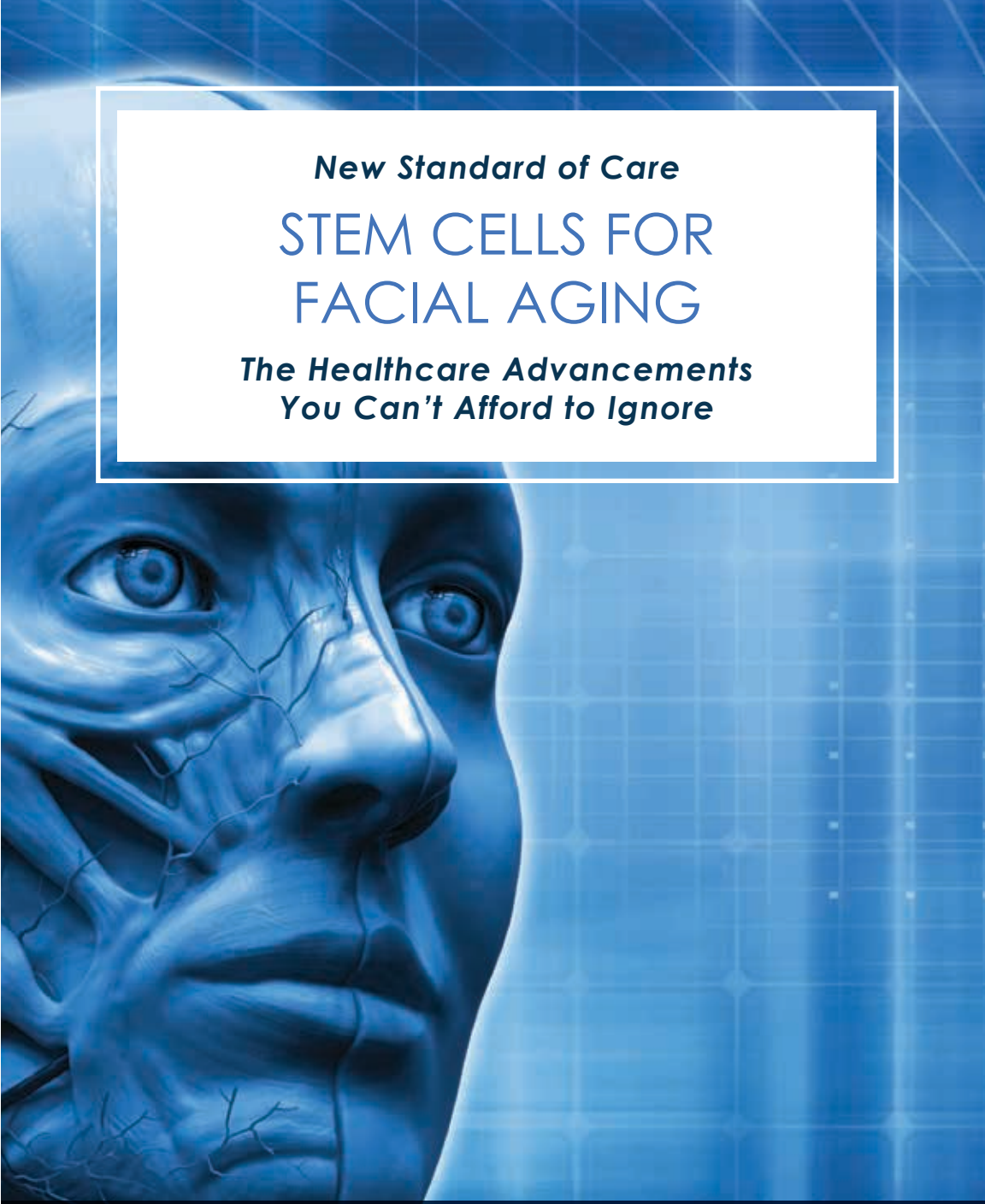
New Standard of Care

STEM CELLS FOR FACIAL AGING

The Healthcare Advancements You Can't Afford to Ignore



Happy Patients. Abundant Economy.

Volume One | Dr. Charles Mok

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INTRODUCTION

For the purposes of this booklet, I'm not going to talk about all the aspects of facial aging. There are plenty of other references that go over the history of how we understand facial aging in current concepts.

What I am going to talk about are the cutting-edge understandings we have of facial aging and how they apply to modern therapy.

If we look at a daughter, mother, and grandmother together, we'll notice similar facial characteristics. We will also be able to tell who is the daughter, who is the mother, and who is the grandmother. The effects of aging are clear to us. When we look at the grandmother, her face appears "saggy"—like it has elongated.

We have talked about facial aging this way for years, and procedures like facelifts were originally sought to tighten the skin and underlying connective tissue around the face. But when a woman has a facelift, we notice. They look "done" and maybe a little unnatural. And when they go for a "touch-up" (because aging is a continual process) they can look even more unnatural.

That is because the cause of aging is not addressed with a facelift. A facelift is simply a Band-Aid—skin does not substantially elongate, nor do the facial muscles or underlying support structures stretch. Instead, what we're finding is that much of facial aging is the result of deflation.

The skull is made of various bones, on top of which lie deep fat pads. These fat pads form most of the aesthetically pleasing aspects of our facial structure. There are some exceptions—the forehead doesn't have much fat on it, nor does the cheek prominence, but the areas in-between, certainly do. Overlying these fat pads is our muscle system combined with the SMAS (subcutaneous musculoaponeurotic system), as well as a thin layer of fat that is covered with our skin.

