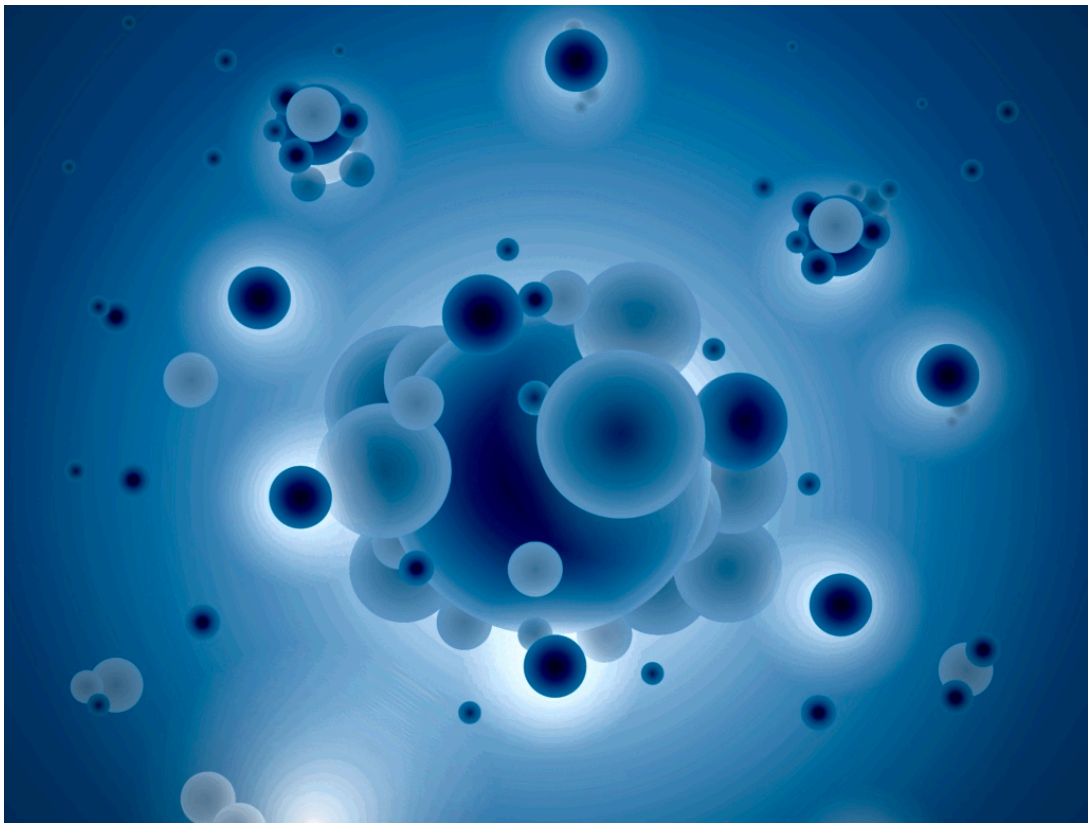
Amniotic Fluid Injection



Osteoarthritis (OA) currently affects approximately 31 million people in the United States. The volume of knee replacement surgery is predicted to rise significantly in the future with the aging baby boomer population. Delaying or avoiding knee replacement is desirable from both an individual medical and health care system perspective. There should be effective conservative treatment options for patients to manage their arthritis symptoms.
Delaying a primary knee replacement may reduce the number of revision or repeat knee replacements. Studies have shown that patients with mild arthritis have worse outcomes following knee replacement than patients with severe arthritis, supporting the

concept of providing conservative treatment for patients with arthritis that is not end-stage.
A conservative management program has been recommended by the American Academy of Orthopedic Surgeons (AAOS) Clinical Practice guidelines. These treatment options are limited to nonsteroidal anti-inflammatory drugs (NSAIDs), physical therapy, hyaluronic acid (HA), and cortisone, among others. Injections of cortisone have been used for years in the treatment of knee arthritis usually with short-term effectiveness (1 week–3 months). Repeated injections have demonstrated concerning long-term detrimental effects.

