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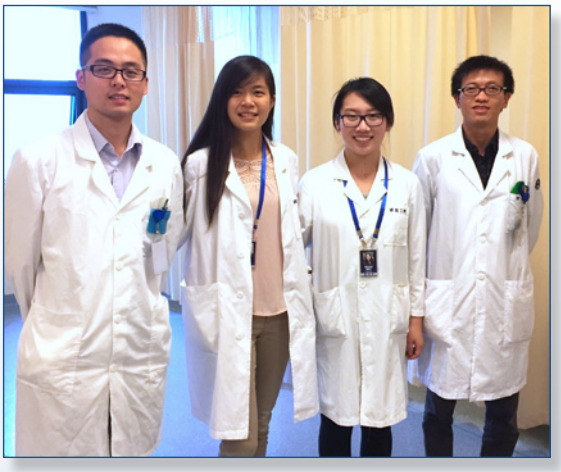
At the Rehabilitation Department at Binjiang Hospital [L–R] attending physician Dr. Li, Alpert Medical Schools students Jessica Cao and Carol Shi, attending physician Dr. Li.

Part II – Brown University's Program in Liberal Medical Education (PLME): Medical Exchange Programs; Student Research

JULIANNE Y. IP, MD
GUEST EDITOR

This issue of the *Rhode Island Medical Journal* continues RIMJ's special themed section on Brown University's Program in Liberal Medical Education; Part 1 appeared in July (http://rimed.org/rimedicaljournal/2015/07/2015-07-14-plme-complete.pdf.). Part 2 offers an overview of our medical exchange programs designed to offer our students international perspectives on health care systems, delivery and innovation; it also offers a sample of our students' research interests.

Currently, we have 12 exchange programs; exchanges involve students from our international partners attending Brown's fourth-year clinical electives and Brown students going to our international partner schools for either clinical electives or an arranged experience which I will briefly review for each program where it is pertinent. In all cases, teaching in our international exchange partner institutions is in English but whenever possible, possessing conversational language skills for the host country are encouraged. All exchanges offer clinical elective rotations (generally for our fourth-year medical students) and most will accommodate our students for research as well. I have outlined some "special programs" for our exchanges that offer them.

In the Far East, we have exchanges with:

- Zhejiang University School of Medicine, Hangzhou China: four reflections are provided in this issue to give the readers a sense of the special summer program; a four-week Introduction to Traditional Chinese Medicine.
- National Cheng Kung University School of Medicine, Tainan, Taiwan offers a two-week summer course on Comparative Medical Systems and Traditional Chinese Medicine.
- Tokyo Women's Medical University, Tokyo, Japan.
- Kyoto University School of Medicine, Kyoto, Japan: special note of public health research given the Fukushima nuclear plant is close by.

In Europe:

- Rostock University School of Medicine, Rostock Germany: two-week summer school course: topics vary but most recently Aging and Comparative Health Systems.
- Tubingen University School of Medicine, Tubingen, Germany; two-week summer school course in Comparative Health Care Systems and Medical Ethics; or four-week Critical Care rotation (Brown intensivists faculty/fellows participate alongside our students).
- University of Bologna School of Medicine

In Africa:

- Kenya-Moi Eldoret, Kenya: month-long clinical elective alongside Brown faculty both Infectious Disease and Pulmonary.
- Ghana- University of Ghana and Kwame Nkrumah University of Science and Technology

In South/Central America:

- University of Nicaragua
- Haiti (on hold)
- Federal University of Medicine Sao Paolo, Sao Paolo, Brazil

And finally, I have included scientific research pieces that our students have written highlighting another core competency, lifelong learning. All Brown's PLME and AMS students are intellectually curious, strive for academic rigor and look to solve ongoing problems in the world. A quick note: these pieces were all voluntarily submitted when I sent out a general call for student participation. These are not necessarily representative of all the students' work but those who chose to share.

SUMMARY

In summary, this is a very brief overview of some of the work that is being done at Brown's Program in Liberal Medical Education and the Alpert Medical School. I appreciate the opportunity to showcase our students and their work. These are the physician leaders of Rhode Island's future in health care and beyond.

Acknowledgments

Thanks to Dr. Joseph H. Friedman for this opportunity to honor my mentor and friend, the late former Dean David Greer, as well as the PLME manager, Hilary Sweigart and our administrative assistant, Terry McAllister, both of whom are the backbone of the PLME.

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Traditional Chinese Medicine Program in Hangzhou, Zhejiang, China

Summer 2013 Reflection

ANNA DELAMERCED, PLME'16 AB PUBLIC HEALTH, MD'20

Guest Editor's Note: *I included 4 reflections from our students on their Zhejiang University School of Medicine (ZUSM) experience to provide perspectives on our students' experiences. The exchanges are meant to provide cultural competency as well as expose our students to international medical perspectives on healthcare systems and actual health care provision. Does a patient in China really use Traditional Chinese Medicine as well as seek allopathic medical care? What does that mean in context of providing care to a patient? How might understanding this help in caring for your own future patients?*

It's the aroma that catches my attention.