When a facelift is performed, incisions are made along the hairline, and in front of the ear, with dissections carried out between the skin and the SMAS. In most cases, the SMAS is lifted and tightened, then the skin is then re-draped, trimmed, and sutured.

Thus, facelifts created a tight, windswept appearance in women, accentuated following the performance of additional procedures.

Recently, surgeons have developed a better understanding of deflation, and its role in facial aging. While the facial fat pads may become loose (saggy), and areas of connective tissue (particularly in the nasolabial fold, the marionette lines, or the brow) become ptotic, something else is happening too. The fat pads themselves are actually deflating.

As reported in the Journal of Dermatologic Science in 2013, ultraviolet light, passes through the skin and penetrates the deep, fat pockets, prevented preadipocytes from differentiating into mature adipocytes. The Journal also reported that sunscreen blocked enough ultraviolet light that the preadipocytes could differentiate into adipocytes, better illustrating why we lose fat in our face as we age.

Fat, preadipocytes, and stem cells exist throughout our body. In the early 2000's, we discovered that fat cells also had stem cells. Prior to this discovery, we thought there were only a certain number fat cells and stem cells in the body, and those cells were kept for the entire lifespan. Now we understand that our fat cells go through apoptosis—naturally dying and liberating paracrine signals, which allow our mesenchymal stem cells (preadipocytes) to differentiate into mature adipocytes. This goes on in a natural pattern throughout our lives.

However, because the face is exposed to more sunlight the preadipocytes are inhibited from turning into mature adipocytes, allowing the face atrophy. Same thing can be seen in the aging of our hands. Ultraviolet light not only damages our skin, but it also damages the deep fat pockets of our face, and is a main contributor to facial structural aging.

> "Rather than just pulling skin tighter with facelifts, we should be refilling the deep fat pockets and restructuring the face."

This is an important concept for us to understand.

We need to be protecting our skin from the effects of the sun not only to make our skin look better, but also to make our faces look more youthful. This is key to managing the aging of the face.

Rather than just pulling skin tighter with facelifts, we should be refilling the deep fat pockets and restructuring the face.

When fillers first came out, we were trained to inject line increases like nasolabial folds and the fine lines around the face. However, as time went on we realized we could lift the face and make it look more youthful by filling the deep fat pockets directly.

Of course, there were inherent limitations to facial fillers when they first came to market—they didn't last too long, and the material itself (collagen or hyaluronic acid) was quite expensive. Cost, in particular, was a major limitation and it led to both patients and physicians trying to economize the filling process by using less filler.

Then a new technique was introduced by Allergan—the primary manufacturer of filler—that would allow doctors to (more or less) cheat nature by using a stiffer filler that could be put directly on top of the bone, lifting the face up, and giving it the illusion of more youthfulness.

And while the new technique certainly worked (patients could use less filler and still get a desirable result) it was not without limitation—patients would end up looking somewhat fake. Their cheeks would look unnaturally large and the overall shape of the face would change.

So, rather than adopt Allergan's new technique, we've been sticking with our magic lift using hyaluronic acid blended with saline, to softly inflating the deep fat pockets, while applying a small quantity of stiffer filler on top of the bones to create a natural-looking lift. The magic lift with hyaluronic acid and saline has been very effective. We are very happy with it, and our patients love it.

However, the questions remain, "Can we make this more natural? Can we actually restore youth without all the expense, the fillers, and the need for repeat treatments?"

SECTION 1

A NEW PARADIGM: FAT GRAFTING

The practice of using fat to augment tissue has been around for decades, but only in the past 10 to 15 years has it become popular. This is largely due to the development of techniques that made the fat augmentation easier to perform and more reproducible.

Dr. Sidney Coleman in New York wrote a book called *Structural Fat Grafting* which was an outstanding, descriptive book into his experience with fat grafting. Dr. Amar was training in Europe a little over a decade ago, and I traveled there to train with him on fat grafting and a procedure called the FAMI (facial autologous muscle injection) procedure. In the FAMI procedure fat is placed in deeper structures of the face, into the muscles, and below the muscles leading to greater fat retention. This technique differed from Dr. Coleman's technique which was more about putting micro-droplets of fat in the face, and the getting the fat to grab onto a blood supply. Both these techniques are reproducible and offer great results. I've used them in combination for over a decade.

> "It is inside these pearls of fat that the actual fat lies."

For fat grafting, the process is as follows:

Liposuction is carried out in somewhat of a standard fashion but with a hand-held liposuction device. A numbing solution is applied to the area to be used, before a small hole is made in the skin. Then, a cannula attached to a syringe is used in a back-and-forth motion to extract the fat, which is then transferred to a centrifuge and spun. After this step, some of the excess oil is discarded, as is the anesthetic solution so the pure, leftover fat can be carefully transferred into 1 CC syringes. These syringes attach to another cannula (smaller than a liposuction cannula but still large) and are then threaded into the deep facial structures to restore volume.

I've been doing this for more than a decade, and the inherent problem with the procedure is that it's difficult to train. It requires a substantial amount of skill to thread the fat into the pockets without getting clumps. Fat, by its nature, likes to accumulate in large pearls. Although these pearls are small to the naked eye, they do not flow through a cannula very well. It is inside these pearls of fat that the actual fat lies. So, we're basically injecting pearls of fat hoping the fat cells on the inside would survive.

There have been numerous papers using different techniques to estimate the amount of fat that would "take" during this process, and it is estimated that between 60% and 80% of the fat cells survive transplantation. This has been the accepted standard until recently. We always assumed that we should handle the fat very carefully, use a large cannula transferred into the face, threaded in such a way that it could grab a

blood supply so the fat cells could survive in contours of the face.

This was logical. But, as it turns out, we were all wrong.

