

STEM CELLS & STROKE PATIENTS

- Each patient underwent stem cell transplantation, which involved drilling a hole into the skull and injecting stroke-damaged areas of the brain with SB623 cells (mesenchymal stem cells (MSCs) taken from the bone marrow of two donors and modified to boost brain function)
- The researchers were surprised to find that after being injected into the brain, the SB623 cells only live for around 1 month, yet patients continued to show improvements for several months
- •On the motor function component of the Fugl-Meyer assessment a stroke-specific impairment test - patients experienced an overall 11.4-point improvement.

3-D PRINTED POLYMER CONSTRUCTS

Bioabsorbable Grafts

- •Not a new concept, however this new material is composed of supramolecular bioabsorbable polymers
- Doctors were able to create connections that acts as a "scaffold," allowing the body to replicate the structure with organic material with the implant then degrading



BRAIN COMPUTER INTERFACES

- The Rehab Neural Engineering Labs at the University of Pittsburgh, with funding from DARPA, have demonstrated that people with spinal cord injury can control a lifelike robotic arm using neural signals from electrodes implanted in a part of the brain that controls movement
- The laboratory can also generate sensations that feel like pressure on the hand or fingers by electrically stimulating a part of the brain that is responsible for feeling touch
- Nathan Copeland has been paralyzed, unable to move or feel his limbs, for the past ten years - Copeland now can move a robotic arm using only his brain and the system is so sensitve he can feel pressure on each finger

MEDICAL BREAKTHROUGHS OF 2016



Bioglass Cartilage

- •A silica-polymer combination that has the tough, flexible properties of cartilage
- •Has self-healing properties, capable of rebonding upon contact if torn apart
- The first tested application will be the replacement of a spinal disc, another, permanent version of the implant is in development to treat knee injuries and other injuries in areas where the cartilage will not regrow material with the implant then degrading



DEA-APPROVED MEDICAL MARIJUANA STUDY

- •First-ever clinical trial in which patients will be smoking marijuana to study the effects on PTSD
- Previous clinical studies have only allowed extracts of the cannabis plant to be tested
- •Cannabis has appeared to demonstrate positive benefits in previous clinical trials across a broad spectrum of ailments, so this softening in DEA policy could mean that further testing is on the horizon.



WORLD'S FIRST ARTIFICIAL PANCREAS

- •FDA approved Medtronic's MiniMed 670G, the world's first artificial pancreas for type 1 diabetes, in September 2016
- Approved for those aged 14 and up, measures a patient's blood glucose every five minutes
- •It uses a sensor with a protruding needle that's slipped under the skin to measure insulin levels, while a pump worn on the abdomen delivers insulin as needed
- This setup could dramatically reduce instances of hypoglycemia and greatly improve the quality of life of type 1 diabetics, who no longer have to constantly check their blood sugar throughout the day



GENE EDITING USING CRISPR/CAS9

- •Chinese scientists will treat lung cancer patients using T-cells modified using the CRISPR-Cas9 technique
- This technology will disable the PD-1 gene, which sits on the surface of the T-Cell and prevents the cell from attacking healthy cells that have the companion PD-L1 protein
- Many cancer cells also express this standard PD-L1 marker as a defensive mechanism to prevent the body's T-cells from attacking them
- •By disabling this PD-1 gene and removing the PD-1 protein, the modified T-cell will be free to destroy the cancer cells