Unfamiliar, as if tasting a new fruit for the first time, yet simultaneously intimate, as if stepping into a shop chockfull of antiques that remind you of your own grandmother's home…

Petals of dusty red peep forth from plump pouches of cloth. Seeds of shades of lavender and indigo adorn a round, silver platter. The seemingly endless rows of wooden shelves remind me of a library, an especially old and storied one, like the Providence Athenaeum. Decked in a white coat, a middle-aged man beckons us to enter, greeting our bewildered eyes as we crossed the threshold.

This traditional Chinese medicine pharmacy is perched in the basement of a large, twenty-first century hospital. From ginger to ginseng, wolfsbane to wolfberries, the fragrances of the herbs intermingle and collide in a tiny room in a large hospital in the middle of Hangzhou, Zhejiang, China.

I wondered if, amidst all the modernity of the huge hospital, the simple boxes brimming with dried seahorses and white peonies felt just as out of place as I did. I didn't speak the language, nor did I fully understand the customs. I was nervous, a bit apprehensive of living in a country that is quite different from the one in which I grew up.

To be honest, I was not sure what I would learn during my time abroad last summer in China. The goal was to learn the principles of traditional Chinese medicine. Before embarking on the trip, I had packed a whole suitcase of questions. How would I apply what I learn to my future medical career? Would I be able to forge any friendships that span across different cultures and time zones and ideologies? Will I be challenged academically, emotionally, spiritually, and physically?

One month later, I did return home with a few answers in my pocket. It turns out, I learned a whole lot more outside the classroom. Last summer, I lived in a mid-sized city in southeastern China. Not only did I get to study traditional Chinese medicine, but I also got to learn so much more about myself, the world, and its people. I may have failed miserably at poking myself with acupuncture needles, and should have learned the language before I arrived, and felt very lost for the first week I was there, but my eyes were soon opened, as was my heart.

After more than 24 hours of flight time, with an additional hour of train rides (and an extra 30 minutes trying to find the train station itself), I was transported to a magical place. Where the 21st century meets a thousand-year-old history down winding roads and placid waters. This was my temporary home in a foreign land, a land brimming with beauty that cannot be tamed. I met many people on our daily bus trips, in the herbal clinics, and even on mountaintops.

From left to right, Alpert medical students Edward Tie, Jessica Cao, and Clara Mao in front of the SAHZU Jiefang Road campus in Hangzhou, China.

Eastern medicine varies vastly from medicine in the Western hemisphere. Equipped with fire, alcohol, and bamboo cups, I experimented with cupping therapy and even had the opportunity to practice on my classmates. I enjoyed sampling Goji berries and trying out acupuncture on myself. My knowledge of these alternative remedies greatly enhanced my medical education.

In the future, I could incorporate what I learn from traditional Chinese medicine to my practice as a physician. For example, I embrace the values behind holism, which emphasizes the individual patient, the patient-physician relationship, and preventing disease through healthy lifestyles. Furthermore, I especially was drawn to the ideals of spiritual and mental healing. A health body goes hand-in-hand with a healthy mind. Learning these elements has added a new dimension to my future capacity as a physician.

The pharmacist in the tiny herbal clinic regaled us with stories of how these tea leaves helped an elderly woman overcome a cold-like illness, or how those tree barks and dried fruit seeds render a potent combination to battle a headache. Coming from an American medical background, I was initially dubious. Can these alternative pathways really cure a viral or bacterial infection? Have these remedies been truly tried and tested? By the end of the program, however, my views significantly changed. I witnessed elderly patients receiving these herbal remedies and acupuncture. Even though we just stood there and watched and listened to her, an elderly woman who was receiving acupuncture told us *xièxiè*, *thank you*. Our presence alone was enough to give her comfort, knowing that we wanted to learn so that we may help others like her be healed. Their stories of how they feel much better after undergoing these medical methods gave me a new lens to my vision of health and restoration.

I have learned that we should respect many different ways of healing because healing is truly a complex endeavor. What resonated most with me during my time abroad was our shared goal. In both Eastern and Western medicine, we all just want to help and serve people. We are united by a common vision of sharing the gift of medicine with people who are in need. We need to respond to the needs of people with compassion, empathy, and honor.

What I also remember most about my time abroad were the friendships strengthened, not only with my fellow Brown University classmates but also with new friends thousands of miles away. I remember their smiles, their encouraging faces as they taught me a few Mandarin words, the way we all bear similar goals of impacting people and the world, the way we all just want to heal and be healed.

I returned to America with heightened awareness and an even more gripping passion to keep pursuing medicine. I want to reclaim the original goals of medicine, so we may not just participate in physical healing, but also emotional, spiritual, and mental. And if it takes seemingly out-of-the-box or out-of-the-ordinary methods, let us open our minds. Let us prioritize the needs and interests of the person who has trusted us with his or her care. Treatments and pills and surgical procedures, in both hemispheres of the world, may fail. So at the end of the day, when all the gadgets and gizmos and herbs are stripped away, let us remember the true goal of medicine: to be there for our fellow human beings. Let us grow in grace. Let us grow in wisdom.