SECTION 2

BEYOND FAT GRAFTING

Fat grafting had most commonly been done with surgery (like a facelift), because the procedure traditionally involved a relatively large cannula, a fair amount of trauma to the face, and some significant downtime.

The presumption was that in transferring the fat from one part of the body to another, some of the fat would obtain a blood supply, survive, and create volume. But this technique had limitations because it's difficult to reproduce, difficult to train people in, and (in some cases) some providers simply couldn't do the procedure.

Moving forward, some physicians started trying techniques to make fat grafting easier by not handling it quite so gently, using smaller needles, and using smaller cannulas that kind of forced the fat into the skin. The original studies were done using fat liposuction with cannulas that had very tiny holes. The idea was that the tiny holes would only allow smaller fat lobules to be picked up, with the larger pearls of fat being left behind because they're too big to go through the tiny cannula.

"...this technique had limitations... difficult to reproduce...to train...and some providers couldn't do the procedure."

A paper published by the American Academy of Aesthetic Plastic Surgery in 2012, titled "Sharp Needle Intradermal Fat Grafting" reviewed a three-year period with 250 patients where the author performed the technique slightly differently. The author would liposuction the fat with a cannula that had tiny holes, run it through filter so only smaller particles of fat remained, and then inject the fat with a 23-gauge needle (a little bit smaller than a needle used to draw blood).

In this paper, the author applied the fat to the fine lines around the face, in conjunction with a facelift so that patients would be expecting the bruising and swelling. He also did it in fine lines around the mouth and in the cheeks. The author found that the fat survived well, the results were acceptable, and he published an elegant paper explaining it.

In another paper called "The Fate of Adipocytes after Neo Vascularized Fat Grafting: Evidence of Early Death, and Replace Above Adipocytes," researchers sought to determine what was happening when fat was transferred from one part of the body to the other. They looked at the tissue microscopically after the fat transfer and found something quite remarkable.

The fat that transferred from one part of the body to another died.

It went through a process called Apoptosis (natural cell death) which then triggered adjacent preadipocytes, or mesenchymal stem cells to mature into fat cells.

We always assumed the fat transfer should be handled very carefully and transferred to another part of the body to get it to

grow. There have been all kinds of papers looking at the best sites for fat aspiration, the best techniques to handle it, and additives that could be used to make it go better, but they all showed pretty much no advantage between one technique over the other.

This was the first description of what was actually happening. In reality, the fat that we're transferring dies. Once it's removed from the body, it starts going through a process where the fat cells will ultimately die, triggering a baby fat cell or a preadipocyte to mature into an adult fat cell. This process allows us to think about fat transfer entirely differently. We're actually doing a stem cell transfer—we're transferring mesenchymal stem cells carried along with the fat from one part of the body to another. The fat cells die, and the stem cell grows into a new fat cell or to whatever type of tissue it's placed in.

Armed with this information, a whole new world for stem cell augmentation of the face (or stem cell rejuvenation of the face) opened up to us.

"a whole new world for stem cell augmentation (or stem cell rejuvenation of the face) opened up..."

Another article in plastic and reconstructive surgery compared two different techniques for skin revitalization. It was long known that when you do fat transfers to the face that the skin looks better (brown spots would be less prominent, wrinkles would get better, discoloration would get better), but it was not clear why we assumed it was because of the new vascularization or Neovascularization.

In this study titled "Anti-Aging Treatment of the Facial Skin by Fat Graft and Adipose Derived Stem Cells," the authors compared utilizing fat injections to tissues with placing isolated stem cells into the tissues done in an area that would be removed later on during a facelift. These individuals were going to undergo a facelift, and the investigators treated areas that he would eventually be excised during facelift.

In both the fat transfer and the stem cell transfer, they found improvement of elasticity, improvement in the structural components of the skin, and improvement of the vasculature to the tissues. This paper confirmed that it is the stem cells in the fat that stimulate the significant improvements that we see in the skin. We know that the fat cells die, we know that the stem cells replace the fat cells, we know that either stem cells alone or stem cells mixed with fat will cause the same improvements not only in the tissue, the volume, and the structure, but also in the appearance of the skin.

This recent understanding that it is actually the stem cells that are responsible for the improvements of facial aging during any component of fat transfer led investigators to look at different techniques to make the procedure easier. We get that it is relatively difficult to do a fat transfer and it's commonly done only during surgery because of the downtime and swelling associated with it. There are also limitations to how much fat can be transferred because the difficulty in transferring the fat can lead to unevenness or lumpiness. This is an inherent reason that we might use dermal fillers which are much more predictable.

In a paper titled, "Nanofat Grafting: Basic Research and Clinical

Applications", they evaluated a new technique of fat transfer for fine lines and wrinkles. In this paper, they use a device that would more or less mash up the fat, damaging all of the fat cells and leaving the stem cells intact. They would use a little device that would narrow down a space between two syringes. A syringe would be attached at one end and another end of a small device with a small lumen and the fat would be forced back and forth between the syringes creating a Venturi effect that would damage the fat cells. When the fat cells were damaged, they looked at it under a microscope and found that the stem cells were fully intact, but the fat cells were all destroyed and the connective tissue was separated as well.

This ushered in a new paradigm for cosmetic procedures. With this nanofat technique, the fat could be transferred into a small syringe with a small needle and fine lines could be injected. Of note, the word nanofat is little bit misleading. It is actually microfat because the size of the Venturi effect is in microns, not on a nano level. But the word nanofat has caught on nonetheless. Different companies have made devices that have screens that narrow the tissue down to a very certain size, about 400 μm, that basically cleave or cut up the fat cells leaving the stem cells well intact. And again, laboratory confirmation has shown us that the stem cells survived.

