community. In some sense, Daubert has strengthened the Frye standard of scientific evidence in the courtroom, rather than lowering it, as evidenced by a survey of trial judges\(^{22}\). Though the requirement for admissibility may be in flux, it is more important to note that the young field of modern neuroscience is in constant upheaval as well. Scientists are still arguing over whether fMRI as a technique is even valid, much less whether it can be used for lie detection purposes.

The situation is much the same in Korea where the standards for scientific evidence are at least as stringent as they are in the U.S., if not more so. In Korea, determining the admissibility of evidence is quite flexible and, in principle, at the discretion of the judge: “Determining the evidentiary sufficiency and admissibility of evidences are under the sole authority of the judges”\(^{23}\). However, this does not mean there is no standard for the admissibility of scientific evidence. There are some judicial precedents that have established a standard and limited the judge’s free discretion. Recent precedents of the Supreme Court determined that raw data, methodology, results of scientific examination and the deducted analysis from it should be scientifically justified by the majority of scientists in a related field, and there should be no or only a very small possibility of error\(^{24,25}\). The most famous proverb in the
Korean judicial system represents this policy very well: “We should not punish one innocent citizen, even if we fail to catch ten criminals.” In other words, Korean judges want well-established, near one hundred percent accurate scientific evidence. This standard is somewhat similar to the hybrid American Frye-Daubert standard. There has been no case in which judges have approved the result of a polygraph examination as evidence. From this perspective, it seems that the recently established fMRI lie detection technology which has about 86-90 percent accuracy even in carefully controlled experimental conditions, will not be admissible in the Korean courtroom, at least in the near future.

Even if we assume that the admissibility dispute is resolved in favor of allowing fMRI lie detection in the courtroom, there remains the fundamental right of a citizen in a democratic society against self-incrimination. By this privilege, a citizen is entitled to not be compelled to bear witness against himself or herself in any criminal case. Both the Korean and the United States government codified this critical right in their constitutions. However, this right against self-incrimination might become useless due to the “testimonial-like” evidence of fMRI, which is directly extracted from the brain. The technology will reveal what the defendant is thinking, regardless of his/her verbal response.

In close conjunction with above-mentioned probable violation of the right against self-incrimination, another fundamental legal/ethical problem of using fMRI in the court is the infringement of the right to privacy. In the case where an individual gives informed consent to undergo a fMRI scan, this is not an issue. However, in the near future, it may be possible to compel criminals to undergo fMRI lie detection by sedating them. Indeed, research on the brain response of sedated infants and children has shown that the brain response to visual and auditory stimulation can be detected even while the subject is not fully conscious. fMRI lie detection technology could be combined with a form of the Guilty Knowledge Test, in which the knowledge of a subject, such as whether he or she has viewed a given scene or person, can be revealed by judging his or her reaction time in response to specific questions. Certainly, it would be much easier to interrogate suspected terrorists by simply sedating them and scanning their brains. Even mentally diseased patients, whose subjective reality may be profoundly distorted, may have unconscious knowledge which is more objective. However, such a physically non-invasive procedure is profoundly invasive in the mental sense. If this were to happen, it would cause multiple violations of the rights of citizens guaranteed in the constitution of both countries. In Korea, if a confession is deemed to be extracted against a defendant’s will, such a confession cannot be admitted as evidence of guilt. More importantly, the Constitution of Korea strictly prohibits infringement of the privacy of the citizen. Even though there is no exact word “privacy” in the U.S Constitution, there are several constitutional barriers that forbid the State’s intrusion into the privacy of the people. The Fourth Amendment stipulates the citizen’s right against “unreasonable searches and seizures” and the Ninth Amendment states that the government cannot infringe on the rights of citizens even if those right are not specifically mentioned in the Constitution. In any given society, not only the United States and Korea, people consider subjective thought as the most important and fundamental domain of
privacy. If any technology allows the state to trespass this “cherished value of privacy”\(^{39}\), the people should not let the government use it.