Let us be noble in our pursuit of healing. ❖

As Far as the East is from the West: Exchange Experiences in Traditional Chinese Medicine

STEPHANIE GUANG, PLME'16 AB ENGINEERING AND AB PUBLIC HEALTH, MD'20

Sitting in JFK International Airport, I picked up a conversation with the girl next to me and came to discussing our travel plans.

"I am going to study in an exchange program at ZheJiang University School of Medicine and learn about TCM – Traditional Chinese Medicine – like acupuncture, cupping, herbology, etc," I explained

"Oh! Is that the Chinese voodoo stuff?" she asked.

The gap between Western and Eastern medicine is as expansive as the Pacific itself. Western medicine connotes deduction, precision, and pharmaceuticals, whereas Eastern Medicine involves induction, balance, and a sense of spirituality. The two are not two sides of the same coin; they are different forms of currency.-

My parents used TCM very often when I was growing up. They waited hours in line for a famous acupuncturist in Chinatown to insert the needles into their skin that would cure them from pollen allergies. When I, at the uncomfortable age of 13, developed uncontrollable acne and mood swings, I was taken to an herbalist, who brewed me brown-colored, odd-tasting soups to drink with my meals. Nonetheless, TCM was talked about as something you either "believe in" or you don't, as if it were a religion or myth.

I had the unique experience of learning Traditional Chinese Medicine before I took any biology classes such as physiology or anatomy at Brown. As the enthusiastic physicians at ZUSM (ZheJiang University School of Medicine) first explained the duality of yin and yang, the equilibrium of the five elements within the body, and the circulation of chi, the concepts were difficult to grasp. Terms like "essence"

Jessica Cao practicing acupuncture in the rehabilitation inpatient wards.

and "energy" seemed vague in the context of medicine. No matter how many times Professor Zhang explained it, a patient's "essence" didn't seem like a valuable health indicator if it couldn't be quantified or observed. I could not feel if a patient's pulse was "floating" or "knotted," let alone differentiate between the twenty-some-odd pulse diagnoses.

My Chinese relatives mocked me when I told them about the program.

"Ha! You cannot learn TCM in weeks. It takes almost a whole lifetimes to really understand and feel it."

I was confused when they warned me. Physiology was a semester-long course. Anatomy is a block of med school. What could be so difficult about TCM content?

As the weeks went on, the professors commingled theory, observation and practice, even allowing us to practice acupuncture and cupping on each other. Though the concepts never fully made sense, we began to understand the constant tug-of-war between good and bad energies within the body. We also saw the meridians link various acupoints on different body parts to the same imbalance. It was as if we learned to see the patient as a whole person rather than a diseased part.

I was also surprised to see how the different hospital departments like cardiology, neurology, surgery, etc. (whose separation no longer made sense to me), integrated TCM doctors into their practice at ZUSM. Oftentimes, TCM was used beside Western practices and the patient had two doctors with a mutual understanding of each other's treatment. Other times, TCM was brought in as a last resort on, say, a paralyzed patient after all Western medicine's measured had failed.

I saw this coexistence of East and West change within myself as well. I struggled to adequately translate the physicians' Chinese to my non-Chinese speaking peers from Brown and vice versa, and I often just found myself speaking a flummoxed mixture of English and Chinese. Growing up in the U.S., I have always been labeled as "Asian," but when I returned to China, my relatives mock me for my incorrect Chinese pronunciations and strange mannerisms. I could never truly be Western or Eastern, and I exist as a harmonic convergence of the two.

When the program drew to a close, the hospital directors shook our hands and said their farewells. They acknowledged the infeasibility of trying to understand TCM in a manner of weeks, but they hoped we would carry an understanding of the promise of TCM with us. Maybe in the future when we begin practicing ourselves, when we see a patient with suspected spleen damage, we might consider examining the color of their tongue and gums and reflect on the imbalance of dampness versus dryness of the spleen. Maybe if we encounter a patient with symptoms beyond the scope of Western diagnostics, we might recommend TCM for treatment. Maybe in the future West and East can harmonize just as they coexist within me. ❖

Edward Tie practicing cupping on a patient while supervised by Dr. Fei.