There have been a few papers on this using this technique known as nanofat for fine lines and it works similar to dermal filler but has the advantage of being permanent.

SECTION 3

ELIMINATING THE OBSTACLES

Stem cells were originally identified in the bone marrow over 50 years ago. The stem cells that were identified were the ones that made our red and white blood cells and we utilize this in healthcare in order to treat certain diseases of the hematopoietic or blood system. For decades, we thought that this was essentially the only place where stem cells existed in our body. Stem cells are cells that are immature and undifferentiated, and under certain conditions would become a new cell. I'm not going to talk about stem cells extensively in this booklet because it's been described in some of our other booklets and blog posts.

Originally, stem cells used for therapeutic conditions such as treating arthritis and other medical conditions were stem cells obtained from the bone marrow. This is a painful and difficult process and bone marrow, derived stem cells have other limitations as well. There are not very many of them. Fat is a very rich supply of stem cells. Fat contains 500 to a thousand times more stem cells per teaspoon, making it a much richer supply of stem cells. Additionally, fat is much easier to harvest and is much more abundant than our bone

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marrow. Bone marrow derived stem cells are painful to get out, usually a drill is placed into the hip and bone marrow is removed. In addition, not very much can be taken. Liposuction can be used to harvest fat, which is generally readily abundant and there are much more stem cells per unit of fat than there is in bone marrow.

Fat derived stem cells were only discovered about 15 years ago. The original discovery of mesenchymal stem cells that were capable of differentiating the bone, fat, and cartilage found in the fat was in 2001. Not much along the lines of therapeutic use of the fat derived stem cells was published until later, about 2008, largely from Asia. In 2008, a paper entitled "Adipose Stem Cells as a Clinically Available and Effective Source of Adult Stem Cell Therapy," published from the Department of Plastic Reconstructive Surgery in University of Daegu, Korea, reviewed some the studies that were done, mostly in Asia, on utilizing adult fat stem cells for treatment of various inflammatory or chronic or other conditions. At that time, there was much stem cell research surrounding the use of bone marrow stem cells. In Asia there was active investigation utilizing liposuction derived stem cells for therapeutic benefits.

This continued to become much more robust and became a mainstay of stem cell investigation in the United States.

The technique described to obtain stem cells from fat tissue was described over a decade ago, and most doctors and scientists have been using this very same method all this time.

In summary, the fat is obtained through liposuction with a standard liposuction technique. Typically, the fat is transferred

into a syringe. An enzyme called collagenase is added to the fat. Collagenase is an enzyme that disrupts collagen which is the connective tissue that surrounds fat cells turning fat cells into a series of fat lobules and turning fat lobules into a series of larger fat pearls. The collagenase allows pearls to break down into lobules to break down into individual fat cells and separates the preadipocytes in the mesenchymal stem cells from the lobules and pearls of fat.

There's a process where the collagenase is "incubated" in a warmed machine, rocked back and forth to let the collagenase digest the collagen. After a period of time, the fat is transferred to a centrifuge and spun. Because stem cells are smaller, they are naturally heavier per surface area. This causes the stem cells to fall to the bottom of the syringe and the fat and any oils to rise to the top. The liquid that is used to anesthetize the fat tissue also falls to the bottom because it is heavy.

The stem cells are aggregated at the very bottom of the syringe at what we call the "plug." The plug is removed and transferred to another syringe and saline is added to it. And then, through a series of washings, all the collagenase is removed and we are left with stem cells.

For the past 10 years, we assumed that this was the best way to get the stem cells. Different companies and manufacturers would come up with slightly different ways to do the same procedure—different speeds of spinning, different periods of incubation, but we all use the same process.

This has led to some of the controversy that surrounds stem cells

derived from fat. The FDA considers a human tissue to be a biologic drug if something more than "minimal manipulation" occurs. There have been laboratories around the country where you could send the fat and they would do this process of adding collagenase and taking out the stem cells and send it back to the doctor, and the FDA has advised them that they cannot do this because they have not registered their system as creating a biological drug. The physicians, however, have felt that what they were doing was not in the jurisdiction of the FDA because they were doing it in their own office, thereby bypassing the concept of being a manufacturer. Nonetheless, this remains a controversy. The addition of collagenase to fat, incubating it, washing it, leads to the possibility of the FDA interfering and requiring doctors to register as drug manufacturers and perhaps putting an end to exploration and use of adipose derived stem cells.

"...large pharmaceutical companies... would like to see physicians stop using stem cells because it is potentially a multibillion-dollar industry..."

There's a book called *The Obstacle is the Way* by Ryan Holiday. In this book, he describes how the Stoics in history would see obstacles and instead of just ceasing their journey, or the travel, they would use the obstacle as a means to find a solution.

The obstacle right now is the threat that the FDA will interfere with stem cell advancement and stem cell procedures. There are hundreds, if not thousands, of doctors utilizing stem cells to treat various conditions right now. But, as time goes on, there

may be more and more fear instilled in doctors that the FDA is going to require them to register as a manufacturer which is of course impossible in most cases. There are drug companies, large pharmaceutical companies, that would like to see physicians stop using stem cells because it is potentially a multibillion-dollar industry if the drug companies can lay claim to this technology. None have done so as of yet, but it is definitely coming.

In this case, the obstacle is the use of collagenase to digest the fat which is the method that has been done for at least 15 years to obtain stem cells from fat.

