The Inside Scope

Summer | 2016

The Future of Fat Stem Cell Research

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Care Extenders of the Rotation

Ronald Regan Hospital
- Jennifer Choi
  - ER-A
- Andrea Casas
  - 5E
- Ashra Tungung
  - ER-B
- Joshua Norman
  - ER-B
- Ashley Nguyen
  - ER-B
- Nareg Thomas
  - ER-B
- Cheryl Huynh
  - 8N
- Joseph Shane
  - 8N
- Ani Ovasapayan
  - 7-ICU

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Care Extender Internship Program
Drink Water When Thirsty

New Medical Research

Photo Courtesy from n.secmd.net

Popular belief states…
that you should try to drink the optimal
amount of water each day, eight glasses of
water per day. The Institute of Medicine (IOM)
has even recommended that women should
try to drink 9 cups a day while men should aim
for 13 cups. However, most people find it hard
to drink this recommended amount.

Contrary to popular belief…
a recent study has been conducted that has
discovered a mechanism as to why it is
physically difficult for people to reach the
recommended “8 glasses of water per day”
rule. Thanks to this study, researchers are
advising the public only to drink when they
are thirsty.

Those behind this study…
were Michael Farrel and his colleagues from
the Biomedicine Discovery Institute at Monash
University in Australia. They published their
study in the Proceedings of the National Academy
of Sciences.

The study consisted of…
test subjects who were monitored when they were
and were not thirsty by using functional magnetic
resonance imaging (fMRI). The team instructed
the test subjects to gulp large amounts of water
after exercise and later, when they weren’t thirsty.

According to the tests from the fMRI…
the right prefrontal cortex of the brain
demonstrated higher activity when one had to
put in more effort to swallow the water when
he/she wasn’t thirsty. Hence, this was the
mechanism that inhibited the ability to swallow.

Drinking too much water…
has already been known to be unhealthy for cells
potentially disrupting the sodium to water
concentration and making cells hypotonic. There
have already been cases of athletes dying
because of over hydration.
The Future of Fat Stem Cell Research
Mends Bone, Cartilage, Muscle, and Heart

It is a common theme in society to rid yourself of your fat. You look at yourself in the mirror, constantly wishing that the extra fat on you could just instantly vanish. However, what if someone told you that your fat could actually save your life or maybe even someone else’s life?

Fat stem cell research has been the burgeoning topic in the scientific community for a while now. Stem cells’ ability to ultimately grow into any type of cells, has opened the doors to new methods of treatments for various conditions, diseases, and injuries. Specifically, research is focusing on the healing potential on the muscle, cartilage, bone, and heart.

Rocky Tuan, a bioengineer at the University of Pittsburgh, has collected many fat samples from volunteers’ stomachs and thighs to create a material that closely resembles cartilage, the soft padding in between joints. Many people in their middle ages suffer from the pain of cartilage degradation (due) to over use, also known as osteoarthritis. Currently, the procedure to amend this painful degenerative condition is an invasive joint surgery that 1 million people in the United States undergo every year. Usually, patients must undergo multiple rounds of surgery to alleviate symptoms.

Tuan and his team have developed a less invasive alternative to treating osteoarthritis. When creating artificial cartilage, Tuan’s team grows a thin layer of fat stem cells on a scaffold...
shaped in the desired size and form. After this, the material is exposed to light so that the enzymes create strong bonds that allow the material to have its cartilage-like structure. So far, Tuan and his colleagues have been successful when implanting these cartilages into animals.

Stem cells are commonly found in embryos, bone marrow, muscle, and blood. It has only been since 2002, when “UCLA researchers discovered stem cells in human fat” (sciencenews.com). Human fat is so concentrated with stem cells, that about 200 million stem cells reside there. J. Peter Rubin, a plastic surgeon from the University of Pittsburgh, believes that fat stem cells are the key to healing many parts of the body.

Tuan and his colleagues have discovered a way to guide the cells in a certain way that help them grow into a specific type of cell, specifically into tenocytes. Tenocytes are the cells that make tendons which connect the muscle to bone. Without these tendons, joints would not bend. Athletes are prone to getting their tendons injured, and this medical breakthrough could completely change how athletes are able to perform in that aspect.

In order to mimic the body’s natural tissues, Tuan’s team had fat stem cells and collagen combine with the scaffolds of nano-sized fibers. The fibers instructed the stem cells to grow. As they grew, scientists placed a mechanical tension on the fibers to mimic stressing tendons.

Fat stem cells have shown positive results in animal tests. Some human subjects have implanted fat stem cells which proved to be a better alternative to invasive surgery. Since fat cells have been proven to be capable of such positive results, what are fat cells possibly made of? Fat is a globular mass of different cells including blood vessels, cells that stabilize blood vessels, and immune cells.

