“My Experiences with Liposuction, Adipose Derived Stem Cells, and Fat Grafting in Aesthetic Plastic Surgery”

James P. Watson, M.D.

＜国籍＞
アメリカ合衆国
＜現所属＞
Stem Cell Research Program
Hollywood Presbyterian Medical Center
Los Robles Medical Center
Thousand Oaks Surgical Hospital
＜前役職＞
Chief, Division of Plastic & Reconstructive Surgery
Harbor UCLA Medical Center
Director, UCLA Microsurgery & Endoscopy
Laboratory, CHS Building
他多数

■Abstract

My experiences as a board certified plastic surgeon, and stem cell scientist has allowed me this wonderful opportunity to share my experiences in aesthetic and breast reconstruction surgery, and the role of stem cells in fat grafting that currently are shaping the aesthetic plastic surgery landscape.

As a board certified plastic surgeon, I have had the honor and privilege of a long and distinguished career as Chief, Division of Plastic and Reconstructive Surgery with the University of California, Los Angeles (UCLA) Harbour Medical Center, and as an Associate Clinical Professor, Division of Plastic Surgery at the University of California, Los Angeles (UCLA). I currently maintain full hospital privileges with UCLA medical centers and interface with continuous and on-going plastic surgery and scientific endeavors with fat grafting and stem cell research.

In my current role as Director of the Stem Cell Research Program at Hollywood Presbyterian Medical Center, in Los Angeles, California, stem cell research in aesthetic plastic surgery plays a large role in how we interface with patients looking for breast augmentation or reconstruction with fat grafting procedures.

Today, we hope to have a brief overview of stem cells, and our current understanding of their origins and purposes. Furthermore, I hope to share my own experiences with liposuction and autologous fat using infrasonic technology (Euromi Ltd., Belgium) and how its high yield of stem cells in the harvesting process is a valued addition in my private practice.

Stem cells have an amazingly unlimited regenerative qualities to which are still being explored and discovered. Some stem cells can transform into whatever biophysical grafting location their environment is, which is dependent on some key inductal factors allowing a nutrient supply and optimal conditions.

There are currently many and varied sources of stem cells including adipose (fat), peripheral blood, bone marrow, and embryotic fluid. The most common source in aesthetic plastic surgery being adipose derived.

Adipose derived stem cells are not tissue specific stem cells and resemble the mesenchymal stem cells (MSC) found in bone marrow. These cells can be induced into forming bone, muscle, cartilage, cardiac muscle, nerve tissue, fat, liver cells and blood. Unfortunately, very few of these cells will form all of these tissues. Most stem cells found in adipose tissue like to form endo-dermal tissue, so they like to form fat, tendon, muscle, tissue or bone.

In aesthetic plastic surgery, we see that adipose tissue (fat) removed through a liposuction process, has an invaluable role to create natural looking and feeling augmentations in the face, breast and gluteal areas.

Stem cell types, quantities available and their indications are source specific. Adipose (fat) derived stem cells are uniquely befitting in aesthetic plastic surgery with robust quantities available, accessible, and favorable in augmentation applications. An overview of the varied stem cell sources, and indications shed light on their limitations and potential in aesthetic plastic surgery.　When harvesting stem cells from embryonic sources there are only about 100-150 stem cells, so culturing them is potentially necessary for use in future applications. Coupled with this low stem cell yield, is the undesirable consideration that embryonic stem cells have the potential to form teratomas.

With bone marrow stem cell sources, in an adult, only 1 out of every 250,000 to 400, 000 cells is a mesenchymal stem cell (MSC), with the rest potentially being hematopoietic stem cells (HSC), Endothelial progenitor cells EPC, or non-stem cells. With a typical bone marrow aspirate there are only about 50,000 cells.　So except with certain circumstances, the ideal thing to do with bone marrow stem cells is to culture them and expand them to graft higher uptake and yield.

Peripheral blood stem cells even with an apheresis machine seen in most blood bank facilities,　you only yeild about 10,000 stem cells – from one harvest, so expansion is also ideal and many of these cells are going to form blood cells because they are hematopoietic stem cells　HSC .

In adipose stem (fat) cells, one out of every 100 cells is a stem cell and in one liposuction harvest you can yield between 10-50 million stem cells. With a high MSC count, extra cellular expansion or culturing　should not be necessary.　There are of course some important aspiration, harvesting, and re-infiltration guidelines designed to limit both damaging the stem cell packages, and to keep the MSC numbers robust. Equally important are re-infiltration guidelines designed to keep high survivability rates of grafted fat aliquots.

In my current practice, we use infrasonic technology with the Euromi Lipomatic liposuction platform (Euromi Ltd., Belgium) as our current choice for harvesting fat. Our current studies show both highest stem cell yield and a patient friendly process. Unlike varied devices that use heat or reciprocating mechanisms only, the Euromi has a nutational movement coupled with a reciprocating movement that both tricks the pain sensors into reducing pain messages (Gate Theory), and we are able to harvest high quality fat essential to uptake in our aesthetic plastic surgery practice.　When compared to manual liposuction approaches, we are not only able to vastly reduce our surgical theatre time, and also aspirate high stem cell yield.

With our Euromi infrasonic approach to harvesting fat in breast augmentation, we are able to reinfiltrate fat without the need for stem cell expansion. In the current climate of FDA restrictions for stem cell applications, this represents a valued component in our aesthetics practice.

Adipose derived stem cells lipostrate can be obtained from the areas of the stomach and hips as ideal sources of high stem cell yield in cosmetic use. In breast augmentation, fat can be used as a stand alone procedure or as an adjunct to breast implants in breast augmentation.　With a breast implant adjunct we re-infiltrate fat carefully into breast tissue to avoid both fat necrosis and compromising the integrity of the breast implant.　We will briefly discuss these approaches and ideal approaches.

In closing, we are at the beginning of stem cells and their functions, uses and origins to which are continuously being discovered.　While serving a current synergy compliment in aesthetic plastic surgery for cosmetic purposes, we are seeing that adipose derived stem cells may expand beyond the cosmetic appeal it carries today, and may serve future healthcare related functions and opportunities we are at the precipice of discovering.