However, there have been numerous published reports, of obtaining stem cells without enzyme digestion. The first papers were just looking at using different techniques that more or less rough up the fat before it's removed, which would allow the stem cells to be separated. There's been other kits and devices made that would allow more and more stem cells to remove from fat, but none of them reached the level of stem cells that we saw with collagenase.

Until now.

In the paper, I mentioned earlier regarding the nanofat technology, they saw that the stem cells were all intact after complete disruption of the fat utilizing a Venturi system. They show that the stem cells are intact, but what they didn't do was try to isolate the stem cells from the nano fat. So, at Allure Medical, we have a cell counter and we have the laboratory in order to identify stem cells. We also have colleagues that work with different manufacturers to count stem cells. We took fat in the

standard fashion, the way we would for collagenase disruption for stem cells, and instead of using collagenase, we simply broke the fat cells up using a mechanical Venturi technique. A colleague of mine, Dr. Gregory Laurence, in Memphis, Tennessee did the same thing. In his case, he has a flow cytometry which is the most accurate way to measure stem cells and also tells whether or not they're viable or alive. So, we obtained 50 CC of fat from one flank on a woman, and 50 CC of fat on the other flank. He then used his collagenase technique and obtained stem cells and had 100 million cells. We actually call it SVF or stromal vascular fraction because the stem cells are a mixture of stem cells, preadipocytes, and other cells; but for the purpose of this booklet, we'll call them stem cells. So, on the one flank using the technique that has been proven for over 10 years he obtained 100 million stem cells, which is a good count. However, on the other flank where he simply used a mechanical Venturi technique, which did not use any collagenase, he obtained 800 million stem cells. Eight times as many stem cells utilizing a procedure which was much simpler, costs far less money, and does not involve any FDA controversy.

To prove this further, we obtained fat from another patient and did the standard technique with collagenase to remove all the stem cells that we could and got about 100 million. Then, we took the leftover fat that would normally be discarded and utilized a Venturi mechanical system again to disrupt the fat, spun it and got six times as many stem cells once again. We have

> "...use FDA cleared devices and the centrifuge for its intended purpose, and obtain the stem cells.

demonstrated this over and over again. The science is solid. The collagenase is not needed. The potential FDA obstacle is really the way. The solution is: don't use collagenase, use FDA cleared devices and the centrifuge for its intended purpose, and obtain the stem cells.

This is the technique that we're using now for stem cells because it is much easier, we get a much higher yield, and it eliminates the FDA obstacle.

SECTION 4

PUTTING IT ALL TOGETHER

The magic lift was a term that we gave to using a relatively high-volume of dermal fillers to restore the fat pockets of the facial skin. This has been a very popular procedure. We have years of extensive experience performing this. The magic lift uses filler and we would combine it with different, restorative skin techniques to restore the aging face to a more youthful appearance.

At the same time, we've been performing stem cell therapy for various conditions. I originally got involved with stem cells because my brother was partially paralyzed from a spinal tumor, so I learned how to use stem cells to improve his ability to walk. And since that time, we've been using stem cells for conditions such as arthritis, multiple sclerosis, cystic fibrosis, kidney failure, heart disease, such as heart failure, emphysema, wound healing, and numerous other conditions.

"...we've been using stem cells for conditions such as arthritis, multiple sclerosis, cystic fibrosis, kidney failure, heart disease...wound healing, and numerous other conditions."

In addition to that, our surgeons had been performing fat transfers for well over a decade and trained with the pioneers in fat transferring.

This came together along with the latest

research that has shown different ways to obtain the stem cells, different ways to transfer them, in utilizing a combination of those three factors:

1. **The magic lift experience with dermal fillers and re-inflating the face**

2. **The experience with fat grafting**

3. **The experience with stem cells has allowed us to offer our patients a stem cell type facelift or what we call a stem cell magic lift**

One of the goals at our practice is not just to cover-up disease or signs of aging, but to restore youthfulness, help people recover and not just manage disease or age, but actually improve it.

In this section, I'm going to talk to providers, physicians and physician assistants and nurse practitioners that are performing the procedure, so you can understand the basic context of the stem cell magic lift.

We talked about the mechanical Venturi disruption of fat to create stem cells and how we can separate them to get a far more robust number of stem cells. We also talked about the difficulties in facial fat transfer because of the lumpiness of the fat. We also talked about the fact that when you transfer fat to the face, virtually all the fat cells die, and the stem cells are triggered to grow into new fat cells. Utilizing these three basic understandings, I'm going to describe how we're doing the stem cell magic lift.

Science has shown us that it doesn't matter where you get the fat from. The fat has the same amount of stem cells regardless of where you take it from. So, it doesn't matter if the person wants it out of their abdomen, their flanks, their legs, even their neck if they have a fatty neck, they'll have about the same number of fat cells. Science has also shown us that the age of the person doesn't affect the number of fat cells very much. As a person ages, they have, surprisingly, about the same amount of stem cells in their fat. As a person ages, the fat cells become less pluripotent, meaning that the fat cells are less likely to differentiate in other tissues. This is not relevant in the case of the stem cell magic lift. We just want the stem cells to turn into fat. The implications of older people having less potent stem cells is subject for another discussion. We have options for treating other conditions besides facial aging, but for the purpose of facial aging, it doesn't matter. Additionally, people with chronic diseases, even cancers, have the same effectiveness of their stem cells so there is no contraindication to stem cell fat transfer or stem cell magic lift.