Warren Grayson, a biomedical engineer, from John Hopkins University has discovered an alternative way to bone surgery. Sometimes, injuries are so traumatic that the bone is unable to repair itself. Currently, the treatment for this is invasive bone replacement surgery which consists of the patient’s own bone or another bone from a deceased human being implanted into the injury. About 1 million bone replacement surgeries take place each year. Fortunately, Grayson’s team has been developing a method to use fat stem cells to grow a bone.

“However, what if someone told you that your fat could actually save your life or maybe even someone else’s life?"
Starting in 2010, fat stem cells were extracted and grown on a scaffold for five weeks in an incubator. They were being fed different nutrients to promote the stem cell to grow into a specific kind of cell.

Stuart Williams, a cardiologist at the University of Louisville Kentucky, has been working on a fat-cell patch. “Fat tissue contains a huge number of blood vessel forming cells,” said Dr. Williams. Hence, he knows it would work well to treat small blood vessels. Specifically, this would help women who suffer from having small blood vessels. The greatest thing about these fat-cell patches is that they don’t need to be directed or guided to become a certain type of cell. All they need to do is connect to each other and they will automatically promote blood flow. Hence, these fat-cell patches could be placed into patients that have limited blood flow in their appendages and/or wounds that aren’t healing correctly.

Much of the research has shown successful results in animal trials. However, as more successful research is conducted, human trials will become more abundant. As a matter of fact, a few traumatic cases have already been treated with fat stem cell research providing nothing, but positive results during implantation and recovery. For example, when five military men were severely injured in battle Rubin’s team was prompted to extract fat cells from the patient and inject them at the injury site.

After several weeks, the patients were able to sit upright with no pain. Scientists hypothesize that once the fat cells are injected in the injury, they send growth signals to surrounding cells encouraging the growth of fat cells and increased blood flow to the tissues. Another instance occurred when a seven-year-old girl had suffered a traumatic blow to her skull and Grayson’s team decided that the best treatment for her would be fat cells. They extracted fat cells from her body and injected them into her skull; again, producing positive results regarding implantation and recovery.

Once methods for fat stem cell extraction and implantation are perfected, everyone will be able to benefit from this amazing break through. So the next time you look at yourself in the mirror wishing your fat away, think again.

“In 2002, University of California: Los Angeles (UCLA), found large amounts of stem cells in fat.”
Chemistry Nobel Prize Goes to Molecular Nanomachines

On October 5th, three inventors of nanoscopic machines, Jean-Pierre Sauvage, J. Fraser Stoddart, and Bernard Feringa, were granted the Nobel Prize in chemistry. They were awarded a $933,000 prize among the three of them.

In 1983, Jean-Pierre Sauvage, from the University of Strasbourg in France, created a molecular chain with a new mechanical bond. In this bond, one set of molecules are in a circle and a copper ion is right next to it.

In the vicinity, is a chain of molecules that are all attracted to the copper ion. The copper ion gathers all of the molecules and another molecule is linked to form a mechanical bond. At this moment, the copper ion is removed.

Fraser Stoddart, from the Northwestern University in Evanston III, created the roxlanne, a structure that consists of molecular machines with rings clipped around a central axis. In 2000, Stoddart had made molecular elevators using multiple rings and axles that interlocked.

In 1999, Feringa, a researcher from the University of Groningen built the first molecular motor.

Essentially, these three colleagues created a nanomolecular delivery system with motors on the sides. This phenomenal technology has a range of applicable uses from delivering drugs to different locations to locating tumors, personally destroying them.

Photo Courtesy of sciencenews.org. Pictured right to left: Jean-Pierre Sauvage, J. Fraser Stoddart, and Bernard Feringa.
Physiology Nobel Prize Goes to Research in Cell Recycling

Yoshinori Ohsumi, biologist at the Tokyo Institute of Technology, just received this year’s Nobel Prize in physiology. His work consisted of critically analyzing the cell recycling mechanism, specifically how cells break down old material like proteins or organelles. When asked about why he chose to do research on the cell’s garbage disposal system, he replied, “I don’t feel comfortable competing with many people. Instead, I find it more enjoyable doing something no one else is doing...That’s what science is all about, and the joy of finding something that inspires me” (theguardian.com).

This recycling mechanism is very important to the cell of the organism. Without a functionally working recycling mechanism, different problems can occur. Too little recycling, increases the chances of a human to develop Parkinson’s and/or Alzheimer’s disease. Too much recycling, has been linked to the development of cancer.