Understanding Patient Perspective

CARYN COBB, PLME'15, AB HEALTH AND HUMAN BIOLOGY, MD'19

The summer after my freshman year at Brown University I had the opportunity to travel to Hangzhou, China to do an internship with Traditional Chinese Medical doctors at the Second Affiliated Hospital of the Zhejiang University School of Medicine, a sister institution to the Alpert Medical School, located in Hangzhou, China. My interest in this experience was peaked because I am very interested in orthopedics and osteosarcoma. I knew that there were different methods of treating cancer that expand beyond just chemotherapy. Having the privilege of being able to learn first-hand the impacts and techniques behind Traditional Chinese Medicine opened my eyes to different treatments of diseases, particularly cancer, that reach beyond the Western practices of medicine. This internship provided an opportunity to gain more experience and to better appreciate non-conventional medicine that may be more effective for some patients. As a future physician my ultimate goal is to, the best of my ability, treat the pain of others. Having a broader knowledge-base of ways to help alleviate the discomfort and distress of someone can only be a positive attribute in helping to fight deadly diseases.

Acupuncture has become a more widely received additive treatment for patients who may not be responding to Western medicine. However, there are not many opportunities to shadow acupuncturists and having the chance to experience, first hand, the roots of Chinese medicine in a genuine environment provided an enlightening adventure. Learning about where to place acupuncture needles and the "chi channels" in the body that correspond to a patient's description of their discomfort was a very precise and detailed practice. Every chi channel is believed to be connected to an organ – either the kidney, the heart, the lung, the liver or the spleen. Someone who may be having knee pain could benefit from having the area from the back of their knee up along their thigh stimulated with acupuncture needles. I learned that treating the discomfort of a patient should be looked at from many different points of view as to all the possibilities of why and what could be contributing to an ailment because it is not necessarily as obvious as one may think.

This exchange trip taught me that understanding components of cultural views of medicine such as acupuncture and herbal medicine not only provides additional knowledge of ways to treat sickness, but also allows physicians, who may not be as immersed in a particular culture, to understand ways to approach patients and how to best comprehend a patient's view of medicine and their understanding of a doctor's role as a healer. For example, in China a lot of medicinal treatments are tied in with the idea of the balance with yin and yang in a person's body. I was taught that if a person's yin is low then the yang must be raised. Yin and yang correspond to in and out, front and back, and up and down. They balance each other. For example, many of the patients I saw being treated for sicknesses or allergies in the summer were not affected until the winter, but with yin and yang, the balance can best be treated for a cold disease during a hot season, such as summer. Tying this belief and other ways of addressing sickness into the medical treatment of certain patients can help doctors be more effective in communicating with their patients if the physician understands the perspective of their patient.

America is known as the "melting pot." Many different cultures and ethnicities make up the American population. Understanding other ways to address the healthcare of people can help physicians be more effective in connecting with patients from different backgrounds that may have different ideas of why particular medical practices, from medicine to surgery to routine check-ups, can be beneficial to their daily lives. People have diverse understandings, priorities and conceptions of physicians and their role in being a health advisor. Being open and aware of additional ways to approach western medicine and adding to medical conversations of why a treatment can be helpful to a patient is a key part of being a doctor. A successful physician can be defined as someone who can effectively treat and help people. Being effective in helping to improve someone's health has to include a patient's receptiveness to being helped. Patients are not always responsive to doctor's suggestions and I think sometimes it is because they have different perspectives on certain aspects of health. This exchange trip taught me different ways to think about the human body and how to address particular health problems. Understanding how different cultures approach medicine gave me a chance to view it from a novel perspective. As a future doctor I have learned that I cannot only think of the Western medical view of treatment because not everyone is receptive to that way of thinking. As many physicians, I want to go into medicine to help others and to do this most effectively I have to understand how others see medicine helping them. ❖

At the Children's Hospital in Hangzhou

TAMMY YU, PLME'16, SCB BIOLOGY, MD'20

After morning rounds, the medical students in the Children's Hospital would trickle one by one into the doctor's lounge at the end of the hall, a small room crowded with computers, patients' charts, and books. Sipping hot water from thermoses, they would look up conditions in English-language medical textbooks, occasionally consulting their phones for the Chinese translation. As they worked, they kept up a spirited discussion about the merits and faults of various attendings.

They were not much older than we were – Chinese medical students enter five-year programs immediately following high school – and even through the double lens of culture and difference in skill, we saw in them a glimpse of our future selves. Like medical students everywhere, they faced the pressure of caring for patients without really knowing whether they were capable of doing so. Their official standing didn't matter once they put on white coats. In the eyes of patients and their families, they were already doctors.

Some of the challenges the Chinese medical students will need to deal with sound too familiar to us: structural inequalities and the challenge of providing universal access to health care. Others are very different: the prevalence of certain infectious diseases; a massive population, mostly rural and poor; a standard of care at local hospitals very different from that at large city centers.

Parents regularly visited the doctor's lounge to ask the medical students and fellows, futilely, whether they could take their children out of the ward for lunch. One man came to fetch the medical records for a baby discharged the previous week. He had ridden for hours on motorcycle to get from the surrounding countryside to the hospital, but without proof of relationship, the hospital could not release the patient's paperwork. The man protested that the child's own father couldn't come; he was working too far away, in another city. What he did not say left a terrible helplessness hanging in the air: a single absence from work could easily get a factory worker fired.