The area for liposuction is selected and generally, we mark it with an erasable marker. 0.1% lidocaine tumescent solution as described by Klein is used to tumesce the area. Tumesce refers to swelling, and we refer to this procedure as tumescent anesthesia. A 50 gauge syringe attached to a spinal needle is used to place tumescent just under the skin. A skin wheal is done with a 3 cc syringe with tumescent solution. It's best to do the tumescent just underneath the skin, more or less a "dermal block." The tumescent is infused under the skin superficially, just enough to create a little bit of bumpiness to the skin or what we refer to as the peel of the orange. If a tumescent pump is used, this is certainly easier, but you'll have to go a little bit faster or you'll be required to wait 20 or

30 minutes for the water to diffuse. Tumescent area much larger than the area you're planning to liposuction. If the person has discomfort from the liposuction, it's because you were bumping in the areas that you did not numb up. So, I typically will tumesce about 3 to 4 inches outside of the marked area where I'm planning to obtain fat.

After this you can wait for a few minutes up to about 20 minutes. The more tumescent fluid you used, the longer you should wait because when you do the liposuction, you'll just get water if you used a lot of solution. Whereas, if you wait, it'll pretty much diffuse. Or, if you used a smaller amount of tumescent anesthesia and were very precise, you don't have to wait very long at all.

Then we take a 2 mm dermal punch and make a little puncture in the skin. The reason I use a punch instead of a scalpel is that a punch is round, so when it stretches it will not tear and make a larger hole. It'll simply shrink back down. Also, a round punch will lead to a round scar and round scars are typically not visible to the naked eye, where a linear scar would be. I usually select the area to put the punch somewhere that will be hidden in the undergarments, and tumesce between the punch site and the liposuction site.

Then we use a liposuction cannula. For the purposes of this discussion, it doesn't matter what kind of liposuction cannula you use, and I'm constantly experimenting to see what is more effective. Previously, when we were doing fat transfer, the type of cannula was very important because we wanted one with tiny little holes. But, now they we're using the Venturi effect in damaging all the fat cells, it doesn't really matter.

Liposuction is carried out to obtain the amount of fat you're planning to transfer to the face. Typically, we're going to want about 15 to 30 cc of fat, which can be assessed when you hold the syringe up, the fat and the water will separate, and you can count the number of cc of fat. The fat tissue is firmly grasped with the nondominant hand. This is sometimes called the "smart hand." And the opposite hand is used to move the liposuction cannula back and forth. To get the best results, fastest procedure, and the best cosmetic outcome, it is best to liposuction in the deeper planes of the fat tissue. An inexperienced fat harvester is going to stroke back and forth in the same area and potentially create a depression in the skin. To avoid this using a smaller cannula with less holes is going to be less efficient; therefore, you'll be sucking less fat out of one area, less likely to create a divot, but it is slower. However, when you're just starting to train with it, we typically have the new person use a small cannula and just take a little bit more time. Then you go back and forth in a fan-like pattern and also, this is three-dimensional, so we're going to go in the deeper layers and the more middle layers, but typically staying well away from the skin, which can lead to some skin irregularities. If I'm getting fat from the flanks, I'll typically numb up both flanks and get a little bit out of each side. If we're doing the abdomen, I'll numb up a large area and take a little bit of fat from all over the abdomen versus one little fat pad.

After the fat is harvested, we just put a dressing on the hole with a little bit of padding to catch the moisture that's going to leak out, but no special care is needed and no special garments need to be worn.

This is almost a closed system in the sense that there's holes in

the end of the cannula, but we don't expose the fat to any air, so we leave the fat inside of the syringe. It's placed in an upright position so that the fat and water can separate and then the fat is separated from water by squeezing this saline/tumescent solution out of the syringe. The fat is then transferred to smaller syringes, typically a 5 cc syringe, from the harvesting syringe, which is typically 30 to 50 cc self-locking syringes. This is essentially done in a closed system utilizing a two-way valve.

SECTION 5

A GUIDE FOR PROVIDERS

After the fat is separated into 5 cc syringes (or something similar), the process of Venturi mechanical breakdown of the fat and connective tissue is undertaken.

There are a couple different ways to do this. Over time we'll keep evolving it, but basically what happens is the fat is transferred between two syringes with a narrow device in between.

One of the devices we use is from a manufacturer called Tulip and it's got various different sizes of transfer adapters: a 2.4 mm, a 1.4 mm, and 1.2 mm and then, it has a device that has a 400 and 600 µm screen. Another way that's been classically described is just using a stopcock where you connect two syringes and run it back-and-forth and the same thing occurs, you break the fat down.

With the Tulip device and the screen, it seems to catch more. The fat is transferred back and forth between the syringes about 10 times. You'll see that the fat turns from the yellow liposuction appearance with a little bit of red or pink in it from the small amounts of blood into a whiter color. This is where the fat cells have all been destroyed, the free fat is liberated, and the stem cells remain intact.

After that point, we transfer it into 1 cc syringes. The reason for the 1 cc syringe with a lure lock is that it gives your hand much more control. We want to be able to slowly inject the stem cells in the oil.

With the 1 cc syringe, a 30-gauge needle can be attached to inject fine lines. These might be lines around the lips or fine nasolabial fold lines. It flows just like a filler.

For deep fat pocket filling, we attach it to a cannula. I find that a 23 gauge to a 25-gauge cannula works the best. The thinner cannulas are too flexible and their hard to advance. Larger cannulas are bigger than necessary, cause more bruising, and are uncomfortable to the patient.

The reason we use a cannula over a needle for injecting the deep fat pockets is to avoid injury to the neurovascular system. When we're injecting stem cells emulsified in oil, the procedure is substantially different from injecting filler in a few respects.

One: the stem cells suspended in oil cannot be injected as a bolus.

If it was injected as bolus, most of them would lack the ability to grab enough blood supply and survive. So, it's threaded back-and-forth with tiny droplets placed in every space. This is in contrast to filler, which is preferentially injected as a bolus and because is not a living tissue and the body degrades it, that is optimal. But for the stem cells, they are threaded into the deep fat pocket where they can grab a blood supply.

