

The New World of Cellular Healing

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No Comments



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Has the day of adult stem cells arrived? Harvesting them from a patient's fat, doctors are using them for everything from providing natural facelifts to healing damaged heart tissue. And it's only just begun.

Imagine if you could go into a hospital where doctors could remove some of your fat—naturally, from some place you really didn't want it any way—then process that fat to produce special healing cells that could repair damaged organs in your body, such as your heart or your lungs. And imagine that within a matter of weeks you could start to function again, like you did before your organs went bad.

Does that sound futuristic? Maybe so, but it's happening right now, in special clinics around the world, and in experimental trials here in the U.S. And those special cells? Stem cells. Not the embryonic stem cells that were taboo because they came from unborn fetuses, but something called 'adult' stem cells, which are found abundantly in our own fat.

Of all the tools in the growing medicine chest of anti-aging doctors, nothing matches the exciting potential of adult stem cells. The possibilities seem limitless. Already more than 30 different cures are being tested, from repairing damaged knees to fixing neurological disorders like multiple sclerosis.

But just what are these magic bullets called stem cells? When the human egg is fertilized, it starts multiplying universal cells—stem cells—that have the potential to become any cell in the body. As the fetus develops, these 'toti-potent' cells (which means they can turn into any type of cell) get their instructions from our DNA to start taking on their special roles.

These embryonic stem cells are not what are turning today's medical world upside down, however. The new kids on the block are stems from fat, the so-called 'adult' or adipose-derived stem cells, adipose being the fancy name for fat.

These fat stem cells are not the same as the embryonic stem cells. Among other things, they are not 'toti-potent,' meaning they can't turn into any other kind of cell. They are already somewhat evolved, so they can only become other fat cells, or muscle, blood, bone or cartilage cells. But that seems to be enough—and actually good news, because

they can't become cancer cells either. And that array provides a host of applications, from giving you a more youthful face to repairing your heart muscles after a heart attack.

Until recently, these fat-derived stem cells were used only for aesthetic purposes. For several decades, cosmetic physicians have been using patient's fat to plump out faces, buttocks and breasts, with sometimes mixed results. Why? Because fat is a delicate substance when it's transferred and doesn't always 'take'—as much as half of it gets reabsorbed, so cosmetic surgeons have been hesitant to embrace a procedure they couldn't control with certainty.

"Doctors have tried [fat transfer] for years, but it wasn't a predictable therapy," says Sharon McQuillan, M.D., a South Florida cosmetic physician and director of the Aesthetic Fellowship of the American Academy of Anti-Aging Medicine. "Otherwise, the facial filler market might not exist. Because, who wouldn't want to take fat from where they don't want it and put it where they do want it? It's a very seductive concept." Then came Sydney Coleman, M.D., a New York plastic surgeon who in the 1990s tried to standardize the technique.

What Coleman found was that if you inject fat in small amounts, it tends to 'take,' because the fat gets enough blood supply. Big lumps tend to clump up and die off. But then Dr. Coleman noticed something unexpected: the skin where the fat was injected started to get healthier and less wrinkled.

Nor was Dr. Coleman the only physician to notice the phenomenon. "I have been doing fat grafting for 10 years," says Harold Bafitis, D.O., a double board-certified plastic surgeon in Palm Beach, Fla. "Every time I inject fat [into the face], eight months later the quality of the skin is better, the quality of the tissue is better... I see an increase in the radiance and glow."

The mystery was finally revealed in the late 1990s by researchers at the University of Pittsburgh: They discovered stem cells in fat, and lots of them. Again, not embryonic stem cells that can become any organ in the body, but adult stem cells with the power to become muscle, bone, fat and blood. Naturally, it wasn't long before researchers wondered if these fat-derived stem cells could repair things like bum knees or damaged lungs. Suddenly it was a whole new ball game.

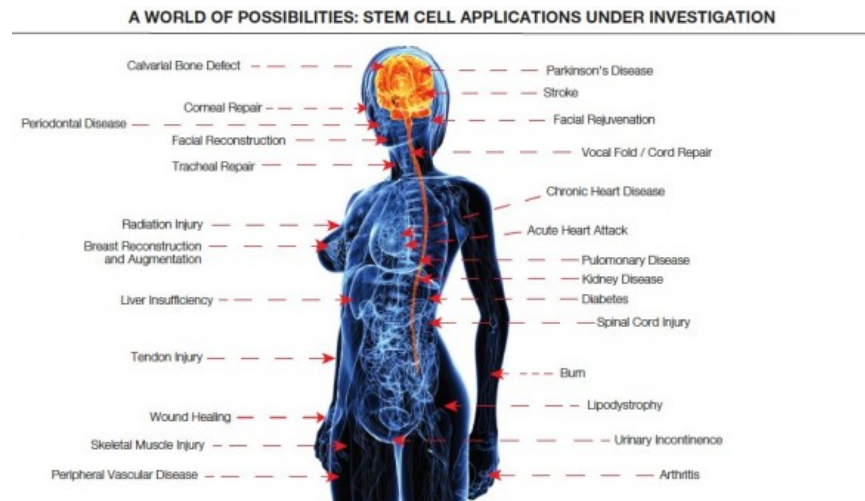
"The Bush administration convinced everyone that you had to kill embryos to get stem cells," says Dr. Bafitis. "But your own fat contains huge numbers of stem cells, way more than bone marrow or anyplace else... The science of this is just beginning to emerge in America."