The five of us who were part of that summer's Hangzhou exchange program did not know at the outset how much this trip would change our conceptions of medicine. From our experiences in other hospitals in Hangzhou, it was tempting to conclude that Traditional Chinese Medicine has been incorporated seamlessly into the Chinese medical system, but if we have learned anything, it is that facile narratives about China do not capture the complexity of the situation on the ground. In a nation where the medical system is pushing for rapid modernization and progress is so often measured by the attainment of Western standards, the med students at the Children's Hospital had little incentive to study what they viewed as outdated beliefs. One student asked what we were studying in Hangzhou and looked politely incredulous upon hearing acupuncture and herbal medicine. Rounding with them opened up the realization that medicine is rarely simple, and that it usually manages to challenge our expectations.

One afternoon, my attending asked if I'd like to help with the day's outpatient nutritional consults. I found myself taking the measurements of impatiently-squirming kids. Three or four families were squeezed into the exam room, and more parents and grandparents were waiting through the door and down the hall. Height, weight, head circumference. Height, weight…I was slow, the line seemed endless, and suddenly the reality of what I was doing was overwhelming. This was the first time I had ever been directly responsible for real patients. At the other desk, Dr. Ma was beginning her next consult. The baby in front of me was stirring from her nap, and her family was waiting for me expectantly. I looked up at them and in my shaky Mandarin I said, "She's got her mother's eyes, doesn't she?"

Some things about doctoring transcend the barriers of language and experience. As they smiled, and as some of the tension slipped from their faces, I took a deep breath and went to work.

The coursework we are doing now at Brown sometimes starts to seem like an end in itself. It is so easy to take refuge in studies and lose sight of the real purpose we are here, so easy to forget that at the end of it all, we will be serving other people. When that happens, I will need to think back to those moments of vulnerability we experienced in Hangzhou: the vulnerability of being lost in another country, or of taking responsibility for a patient I was not sure I had the ability to care for. Many such moments of doubt and uncertainty will undoubtedly be waiting for us in the years of training to come. And in those times, I must remember what it felt like in the Children's Hospital to be entrusted with another person's well-being: such a privileged feeling, no matter how far you are from home. ❖

Society and Infant Genital Reassignment Surgery: Past, Present, and Future

MADELINE PESEC, PLME'16 AB PUBLIC HEALTH, MD'20

Guest Editor's Note: *Finally, our PLME (and AMS students) are all highly engaged in scientific inquiry. PLMEs are not "just" into the liberal arts. Over 60% concentrate in the sciences and pursue honors in their field. Many are part of research groups and publish with Brown and other faculty. Included are the following research papers, again, not peer reviewed but submitted by the student in hopes of having their work published.*

KEYWORDS: Disorders of Sexual Development; hermaphrodite; age of conversion; gender reassignment; binary

INTRODUCTION

Due to the lack of understanding of Disorders of Sexual Development (DSD), they can be a stigmatizing and traumatic diagnosis for many. Often, physicians fail to understand the psychological ramifications of a DSD diagnosis for both the patient, and the patient's family. Additionally, society struggles to accept those with a DSD diagnosis, as they do not fit into the ingrained sex binary. The sex binary is expressed in everything from public restrooms to bureaucratic forms. DSD conditions raise complex issues including medicalization, parental acceptance, self-identity, and the production and dissemination of knowledge. DSD, previously known as intersex conditions or hermaphroditism, are defined as a reproductive, genital, or chromosomal condition that deviates from the traditional definitions of male and female and occurs in up to 1:300 live births.[1]

While the management of DSD has become more patient-centered than ever before, there remains significant stigmatization of DSD patients, perpetuated not only by society, but also by the biomedical establishment. The most controversial aspect of DSD care is infant genital reassignment surgery, in which physicians surgically alter the external and/or internal genitalia to conform to society's definitions of female and male genitalia. This surgery is medically unnecessary in the vast majority of cases because it is done for cosmetic reasons or to allow for penetrative intercourse.[2] This article will examine how views about DSD have shifted through history due to the moralism of the biomedical establishment, social movements, and rising academic theories, as well as question the high rates of infant genital reassignment surgery.

Age of the Gonads

Hermaphrodites and intersex individuals have a long documented history, beginning with the etymology of the word hermaphrodites. Greek myth states that Hermes and Aphrodite had a child together but could not decide on its gender. They finally elected to make the child half boy and half girl to ensure that Hermaphrodites was the true amalgamation of both parents. While antiquity held more malleable and geographically variable perceptions of gender, in the seventeenth century, physicians began to advocate for a stronger division between male and female.[3] In the Renaissance, physicians gained more prominence in society, replacing priests as the sole authorities of the anatomy and genitals; they became fascinated by the study of unusual anatomy – what they dubbed "monstrous" births – and named their new field teratology. Medicine entered into what Alice Dreger calls the "Age of the Gonads" where physicians, empowered by their newly invented microscope, examined gonads and genital tissue.[4] Based on their slides, physicians decided the sex of the child. Factors such as the new field of pathology, a greater understanding of embryonic development, and the theory of evolution (which emphasized reproduction) ingrained the genitals' importance as the sex-determining factor.