Two: you can't really aspirate.

Since we're fanning it back-and-forth and depositing tiny amounts over a large area, it is not practical to stop and aspirate over and over again.

So, we use a cannula which has a blunt end that will not pierce into blood vessels, making it much safer.

Three: fillers had to be economized whereas with fat, we can get generally as much as we want so we don't have to worry about the volume.

With fillers, we typically want fillers that are stiff and place them on top of bony prominences to cause lifting of the lower face. An example would be the V1 and V2 points that are anatomically not associated with much of a fat pad but are bony prominences covered by a thin, fat, muscle and skin. With the filler, we placed the stiffest filler on these bony prominences to lift them up and then used a blended hyaluronic acid, with lesser amounts in the fat pads. With the stem cells, we are not really putting much on top of the bones at all because it's not necessary and we are only filling up the deep fat pads in a manner consistent with fat pads of youth. All the fat pads can be filled and we'll map the face out, generally with a permanent marker, marking the areas that we're going to transfer fat.

"With the stem cells, we are not really putting much on top of the bones... we are only filling up the deep fat pads in a manner consistent with fat pads of youth."

The volume of fat used varies with the patient's needs. As a general rule, the more deflated a person's face is, the older they are, the more fat we will use. People who are younger and have limited deflation we'll take smaller amounts. That being said, the range is typically 5 cc to 30 cc of fat will be harvested and that's about the amount that we'll be transferring because even though the stem cells are just an oil, it's the same volume once we removed the tumescent solution.

When performing the stem cell magic lift, we will focus on the same characteristics that we talked about with the regular magic lift. We asked patients questions such as, "Do you look sad?," "Do you look tired?," "Do you look angry?" "Do you think you look sad, tired, saggy, angry?"—those are the four questions we'll ask them.

For the people who look tired and sad we are mostly going to focus on the mid and upper face temples and orbits. For grumpy and saggy, we'll follow the same codes that we described in the magic lift technique learning module.

The facial structures contain numerous fat compartments. Essentially, there's fat compartments in the entire skull. However, the thickest ones are demonstrated in the image. They're separated by little connective tissues, and this is where we see different lines in the face. We see the nasolabial fold as the separation between the upper and lower fat pads. The sagginess of the lower eyelids, or the nasojugal fold, is the difference between the suborbicularis oculi fat pad in the malar fat pad. When there's a sagginess underneath the eye, there is some degree of laxity of the connective tissue, but is mostly because of the loss of fat in the lower portion of the midface. So, we'll inflate the fat packets.

Again, we'll use cannulas, take a small needle to pierce a hole in the skin after giving a skin wheal. Numb the patient up where appropriate—this may include doing a dental block and doing a little bit of tumescent anesthesia and waiting a period of time so the patient is more comfortable. And some patients can handle it with just little skin blocks. The fat is fanned into the fat pads, one compartment at a time, and typically we'll have somebody count the number of cc per region. A good example of a middle-aged face would be using about 1/2 cc on the lateral orbital ridge, using about 1 to 2 cc in the temple, using 3 to 5 cc in the malar fat pad, using 2 to 3 cc along the mandible, and then fanning about 3 cc in various areas such as the tear trough, the marionette line, and other areas of deflation.

For the lips, I would typically use 1 cc per quadrant of lip. In other words, 4 cc altogether: 2 on the upper lip, 2 on the lower lip. This is placed in the space between the pink and the white portion of the lip, so in the mid lip and again, it is fanned. Occasionally, you'll see a little bit of the yellow appearance at the surface of the mucosa. This will go away, don't be concerned by it. I generally do the lips last because we're going to be touching the contaminated portion of the patient's face, which is their mouth.

SECTION 6

THE STEM CELL MAGIC LIFT

The stem cell magic lift is the process where we transfer stem cells lubricated with oil that came from your own fat into the deep fat pockets. The stem cells have been shown to increase neovascularization (new blood vessel growth), lead to restoration of the volume of the fat, and make changes in the skin that is overlying the fat.

This stimulates elasticity so there is more tightness, collagen production, improved color and improved texture of the skin. We can add platelet rich plasma to the stem cells when we're doing the facial magic lift stem cell improvement, which will stimulate more growth. But, we can also do things simultaneously with the stem cell magic lift to improve the appearance of the skin even further.

People who have a stem cell magic lift will notice that their skin looks brighter, less discolored, and more youthful. But, at the same time, we can do rejuvenation of not only the fat pockets of the face, but also to the skin itself beyond what the stem cells alone will do.

To accomplish that, we also want to reduce the rate of developing skin cancer because your skin has got ultraviolet damage over the years, which can manifest as cancer on the skin, discoloration, brown spots, blotchiness, redness. Whereas in the fat pockets, it pretty much just deflates the fat.

To reduce precancerous cells on the skin, brown spots, discoloration, and increase firmness of the skin, thickness and texture, we can do some directed treatments on the skin simultaneously. We use two wavelengths of laser—currently we're using the Fraxel Dual Laser—to drills tiny little holes into the skin to stimulate collagen growth. Simultaneously, we do a microneedling procedure where multiple little holes are mechanically made into the skin stimulating the skin's own stem cells to grow.

Then we add platelet rich plasma which comes from your blood. We take the platelets and separate out the platelet rich plasma (this is described elsewhere) and we apply that to the skin and it gets absorbed through the little micro channels and stimulates tissue growth. This also reduces skin cancer down the road because it's wiping off precancerous cells (the FDA has cleared Fraxel for treatment of precancerous lesions and it also stimulates more collagen growth and better appearance of the skin).