In 1974, auto phagosomes had been discovered exposing the cellular process of cells digesting themselves with the help of fused lysosomes which throw out the old digested material.

In Ohsumi’s experiment, he bred defective baker’s yeast that could not digest their cellular garbage. He found that there was an increase of auto phagosomes in the cells because the cellular waste was piling up. He discovered that this was not a garbage disposal. Rather, it was a recycling mechanism.

Photo Courtesy of: latimes.org
3-D Printed Bonds Could be the Future of Bone Repair

Ramillie Shah, a materials science engineer at Northwestern University in Chicago, has created a new 3D printed material. This material can be printed in such ways to be implanted into complementary bone shapes.

The material is made up of elastic polymer plus hydroxyapatite. This is calcium made in bones and teeth. When the material is implanted, it encourages the actual bone to grow within the implanted material. This finding was published in Science Translational Medicine.

So far, these tests have been performed in animals and have proven successful results. Human trials should be happening within the next five years.

The creation of this super malleable and flexible material could change the way surgeons heal critically damaged bones. Not only has it given positive results in animal subjects, but also it has proven its cost to be very inexpensive because of its synthetic material.

It doesn’t need to be placed in certain physiological conditions, so no freezing, heating, or refrigerating required.
Dental Bacteria Infects Southern California Children

In Anaheim, California there were approximately 30 children who received a root canal and were accidentally infected by bacteria-infested water at the dentist’s office. Children’s Dental Group is the dental office that had children 3-9 years old being sent to the hospital.

The bacteria are called *Mycobacterium abscessus* and appears dormant in the first few weeks or months. After that, patients will begin to exhibit symptoms. These symptoms include: redness, pain, and swelling around the infected tooth. Unfortunately, the bacteria has the opportunity to infect the gums as well as the entire jaw.

The bacteria grow in stagnant dental water that hasn’t been flushed. Apparently, many people have had these bacteria in their mouth, but it eventually leaves. However, after a root canal, the bacteria are trapped under the tooth; hence, giving the bacteria an environment to grow and thrive in.

The Dental Board of California is currently investigating the water cleanliness of the Children’s Dental Group.

The Children’s Dental Group is still under operation; however, many parents are not happy about their practices. Cecilia Roman, a mother of a daughter who became infected expressed anger after what had happened, “At the end of the day, she had three teeth taken out. Her face was swollen. I feel like I let my daughter down. I want their license revoked and I want that place shut down.” The Center for Disease Control, The Dental Board of California are currently investigating the situation.

“*At the end of the day, she had three teeth taken out. Her face was swollen...*”
Care Extender Committees

There are many leadership opportunities offered in the Care Extender program. You can find more information on our website:

https://www.uclahealth.org/careextender/care-extender-program

Department Coordinator Assistant (DCA) Position

DCAs must perform “sweeps” at Ronald Reagan or Santa Monica Hospital to gain feedback from staff and Care Extenders. DCA’s must also make sure Care Extenders are attending shifts and are in proper uniform.

Recruitment Committee

These leaders must spread the word about the Care Extender Program by emailing professors, visiting the school’s career center, making class announcements, etc.

Greeters Committee

These leaders must train incoming Care Extenders to get them more acquainted with the hospital. The tours consist of taking Care Extenders to the most visited places in the hospital.

Admissions Committee

These leaders must facilitate the interview and Live Scan Process by checking in applicants, taking photos, giving health requirement presentations, and answering applicants’ questions.

Care Extenders of the Rotation

For Fall 2016

- Jena Gonsalves
  - 7-ICU

- Mehdi Nojoumi
  - CCL

- Joe Zaarour
  - PICU

- Esmeralda Salazar
  - PICU

- Brenda Tinoco-Bravo
  - Labor and Delivery

- Francis Rojina
  - CCL

Thank you for all of your hard work!

Did you know?

Care Extenders that have been nominated as “Care Extender of the Rotation” at least two times may be eligible for a letter of recommendation.

Although all completing CEs will receive a reference letter, only our most outstanding volunteers will be considered for a letter of recommendation. For more questions, please email ASherer@mednet.ucla.edu.
Care Extender Internship Program

Important Dates

November

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10.31.16 New Rotation
11.07.16 Recruitment Committee Applications Open Up
11.09.16 Extension Request Form Due
11.13.16 Recruitment Committee Application Deadline and Preferences Sign-ups Open
11.26.16 Admissions Committee Applications Open Up
11.27.16 Preferences Sign-ups Closes
12.03.16 Admissions Committee Applications Deadline
01.08.17 Winter Department Assignments Posted
01.23.17 DCA Applications Open Up
01.29.17 Training Day and Department meetings