Age of Conversion

In the middle of the 20th century, the emergence of Freudian theories of gender and sexuality shaped the experiences of those with DSD. Advancements in medicine allowed for a better understanding of embryonic physiology and improvements in surgical procedures made genital reconstruction and reassignment possible. These advancements, combined with the repressive social order, made infant genital reassignment the standard procedure. John Money's psychosocial gender identity theory established conversion-based DSD care, which lasted through the end of the 20th century.[5] This century was consequently dubbed the "Age of Conversion."[6] This theory states that children are malleable at infancy and will conform to any assigned gender, as long as sex assignment surgery is done swiftly after delivery and parents keep details about their child's sex a secret. Because of the intense stigmatization of those affected, biomedicine operated on the axiom that children should never know they were different from their peers.[7] This secrecy is a reflection of the general societal repression at this time and likely stems from the sexually repressive nature of American society in the 1950s and the societal taboos regarding sexual intercourse and the sexual organs.

In the 1960s, the sexual revolution generated conversation about sexuality and the sexual organs.[8] Knowledge from the feminist and LGBT+ movements began to alleviate the heavy tone of moralism adopted in the 1950s. In turn, these movements increased discussion concerning sexual terms and anatomy, allowing the public to better understand their gonads. As society began to embrace the importance of sex, surgeons similarly began putting money, time, and research into preserving sexual nerves during surgery. Despite this

progress, treatment of DSD individuals, however, remained based on "fixing" anatomical deviations and not preserving sexual feelings.[9]

In the wake of the sexual revolution, feminist theories examining DSD, then called intersex, emerged in the 1980s and 1990s. One of the most influential voices was Anne Fausto-Sterling, who began to call for an expansion of the gender binary to include different types of DSD, proposing five sexes instead of two. Ultimately, she argued for the elimination of genders entirely and rejects the convention that a boy must have penis large enough to achieve penetrative intercourse to be considered male.[10] This assertion directly contradicts the biomedical standard that one's genitals determine one's gender. By the close of the 20th century, feminist and queer theories had begun to lift the curtain around DSD and intersex advocates had established their own theories rejecting normative gender categories.

Recently, the debate regarding the treatment of DSD has been elevated to a greater level of importance and physicians have begun to reconsider the ramifications of infant genital reassignment. Despite this progress, at the turn of the 21st century physicians were still promoting treatment based on the framework developed by Money in the 1950s. Until the past decade, the American Academy of Pediatricians characterized DSD as a "social emergency" to be remedied.[11] In 2004, based on the recommendations by the activist organization the Intersex Society of North America, physicians adopted a new multidisciplinary framework that urged caution in infant genital surgery.[12] Unfortunately, this progress, too, is deceptive. The Intersex Society of North America reports that infant gender reassignment surgery persists unabated. In Colombia University's meta-analysis of the developments in treatment of DSD, published in April 2014, the authors support a multidisciplinary approach including a team of psychologists, social workers, and physicians. However, the paper also recommends that reassignment surgery should be preformed within the first week of life when genitals are not exclusively male or female.[13] As this irreversible surgery continues unabated today, it seems theoretical discourse has had little effect on surgeries.

When examining the factors that have lead to today's high level of infantile genital reassignment, many physicians insist that surgery continues in response to parent demand. Parents, upon hearing their child's DSD diagnosis often struggle to comprehend the medical aspects of the disorder and physicians simultaneously push parents to make a swift decision regarding their child's genitals.[14] Many parents report that fear of ridicule encourage them to "normalize" their child's genitals. However, due to the secrecy that shrouds the diagnosis and care of DSD, there exists little data regarding the effects of infant genital surgery. No significant data suggests that these surgeries are beneficial to the child; in fact, in some cases, these surgeries have been shown to cause mental anguish or even harm to the patient.[15]

Parents in the United States possess complete autonomy to make decisions on behalf of their children up to age eighteen in most states. While reproductive services do not generally require parental consent, intersex surgeries and treatments do. Recently, the parental right to make decisions about the bodies of adolescents has received some scrutiny and may soon be challenged in court. The thought that parents make autonomous decisions regarding their child has been contested recently by research showing that the type of counseling parents receive substantially influences the decisions they make. One study showed that while parents believed their decision was based on personal considerations only, it was actually heavily influenced by whether their counseling was surgical or psychological.[16] Given the irreversible nature of infant genital surgery, society must consider parents' true motivations and reevaluate the way in which biomedicine communicates with parents.