To reduce precancerous cells on the skin, brown spots, discoloration, and increase firmness of the skin, thickness and texture, we can do some directed treatments on the skin simultaneously.

Other things can become combined with this, such as Botox® or tightening devices. I would typically do Botox® simultaneous with the magic lift because this does relax the muscles.

Other tightening procedures such as Ulthera or Thermage can be done, but typically, we'll stage those out a few weeks after

the magic lift or a few weeks before. There is no known reason why we couldn't do it at the same time, but there are no clinical studies that have shown us that this alters the outcome of the growth of the stem cells so I would just put it off a little bit of time. Additionally, we'll have some lifting with the stem cell magic lift so we can determine how much Ulthera energy devices are needed at a later time. However, the PRP microneedling and Fraxel can be done simultaneously (as can Botox®) to improve discoloration of the skin. Other procedures such as kybella to the neck or coolsculpting to the neck for the double chin can be done simultaneously as well.

While a stem cell magic lift and accompanying procedures can reverse signs of aging, it is critical to continue to maintain results with a well-rounded skincare regimen. In my blog that can be found here, I review products that should be used to prevent aging and skin cancer.

Skincare Blog, follow this link:
https://alluremedicalspa.com/effective-topicals-skin-health/

The stem cell magic lift is designed to not only improve our appearance of the face, but also to restructure the face. The sun has damaged your skin and has damaged your fat pockets and deflated your skin and caused you to look saggier.

Stem cell magic lift restores that; it doesn't mask it like fillers do or temporarily improve it like fillers do, but it actually restores the fat

pockets to their prior size. We're simply repositioning stem cells from one area we've lost them (your face) and getting them from other areas, such as your stomach or your flank (where you haven't lost any of your stem cells and maybe you don't even want the fat there to begin with).

Individuals will have different needs and expectations. It is best to start out conservatively, then come back in 2-3 months. At that time, they may want additional stem cell treatment. Most people will get one or two treatments. It lasts forever, but aging never stops—so we will likely see patients years later as they continue to age. Emphasizing skin care is a critical part of the process. In fact, I don't treat people who refuse to do proper skin care.

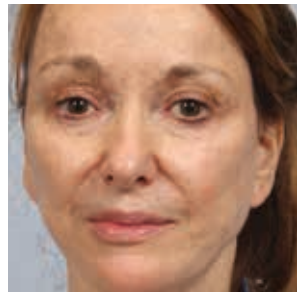
Thank you.

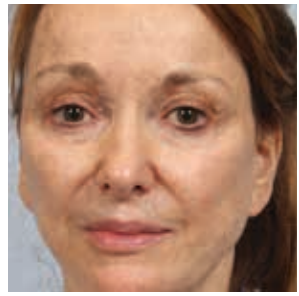
Dr. Charles Mok

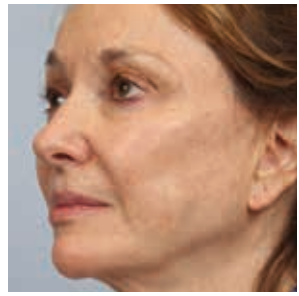
SECTION 7

STEM CELL MAGIC LIFT PATIENTS

BEFORE AFTER





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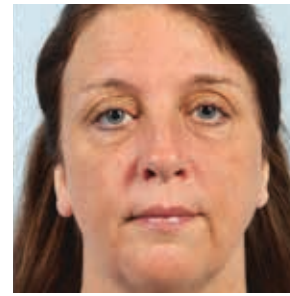

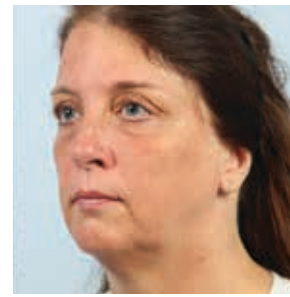

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It's time we think about facial aging ***differently.***

Daily, ultraviolet light passes through your skin, damaging your deep fat pockets, and causing the start of facial aging.

Rather than pulling the skin tighter with surgical face lifts, we can ***refill the deflated fat pockets and restore the face.***

How? With the regenerative powers of ***your body's own stem cells.***

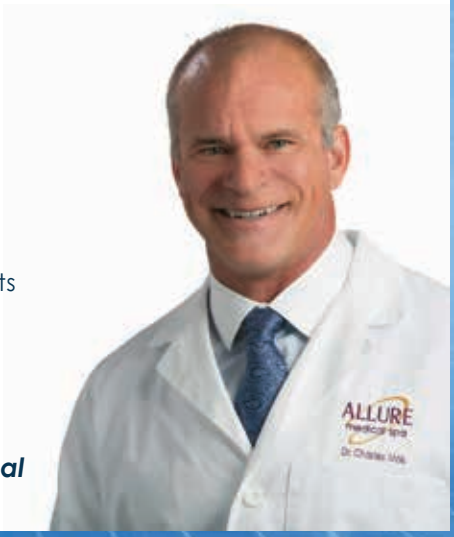
We believe we can restore youth without all the expense, facial fillers, and the need for several treatments.

We don't need to cover-up signs of aging. We can restore youthfulness and help regenerate what has been lost. We no longer have to simply manage disease or age, we can truly improve it.

In this booklet, we cover:

- The facelift vs. stem cells
- Stem cells derived from your own fat cells
- A provider's guide to the "Stem Cell Magic Lift"
- Facial lasers & skincare products to help prevent skin cancer
- Before & after photos
- & more!

Dr. Charles Mok, Allure Medical



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