NORTHWESTERN INTERNATIONAL HEALTH

World Class HealthCare
World Class Destination

PET/MR NEW TECHNOLOGY

Northwestern Memorial Hospital is now home to the Chicago area's first combined magnetic resonance (MR) and positron emission tomography (PET) scanner, a machine that shortens the total time a patient spends in imaging tests while providing exceptional image quality at lower doses of radiation. The scanner provides real-time information on anatomic structure and metabolic activity at the molecular level in the same sitting. This provides physicians with precise diagnostic data to accurately detect disease and plan treatment.

The system is expected to be particularly valuable in the diagnosis and treatment of prostate cancer. The recent installation of the Siemens PET/MR scanner at Northwestern will open new areas of research by enabling new insights into the diagnosis and progression of prostate cancer which may ultimately unlock new paths to treatment.

The synergism of MR and PET can offer vastly superior anatomic detail and biologic data that are extremely valuable in advanced evaluation of prostate cancer, particularly with respect to surgical and radiation planning as well as in assessing therapy response. PET/MR, while a relatively new technology, offers a unique opportunity to improve initial detection of locally advanced or metastatic disease in patients with newly diagnosed prostate cancer.

Edward Schaeffer, MD PhD
Chairman of Urology

"PET/MR is unique in that it has the potential to not only evaluate the stage of men with advanced cancer, but may also identify those who are optimal candidates for active surveillance, thus reducing unnecessary treatments and associated side effects."

MESSAGE FROM:

DR. DANIEL DERMAN

PRESIDENT, NORTHWESTERN INTERNATIONAL HEALTH

Warm Greetings from the International team at Northwestern in Chicago! In this newsletter we have highlighted some of our researchers' cutting edge discoveries which look very promising. Northwestern Medicine is world renown for bringing science from the bench to the bedside at a very rapid pace and in the safest manner.

We are also committed to providing the best technology to improve patient experience as demonstrated in our recent acquisition of a combined magnetic resonance (MR) and positron emission tomography (PET) scanner.

As always, we are here for you if you have any questions or issues that need to be brought to our attention. Feel free to contact me at any time at dderman@nm.org or Laura Leahy (lleahy@nm.org) for any questions or comments on our international operations.

$3.3 MILLION IN FUNDING TO AID RESEARCH ON INHERITED HEART-VALVE DEFECT

BY: ROBERT HADLEY, PATIENT DAILY

"Researchers at Northwestern Medicine in Chicago, aided by $3.3 million in funding from the National Institutes of Health, have launched a clinical trial to unlock the secrets of a widely seen inherited heart defect known as bicuspid aortic valve (BAV).

The disorder, in which patients have two flaps in the valve instead of the usual three, will be studied for the next five years by Dr. Paul Fedak, a cardiac surgeon with the Cummin School of Medicine, and Alex Barker, an assistant professor of radiology with Northwestern University's Feinberg School of Medicine, Northwestern Medicine said in a release. The team hopes to perfect a surgical technique that will allow repairs on faulty valves causing the symptoms while also better predicting who will need the operation.

Alec Barker, PhD

"Not all BAV patients are the same, yet they are currently treated the same when it comes to timing and extent of surgery," Fedak said in the release. "Through this study, we can give clinicians and surgeons the tools they need to create precise, individualized treatment plans for patients."

Barker said the study will use both cell examinations and advanced MRIs to map the patient's circulation around a missing flap in the heart valve.

"The use of this novel imaging technology can provide a better understanding of the underlying cause of aortic aneurysms in addition to identifying the patients who are most at risk of complications," he said in the release."

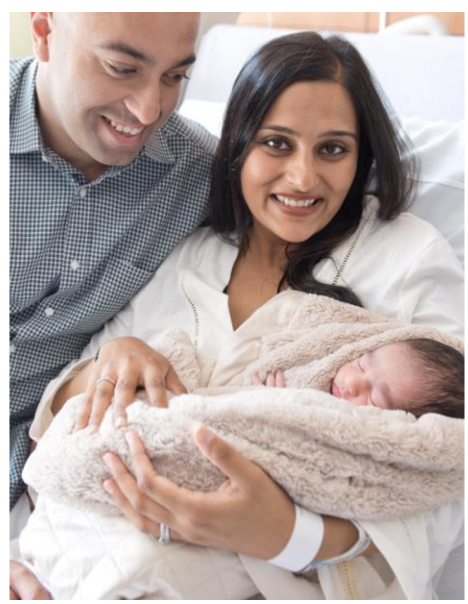
http://patientdaily.com/stories/511143998-3-3-million-in-funding-to-aid-research-on-inherited-heart-valve-defect

NORTHWESTERN IS ONE OF 16 LARGE HOSPITALS WITH THE LOWEST C-SECTION RATES

Consumer Reports conducted an analysis of birth rates from C-sections at more than 1,300 hospitals regarding first-time mothers at low risk, or those who are having one full-term child who is positioned head first.