Age of Acceptance

Based on the progress of DSD treatment and awareness in the past twenty years, this article asserts that society has begun the Age of Acceptance. Now that feminist theory is well established and those individuals with DSD are more vocal than ever, biomedicine must critically examine how society's prejudices influence biomedical protocols and, more importantly, the quality of life of those with DSD. Studies suggest that societal fears of sexual perversion and deviation are the driving factor behind infant genital reassignment surgeries.[17,18] With an alarming lack of empirical evidence supporting these surgeries and an ever-growing group protesting them, biomedicine must scrutinize their use. If society can begin to understand that one's gender is determined by one's psyche, not by outward appearance, society can enter the Age of Acceptance and begin to erase the notion that genitals define gender. Moreover, as scholars have accepted gender as a spectrum not a binary, so too must they accept sex as a spectrum. An expanded definition of sex will help patients with DSD be accepted in their natural bodies and no longer feel pressured into genital reassignment. Moving forward, biomedicine's approach to DSD must be critically interrogated, and more research on the psychosocial motivators and impact of infant genital reassignment surgery is needed.

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Role of Subventricular Zone Derived Neural Precursor Cells in the Therapy of Experimental Autoimmune Encephalomyelitis

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ABSTRACT

Examining the accumulation of stem cells following transplantation can provide valuable insight on the possibilities of stem cell-based human therapies for neurodegenerative disorders, namely multiple sclerosis (MS). MS is a chronic disease that attacks the central nervous system (CNS). Symptoms may be mild, such as numbness in the limbs, or severe, such as paralysis or loss of vision. MS is currently believed to be an immune-mediated disorder caused by the patient's own immune cells gaining entry into the CNS via the impaired blood–brain barrier. This leads to demyelination and scarring in addition to other common neurological symptoms associated with autoimmune disease. The purpose of this report is to use td-Tomato transgenic mice to determine the accumulation of intravenously-injected Green Fluorescence Protein (GFP) reporter neural precursor cells (NPC) in the CNS. Using a mouse model of MS known as Experimental Autoimmune Encephalomyelitis (EAE), the effect of NPCs in the CNS was evaluated by clinical scores, in vivo *magnetic resonance imaging* (MRI) and Xenogen imaging, and histology. This study provides support for a potential role of NPCs in the therapy of EAE and MS in humans.

KEYWORDS: stem cell use for neurodegenerative disorders; multiple sclerosis

Note: This submission only contains the research abstract. To obtain access to the full-length report, please contact me at soha_ghanian@brown.edu

Radiographic Evaluation of the Carpometacarpal Joint in Early Stage Osteoarthritis Severity and Joint Laxity

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KEYWORDS: carpometacarpal osteoarthritis; radiographic evaluation of osteoarthritis

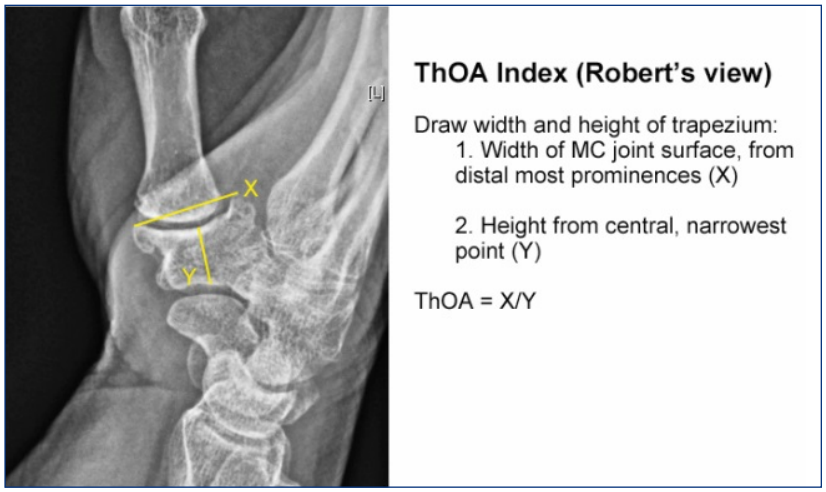
INTRODUCTION

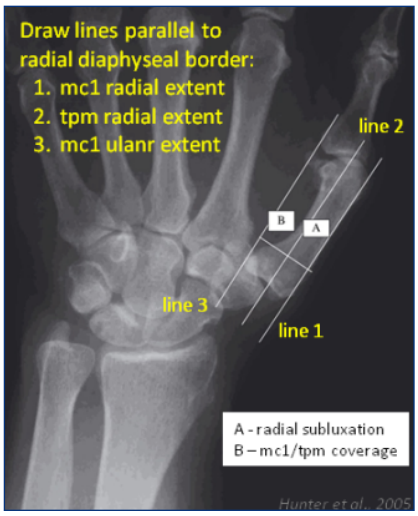
Thumb carpometacarpal osteoarthritis is a common and disabling disorder that affects 15% of adults over the age of 30, and 66% of women over the age of 55.[1] Thumb use is affected by pain, weakness and loss of dexterity, leading to significant impairment (40%-50%)[2] of the upper extremity due to its central role in nearly all grasp and handling maneuvers. Since Kellgren and Lawrence's study documented the prevalence of degenerative thumb CMC arthritis in the late 1950s[3], several subsequent studies have confirmed the importance of accurate radiographic evaluation in the grading of OA across assorted radiographic views. However, widely used OA staging systems are of questionable utility, as they are highly subjective and unreliable between users. The present study will generate heretofore unavailable foundational data on longitudinal and quantitative evaluations of CMC joint subluxation and ThOA (thumb osteoarthritis) indices through key radiographs. In a sample of patients who present with pain and Eaton Stage I/II joint degeneration, radiographic OA progression at 1.5- and 3-year follow-up was expected to be more advanced in patients with larger baseline CMC joint laxity than in those with smaller baseline CMC joint laxity and in those with no evidence of OA.

