JAMES J.
ROMANO, M.D.
COSMETIC SURGERY

ARTEFILL FOR THE TREATMENT OF FACIAL WRINKLES

by

JAMES J. ROMANO, MD

The search for a safe and persistent biomaterial for use in soft-tissue augmentation has been underway for many years. For all of us that have enjoyed the convenience and relative safety of collagen, but have desired more permanence to satisfy this often heard patient complaint, Artefill may be the answer. Dr. Gottfried Lemperle, professor and plastic surgeon in Germany, developed Artecoll in 1994 and based on much of his own research performed while at Yale. It has been in widespread use in Europe, South America, Central America and Canada where over 100,000 patients have been treated since then with a serious complication rate of less than 1 in 10,000. It provides a long lasting correction for wrinkles and other skin defects. Its basic element is microspheres of polymethylmethacrylate (PMMA), which we all know as cranioplast and orthoplast. This material has been implanted in humans for over the past fifty years in such forms as the cement for fixing hip joint replacements, repair of skull defects, a bone substitute, artificial lenses and dental implants.

Artefill has been approved by the US Food and Drug administration for sale in the United States in 2007 after very vigorous testing. I am one of only eight investigators that were involved in this clinical trial.

Artefill consists of homogenous polymethylmethacrylate (PMMA) microspheres evenly suspended in a solution of 3.5% collagen, which serves as a vehicle for deep dermal implantation, and 0.3% lidocaine for pain relief. It is near totally polymerized so that there are no methyl methacrylate monomers in the microspheres, and this virtually eliminates the risk of allergy to PMMA. A complicated process creates definite sized microspheres of 32-40 microns in diameter. They are completely round, and have the polymerized exceptionally smooth surface free of residue or contaminants. The final injectate consists of 25% microspheres and 75% collagen by volume, which allows for the best flow through a small gauge needle.

The material and process and mixture make Artefill unique and safer for several reasons. The process to produce these microspheres is unique and produces extremely round and uncontaminated PMMA microspheres. This is important because it is the smooth surface of PMMA microspheres which facilitates rapid encapsulation with the patient's own collagen. Smooth round surfaces also are theorized to have very few electrical charges as opposed to materials with edges or irregularities where electrical charges accumulate and attract macrophages. This absence of electrical charges accounts in part for the decrease in macrophage activity and infection. So, smoothness and decreased electrical activity facilitate encapsulation and prevents migration and phagocytosis respectively. In addition, the PMMA microspheres are not biodegradable and too large to become phagocytosed by macrophages but just small enough to pass through a small gauge needle. Macrophage activity and thus infection, migration, and granuloma formation, are considered decreased by particle size, chemical form, and surface characteristics.

Following implantation the collagen vehicle is degraded over time and the microspheres are permanently fixed in the tissue as the host collagen replaces the collagen vehicle in roughly equal amounts. The microspheres become quickly encapsulated so that they and the collagen which

forms serves as the structure for filling the defect. Rapid encapsulation, lack of electrical charges, smooth surface, biocompatibility, polymerization, and chemical characteristics all contribute to decreased migration, decrease infection, and stability over time.

Histologically, there have been no detectable changes up to four years after implantation. Artecoll is stable at room temperature but should be refrigerated where it there has a shelf life of approximately ten years.

Many doctors impulsively judge this as just another foreign substance similar to silicone and fraught with the same set of potential risks and complications. This is simply not the case. Silicone, whether liquid droplets or Bioplastique, has irregular surfaces and edges, is much different in biological activity and side effects. Silicone is very inert and therefore not encapsulated and can easily migrate through the tissues, usually as a response to gravity. The irregular surfaces and electrical charges stimulate macrophages and giant cell formation. Silicone is non-polymerized and this raises the risk of allergy, often seen as a type IV allergic reaction and granuloma formation many years later.

The indications for usage are roughly the same as for collagen and include wrinkle lines, lip augmentation, and treatment of acne scars. Crows feet and other very superficial wrinkles in thin skin are not as good for Artefill. Patients have an almost identical experience to that of collagen injection with some pain on injection, minimal punctate bleeding, and minor swelling all which resolve quickly. There is slightly more redness in the injection site, which lasts days to weeks, and eventually resolves.

Because Artefill contains collagen, a skin test is required prior to treatment. Since it is permanent and not as forgiving, overcorrection is not recommended. It is available in .5cc syringes to use with a 26 or 27-gauge needle for injection. Artecoll is a viscous gel-like substance that is more difficult to inject and generally requires a good topical or field block anesthetic. Greater injection pressure applied firmly and continuously is needed for placement, but an experienced practitioner easily and quickly masters this. Linear threading technique is preferred and it is sometimes necessary to draw the needle back and forth to develop a tract beneath the wrinkle for product placement. Serial puncture technique may also be used but is not recommended as it may create a "string of pearls" result. It should be implanted deep in the dermis at the fat interface and not intradermally or more superficial. The amounts needed for correction roughly equal the amount of collagen normally required so estimation of patient needs is fairly straightforward. Occasional second or third implantation may be needed to obtain the desired result but very little volume is usually given in these sessions.

Complications span the spectrum of redness, pain, bruising, swelling and other more localized phenomenon. Scarring and acute allergic reactions are very rare. Granuloma formation is rare but can occur and may require steroid injection or excision. There have been no reports of migration or carcinogenesis.

For more information contact Dr. Romano at 415-981-3911 or his website at www.jromano.com.