They found 16 large hospitals had C-section rates of 17 percent or less. Northwestern Memorial Hospital was one of these distinguished hospitals. The 16 hospitals delivered at least 3,500 babies or had at least 750 low-risk births in 2015 or the nine months ending September 2015 or June 2016. The national average is 25.8 percent and the national target, set by The U.S. Department of Health and Human Services (HHS), is 23.9 percent. Several hospitals had C-section rates over 40%.

http://www.consumerreports.org/media-room/press-releases/2017/05/consumer_reports_analysis_most_us_hospitals_csection_rates_exceeding_national_targets/



ALL- FEMALE NU RESEARCH TEAMS BREAKTHROUGH: 3-D PRINTED OVARY TO ONE DAY HELP YOUNG CANCER PATIENTS

BY: BRIGID SWEENEY, CHICAGO BUSINESS

“An all-female team of researchers at Northwestern University's Feinberg School of Medicine and McCormick School of Engineering has managed to use a 3-D printer to create a fully functioning prosthetic ovary in mice. The artificial organ has the potential to change the way human infertility is treated.

Made of gelatin, the prosthetic ovaries have not only allowed the mice to ovulate, but also to give birth to—and even nurse—healthy babies. The journal Nature Communications printed news of the breakthrough today.

"We started with the notion that we need a transplantable, durable solution for young cancer patients," Teresa Woodruff, a reproductive scientist and director of the Women's Health Research Institute at Feinberg, said in an interview.

Right now, girls who undergo radiation or chemotherapy that renders them sterile prior to puberty have limited options for preserving fertility. Doctors can save pieces of these patients' ovarian tissue and attempt to re-implant them later—"but that comes with a risk," Woodruff explained. "The tissue might contain the cancer that they just survived."

Woodruff reached out to Ramille Shah, an assistant professor of materials science and engineering at Northwestern who has a doctorate from MIT. Shah, who also has an appointment as assistant professor of surgery at Feinberg, works with transplant doctors, plastic surgeons and orthopedic surgeons to create implantable structures.

Woodruff and Shah's big win is the fact that their ovaries successfully boosted hormone production and restored fertility in the mice.

This success was due to the use of gelatin, made from broken-down collagen, that is both rigid enough to survive handling during surgical implantation and porous enough to interact with the mice's own tissues and systems the way a biological ovary does.

The team members precisely calibrated the gelatin temperature and the printing method to create ovaries that maintained their physical integrity inside the mice.

Other labs working on similar organ projects have used types of gelatin that are mostly water and disintegrate too easily, according to Woodruff.

The scientists began with an understanding of what an ovary "skeleton," or infrastructure, looks like. They then built the 3-D ovary the way you do a building. Like the scaffolding that temporarily supports a high-rise as it's erected or repaired, the Northwestern team used 3-D printing to create layers of gelatin in precise angles that replicated a real ovary skeleton.

Because it was designed with a geometry that exactly matches a biological ovary, a mouse's immature eggs were able to wedge into the 3-D structure just as they do in a real one. The immature eggs, properly supported, matured normally.

The fact that the structure was so carefully engineered also allowed the normal cultivation of cells that release reproductive hormones, as well as the formation of blood vessels through which the hormones flow. Because their hormone levels were correct, the mice lactated and could breastfeed.

"Our next step is to go from mouse to mini-pig," said Woodruff, because its ovarian cycle is almost identical to that of a human.