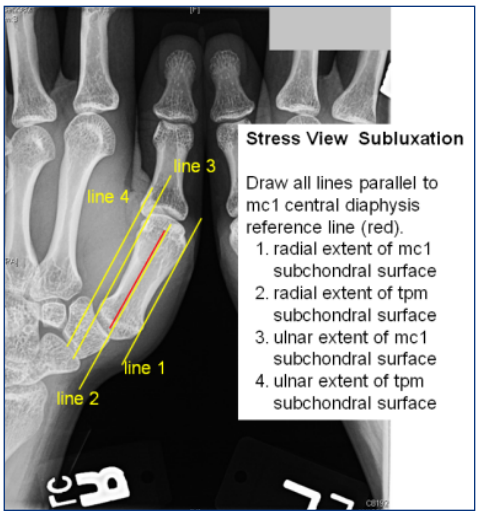
Four fundamental radiographs (lateral view, Robert's view, posteroanterior view, and stress view) were obtained for each subject. A total of 139 (69 normal, 70 OA) subjects were imaged, and data was sent to orthopaedic surgeons, residents, and CMC radiologists. An ImageJ macro was developed that allows raters to grade OA progression using the Eaton and Ladd-Weiss classification systems and digitally calibrate the radiographs to perform the proceeding measurements. In the Robert's view radiograph, Thumb Osteoarthritis index (ThOA) was determined by the ratio of the measured trapezium width to the measured trapezium height. In the lateral view, Hunter radial subluxation (RS) of the base of the first metacarpal off the trapezium and Hunter metacarpal 1-tpm coverage (mc1-tpm), the amount of the base of the first metacarpal covering the articular surface of the trapezium, were quantified. Subsequently, the stress view radial subluxation, articular width (AW) of the metacarpal, and distance (U) between the ulnar articular facet of the trapezium and the ulnar metacarpal edge measurements were performed for both hands in the stress radiograph. In addition to longitudinal data that is currently being collected and processed, reproducibility among and within users (1 biomedical engineering student, 1 medical student) was also evaluated. Intraclass correlation coefficients were calculated for inter-user reliability (with 95% confidence interval) and test re-test bivariate analyses for intrauser reliability (with $p<0.05$).

Statistical analyses using SPSS software of the Eaton and Ladd-Weiss gradings demonstrated significant inter- and intra-user variance. The intraclass correlation coefficient (ICC) was fairly low (ICC=0.392, 95% C.I.) and test-retest

Figures (counterclockwise): Robert's view, Hunter's view, Stress view







coefficients (r=0.197-0.304, p<0.05) as well. In Robert's view, the interclass correlation coefficient (ICC=0.883) for the ThOA index measurements exhibited high agreement, as did the test-retest reliability coefficient (r=0.723-0.984). In the posteroanterior view, raters calibrated the Hunter RS and Hunter mc1-tpm measurements, which translated to a RS/ mc1-tpm ratio of 0.35 (standard deviation = 0.017). Intraclass correlation coefficient (ICC=0.819) and test-retest reliability (r=0.702-0.930) for the ratio confirmed acceptable reproducibility. In the stress view, raters measured RS, AW, and U for both right and left hands, which yielded an average right hand RS/AW ratio of 0.48 (SD= 0.011). Intraclass coefficient (ICC=0.746) and test-retest reliability (r=0.603-0.799) were moderate for the right thumb. Moreover, the left RS/AW ratio of 0.46 (SD=0.008) had higher inter- (ICC=0.813) and intra- (r=0.699-0.923) user reliability. High ICC and r values indicate high fidelity and reliability in this quantified paradigm for defining subluxation and, consequently, OA progression. These results are highly contributive due to the demonstrated consistency of radiographic evaluations, in contrast to the variability in existing classification systems. Such findings facilitate better diagnoses and correlate clinical CMC symptoms to a systematic radiographic standard. Longitudinal data from benchmark year 0 and progression of OA patients at year 1.5 will also be presented at the time of the conference.

The findings from the present study on thumb CMC biomechanics and OA progression will foster the development of new clinical treatment techniques to arrest early stage disease progression. The improvement of radiographic CMC joint analysis and, in particular, quantifying the ThOA index and joint subluxation informs the assessment of degenerative radiographic changes and the detection of subluxation to preventatively reduce risk of osteoarthritis.

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