THE MAGIC OF FAT

There is still a lot of disagreement about the best way to harvest, process and apply stem cells from fat. Scores of doctors and companies now tout one method over the next each step of the way. About the only thing that everyone agrees on is that they work.

Most of the procedures involving stem cells today are done by cosmetic and plastic surgeons—a.k.a. beauty docs—who use liposuction to sculpt the female form. When liposuction became the rage in the 1980s and 1990s, a number of pioneering doctors perfected the art of re-injecting that fat into areas of the body that needed it.

One of the first physicians to advocate the use of stem cell-rich fat for facelifts was Mark Berman, M.D., a cosmetic surgeon in Beverly Hills who had previously used synthetic fillers to plump out tired faces. Dr. Berman, last year's president of the American Academy of Cosmetic Surgery, was interested in the cosmetic use of fat, and so he used the same technique as Dr. Coleman—take the patient's liposuctioned fat, spin it in a centrifuge, then inject the concentrated layer that had the most stem cells.



Cosmetic physician Nathan Newman, M.D., has also been using stem cells to enrich the fat he injects for facelifts. Because of what he has seen in terms of skin regeneration, he also uses stem cells to heal scar tissue, another of the big effects observed by Dr. Coleman.

With anecdotal reports coming in from doctors across the county, the scientific research community—with little stem cell funding during the Bush Administration—is now catching up. Today there are more than 2,400 studies in the U.S. looking at the power of stem cells. Like the doctors who use stem cells, researchers do not claim that they can do anything. All they can say is that the results look promising. The FDA, likewise, prohibits doctors in the field from making any medical claims about stem cells—not until their efficacy is proven.

This is not the case with cosmetic applications. The FDA, in general, does not govern the practice of medicine, and fat transfer is a bit like the medical practice of blood transfusion. The doctor is merely extracting your own fat tissue, separating the stem cells, then either replacing the stem cells alone or mixing them back into the fat before re-injecting them. The only reason for the FDA to become involved is when the tissue has been significantly changed, turning it into a drug.

In terms of both cosmetic and therapeutic applications, however, the big question is still how the fat should be removed, how it should be processed and how it should be re-injected to make the most of the stem cells. “We know that different doctors have different results,” says Jeffry Schafer, M.D., a San Diego-based cosmetic surgeon who recently co-hosted a stem cell conference for about 70 doctors in Southern California. “What I’ve found is that everybody is a cowboy, with different techniques of fat harvesting, processing and transfer.”

That lack of standardization is sparking a new wave of companies and products, all trying to figure out how best to ‘awaken’ the tiny stem cells that are mixed in with the larger fat cells in fat tissue, with solutions ranging from a \$100,000 machine made by

Cytori, to a simple, affordable centrifuge kit made by Palomar. Other companies, such as IntelliCell BioSciences, are promoting a 'manual' method, where the fat tissue is broken up by ultra sound. Even with doctors across the country trying to figure out the best way to use stem cells, the big missing ingredient is still scientific verification. Anecdotes are one thing, but clinical evidence is the proof in the pudding.

While the consensus is that stem cells work, the latest observation is that it may not be the stem cells at all which are actually doing the work. Scientists, researchers and doctors in the field now believe that stem cells are just one of a group of cells that travel together in what's called the stromal vascular fraction, or SVF. Along with the 'mesenchymal' stem cells (which can become bone, muscle or cartilage) there are growth factors (proteins that instruct cells to repair themselves), lymphocytes (white blood cells), preadipocytes (which can become fat cells), endothelial progenitor cells (which can become blood cells), etc., all of which might have something to do with the healing that occurs when you inject stem cells.

"There is controversy now as to whether the stem cells alone are efficacious or that they require other cells in the SVF," says Dr. Ron Shane, a research scholar in neuroendocrinology at UC San Diego. "In five years we may not even be talking about stem cells."

Some doctors even question whether adult stem cells actually become the tissue into which they are injected. Instead, the stem cells may just be giving special instructions to repair the tissue. "I try to use the word 'repair' cell, rather than stem cell," says Dr. Coleman. "We are starting to realize that fat is part of the repair system of the body. They [the fat-derived stem cells] are not making new organs, they are repairing tissue."

Whatever the reason they work, stem cells are poised to become the basis for a revolution in anti-aging medicine, one in which the patient uses his or her own natural healing mechanisms to regenerate new tissue and repair the old. Pharmaceutical companies are busy trying to make drugs out of stem cells, finding special ones for the heart, lungs and cartilage that they can mass-produce. But in the end, the idea of the family doctor taking your fat, processing it and putting it back in your own body could become as common as taking two aspirins and calling the next day.

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