If successful in people, the prosthetic ovaries can be used for purposes beyond pregnancy, too.”

http://www.chicagobusiness.com/article/20170516/NEWS03/170519894/all-female-nu-research-teams-breakthrough-3-d-printed-ovary

MORE ABOUT PROFESSOR TERESA WOODRUFF…

Teresa Woodruff is the Thomas J. Watkins Professor of Obstetrics and Gynecology, the vice chair of research (OB/GYN), the chief of the Division of Reproductive Science in Medicine at Feinberg and a professor of molecular biosciences at the Weinberg College.

She is an internationally recognized expert in endocrinology and ovarian biology. She has made and continues to make lasting contributions to the fields of reproductive science and medicine. She was the first to clone the key endocrine hormone inhibin.

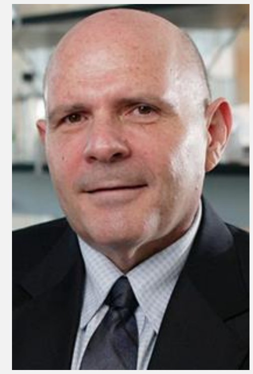
Woodruff has published more than 300 peer-reviewed original research papers, editorials and reviews. She also has authored and edited several books on oncofertility, a term she coined in 2006 to describe the merging fields of oncology and fertility.

SUGAR COATED NANOMATERIAL EXCELS AT PROMOTING BONE GROWTH

METHOD OFFERS PATHWAY FOR IMPROVING PATIENT OUTCOMES AFTER SPINAL FUSION SURGERY

BY: MEGAN FELLMAN, NORTHWESTERN

“There hasn’t been a gold standard for how orthopaedic spine surgeons promote new bone growth in patients, but now Northwestern University scientists have designed a bioactive nanomaterial that is so good at stimulating bone regeneration it could become the method surgeons prefer.



Samuel I. Stupp

While studied in an animal model of spinal fusion, the method for promoting new bone growth could translate readily to humans, the researchers say, where an aging but active population in the U.S. is increasingly receiving this surgery to treat pain due to disc degeneration, trauma and other back problems. Many other procedures could benefit from the nanomaterial, ranging from repair of bone trauma to treatment of bone cancer to bone growth for dental implants.

"Regenerative medicine can improve quality of life by offering less invasive and more successful approaches to promoting bone growth," said Samuel I. Stupp, who developed the new nanomaterial. "Our method is very flexible and could be adapted for the regeneration of other tissues, including muscle, tendons and cartilage."

Stupp is director of Northwestern's Simpson Querrey Institute for BioNanotechnology and the Board of Trustees Professor of Materials Science and Engineering, Chemistry, Medicine and Biomedical Engineering.

The colored region in a micro-CT image shows regenerated high-quality bone in the spine with minimal use of growth factor.

For the interdisciplinary study, Stupp collaborated with Dr. Wellington K. Hsu, associate professor of orthopaedic surgery, and Erin L. K. Hsu, research assistant professor of orthopaedic surgery, both at Northwestern University Feinberg School of Medicine. The husband-and-wife team is working to improve clinically employed methods of bone regeneration.

Sugar molecules on the surface of the nanomaterial provide its regenerative power. The researchers studied in vivo the effect of the "sugar-coated" nanomaterial on the activity of a clinically used growth factor, called bone morphogenetic protein 2 (BMP-2). They found the amount of protein needed for a successful spinal fusion was reduced to an unprecedented level: 100 times less of BMP-2 was needed. This is very good news, because the growth factor is known to cause dangerous side effects when used in the amounts required to regenerate high-quality bone, and it is expensive as well.

The findings were published June 19, 2017 in the journal Nature Nanotechnology.

Stupp's biodegradable nanomaterial functions as an artificial extracellular matrix, which mimics what cells in the body usually interact with in their surroundings. BMP-2 activates certain types of stem cells and signals them to become bone cells. The Northwestern matrix, which consists of tiny nanoscale filaments, binds the protein by molecular design in the way that natural sugars bind it in our bodies and then slowly releases it when needed, instead of in one early burst, which can contribute to side effects.

To create the nanostructures, the research team led by Stupp synthesized a specific type of sugar that closely resembles those used by nature to activate BMP-2 when cell signaling is necessary for bone growth.

The Northwestern research team plans to seek approval from the Food and Drug Administration to launch a clinical trial studying the nanomaterial for bone regeneration in humans.”

https://news.northwestern.edu/stories/2017/june/sugar-coated-nanomaterial-promote-bone-growth Materials provided by Northwestern University. Note: Content may be edited for style and length.