After appropriate conservative care efforts, a large number of patients will remain symptomatic, yet are not candidates for knee replacement. They may not have end-stage arthritis, or may have medical frailty, obesity, young age, or high activity level precluding knee replacement. For this group of patients, orthobiologic injections provide an option.
This group of injectables includes platelet-rich plasma (PRP), bone marrow aspirate concentrate (BMAC), amniotic fluid, Wharton's Jelly, and others. Placental products such as amniotic fluid and Wharton's Jelly have demonstrated safety and efficacy in other medical applications. While increasingly popular, there is a lack of high-level, peer-reviewed studies on the efficacy of amniotic tissue for the treatment of symptomatic knee arthritis.

Safety

Amniotic tissue has been used for over 100 years in burn, ophthalmology, and chronic wound patients with favorable outcomes and no adverse effects reported in the literature.

Advantages of Amniotic Tissue

Amniotic tissue is readily available, as it is often discarded after childbirth. The use of this tissue poses no added risk to the fetus or mother, eliminating the ethical concerns associated with

obtaining embryonic stem cells. Amniotic tissue is composed of an extracellular matrix, which acts as a natural scaffold for cellular attachment and structural support for cells as well as collagen types I, III, IV, V, and VI, hyaluronic acid, and a host of growth factors. In addition, it possesses antimicrobial properties.

Amniotic tissue has been shown to exert an anti-inflammatory effect by inhibiting the inflammatory cascade. It has been shown to inhibit cytokines, proteins which can cause inflammation. These findings indicate that amniotic tissue has the ability to dampen the “cytokine storm” that occurs after an injury in an adult, which would lead to beneficial impacts on healing and scar formation in patients.

Basic Science and Animal Studies

Several studies have demonstrated promising outcomes for orthopedic applications. A comparison of bone forming potential found that amniotic fluid-derived cells were able to produce approximately 5 times more mineralized matrix than bone marrow-derived stem cells. Amniotic tissue has shown potential for cartilage cell formation and tendon repair in animal studies. A study evaluating implanted amniotic epithelial cells (AECs) into artificially created sheep Achilles tendon defects showed superior structural and mechanical recovery in the defects at a faster rate compared to controls not receiving AECs. Amniotic tissue also has properties that prevent adhesion formation around tendons following injury and reconstruction.

Human Studies

In a 6-patient feasibility study using amnion injections to treat symptomatic knee osteoarthritis, each patient received a single intra-articular cryopreserved amniotic suspension allograft injection and was followed for 1 year. No adverse outcomes were reported. Most of the human studies using amnion are in foot and ankle surgery. Its use as a treatment for diabetic foot ulcers and recalcitrant plantar fasciitis was one of the early recognized successes. In a prospective randomized trial with 45 patients with refractory plantar fasciitis, there was significant

improvement in plantar fasciitis symptoms at 8 weeks compared to controls (saline injections).
A recent study conducted at New York's Hospital for Special Surgery published in the *Journal of Knee Surgery* found clear evidence that amniotic fluid or amniotic suspension allograft (ASA) injections may be a superior anti-inflammatory treatment for knee osteoarthritis.
This was a multicenter randomized controlled trial accessing the ability of amniotic suspension allograft to improve inflammation and swelling versus saline and hyaluronic acid (HA) injections in patients with knee osteoarthritis.
200 patients were randomized to ASA, HA, or saline. Primary endpoints included changes from baseline of patient-reported outcomes and pain assessment.
Patients receiving ASA demonstrated significantly greater improvements in overall pain and functional outcome scores.

Insurance Coverage/FDA Approval

Amniotic Fluid is an evolving and often effective treatment option. Although Amniotic Fluid is not 'FDA-approved,' it can be legally used 'off label' for musculoskeletal conditions. This procedure is considered experimental, investigational, non-covered, or not medically necessary by insurance companies. Patients are financially responsible for the cost of this procedure.