Lastly, in addition to the legal issues discussed above, there is a question of whether expert testimony from neuroscientists is particularly prejudicial to those in the courtroom. A recent study found that college students and even professors of neuroscience were easily swayed by erroneous explanations of criminal acts filled with neuroscientific jargon\(^{40}\). Allowing fMRI lie detection in the courtroom may engender yet more claims along the lines of ‘my brain made me do it’, but instead ‘my brain says I did not do it.’

After several thousand years’ struggle to develop objective and scientific lie detection methods, we have finally obtained the ability to allegedly detect lies directly from the brain, which bypasses all peripheral physiological reactions. However, there are still many open technical problems that can completely undermine the scientific foundation of this technology. Namely, the controversial accuracy of fMRI, the notable discrepancy between experimental environment and real-world situations, malleable human memory, and personal differences in the state of mind. Even more seriously, in the future, it might produce a forbidden key to open a individual’s most private sanctuary and the house of his/her very being. Is reading our citizen’s minds an activity we seriously want to allow anyone, government official or otherwise, to do? Therefore, there should be more objective and open discussion about the application of this technology. Extreme caution should be taken when we assess this double-edged technology, not be misled by the beautiful images of our brains in action.

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Should individuals possess the ability to decide if and when to cut short their lives? Assisted suicide, whose advocates and opponents disagree about the answer to the above question, remains the subject of heated bioethical debates throughout the world. This controversial topic involves the provision of information, such as fatal dosage amounts, or tangible resources, such as prescriptions for lethal medications or deadly quantities of carbon monoxide, to a patient for the purpose of killing him/herself. The person proffering these means of suicide, often a physician, is always cognizant of the patient’s resolve. Beliefs about the acceptability of assisted suicide vary among different cultures, especially between the disparate Western and Eastern regions. Consequently, much can be learned through a comparison of religious, legal, and philosophical opinions in the United States as well as Thailand about this bioethical issue.

Christianity and Buddhism, specifically Theravada Buddhism, constitute the most widely practiced religions in the United States and Thailand, respectively. Analyzing Christian and Buddhist beliefs regarding assisted suicide will facilitate comprehension of the common American and Thai religious perspectives on this debatable subject. Christianity serves as a large umbrella organization that encompasses countless denominations, each with their own disparate opinions about bioethical topics;¹ the Christian opinion about assisted suicide is consequently ambiguous and extremely difficult to ascertain. Dr. Engelhardt asserts that traditional Christianity views physician-assisted suicide as unacceptable “assisted self-murder”.² Thomas Aquinas, an important figure in traditional Christianity, reproached all forms of suicide, claiming that only God is able to grant and take away life;³ participating in assisted suicide would thus constitute a hubristic form of playing God. A BBC article states that most modern Christians reject assisted suicide for this very reason.⁴ Catholicism condemns assisted suicide as well, as illustrated by the proclamation in the Catechism of the Catholic Church that “whatever its motives and means...putting an end to the lives of handicapped, sick, or dying persons...is morally unacceptable”. However, Engelhardt alleges that some forms of post-traditional Christianity accept assisted suicide in justifiable situations. Currently, the United Church of Christ and the Methodist Church, both of which are progressive Protestant groups that have American followers, support assisted suicide. Additionally, the two instances of assisted suicide in the Old Testament (King Saul and Ahitophel) do not receive much textual discussion and thus fail to shed light on the biblical opinion of this bioethical issue. Nonetheless, there is still much internal debate among Christian denominations over the acceptability of assisted suicide.

The concept of karma, a result of an individual’s behavior and a determining factor in one’s next life following reincarnation, is essential to the Buddhist faith. A karmic analysis of assisted suicide is thus necessary in the attempt to discern the Buddhist perspective on this controversial issue. In his discussion with BioCEP students, Thai Buddhist monk Phra...
Chainarong explicated that Buddhism does not view actions as singularly good or bad, so behavior therefore may produce both positive and negative karmic effects. During assisted suicide, both the subject and the facilitator participate, either directly or indirectly, in the act of killing; this results in negative karma because according to Professor Bhikkhu Dhammavihari, a Buddhism researcher, it defies "the pledge by every Buddhist to abstain from destruction of life". However, Buddhism additionally places much importance on the intention motivating an action. The individual assisting in the suicide intends to fulfill the wishes as well as eliminate the suffering of the patient, and this benevolence thus causes positive karma. Despite this positive karmic effect, Buddhism seems to largely oppose assisted suicide for anyone who has not yet attained a fully enlightened state because "suicide (and so euthanasia) is only approved for people who have achieved enlightenment". Individuals wishing to undergo assisted suicide have not reached complete enlightenment because they have retained at least some degree of selfishness, emotion, and ignorance of the first Noble Truth that "all existence is suffering" and "unsatisfactory"; the Thai Buddhist religion thus most likely disapproves of assisted suicide. Furthermore, Buddhism teaches that "the way life ends has a profound impact on the way the new life will begin", so the reincarnated existence of a patient who kills himself will be negatively affected by his decision to destroy life. The pain and suffering this individual was trying to avoid will likely return in his next life as retribution for his suicidal act; the tenets of Buddhism therefore do not advocate assisted suicide as an acceptable solution.

Physician assisted suicide, which has been debated frequently among the legislatures of both countries, is legal in only two states in the US. Oregon passed the Death with Dignity Act in 1994, which allows doctors to prescribe lethal drugs that the patient must ingest orally. Although there is still much controversy surrounding this decision, Oregon made various stipulations to reduce abuse of the law, encompassing requirements that "patients be in the final six months of terminal illness...make two oral requests and one written request to die...and be 'mentally competent' to make the decision". In 2008, Washington legalized assisted suicide by passing a law, which closely resembles that of Oregon. Similar laws may now be passed across the country, as manifested in bioethics lawyer Wesley Smith's assertion that "now that two states have legalized assisted suicide, the likelihood is great that the movement will spread throughout the Union". According to a member of the Ethics Committee at Thailand's National Cancer Institute, assisted suicide is "illegal" in Thailand because the practice contrasts with the Hippocratic oath to "do no harm". Although no Thai province has legally permitted assisted suicide, Section 12 of the Thailand National Health Act, instituted in 2007, grants each individual the opportunity to make a living will to refuse medical service so as not to "prolong his/her terminal stage of life" or for the purpose of ending "severe suffering from illness". As this legislation's enactment was fairly recent,
the government has not yet fully specified all of the corresponding details, but is “now in the process” of doing so. Several sources classify this law as a form of legalized euthanasia.

When comparing American and Thai opinions regarding assisted suicide, the different mindsets of Westerners and Easterners must be considered. In bioethics debates in the United States, the “right to die” is often discussed, but it is important to acknowledge that the Western concept of human rights does not really exist in Asian cultures. Instead, Buddhism emphasizes duties as well as responsibilities to one’s family and community, as portrayed in Damien Keown’s comment that Buddhism “traditionally approaches moral issues from the perspective of duties rather than rights”10. Additionally, the principle of autonomy, or moral independence, pervades Western bioethics, but Buddhist tenets underscore the importance of interdependence. Whereas it may be more acceptable for an American patient to make the decision to undergo assisted suicide largely by him/herself, Thai culture dictates that before a choice is made, “doctors, patients, and relatives must think about the emotions and interests of all parties involved”11. Consequently, the disparate philosophies between Western and Eastern cultures result in different beliefs about bioethics topics.

A recent survey of about 2,000 physicians in the United States found that even if assisted suicide were legal in the state they practice in, only 36 percent would, upon request, facilitate a patient’s death via fatal prescription. Additionally, only 3.3 percent of the doctors questioned had ever written at least one prescription for the purpose of assisted suicide12. Therefore, many American doctors are opposed to assisted suicide and the practice is not very common in the US. There is currently no comparable data for Thai doctors, but it is fair to hypothesize that, given the great influence of Buddhism, the percentage would be even lower. Discussion of assisted suicide also provokes many interesting questions, such as whether the image of the physician will be altered if the practice of assisted suicide becomes more commonplace.

The large differences between as well as within American and Thai cultures make it extremely difficult to reach a universal consensus about when assisted suicide is justifiable or not. Each case must be analyzed individually, considering the current implemented laws in addition to the patient’s and physician’s religions and cultural mindsets.
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