

Plasma Protein Concentrate Therapy

Patient Information Sheet

What Is Plasma Protein Concentrate?

Plasma protein concentrate refers to a large protein your body already makes and carries in the bloodstream. It works as a broad-spectrum inhibitor, meaning it can bind and neutralize many of the enzymes and inflammatory signals that break down cartilage after an injury or in an arthritic joint. Because this protein is your own, plasma protein concentrate therapy is prepared from a sample of your own blood.

Why Is It Used?

Under normal conditions, very little of this protein reaches the inside of a joint. It is too large to cross easily from the bloodstream into the synovial fluid, so an injured or arthritic joint is often left without enough of its own natural protection against the enzymes that digest cartilage. Concentrating and injecting plasma protein concentrate directly into the joint restores this protective effect where it is needed most. It is used for two related purposes:

- As a joint clean-up step. Plasma protein concentrate binds and helps clear the catabolic breakdown products already circulating in an arthritic or injured joint, calming the inflammatory environment before another regenerative treatment (such as PRP, BMAC, or MFAT) is introduced.
- As a stand-alone treatment. On its own, plasma protein concentrate can reduce the catabolic, cartilage-degrading activity within a joint and support a less inflammatory environment for healing.

What to Expect

Plasma protein concentrate is drawn from your own blood, processed in-office to concentrate the protein, and then injected into the target joint during the same visit. Because it is your own naturally occurring blood protein rather than a foreign substance, patients frequently report very little soreness in the treated area afterward, and many resume normal activity sooner than they do after other injection procedures. As with any injection, some mild, short-lived soreness is possible, and Dr. Mulvaney will go over specific aftercare instructions with you before you leave.

Plasma protein concentrate is often given as part of a broader treatment plan. When it is used to prepare a joint before a regenerative procedure such as PRP, BMAC, or MFAT, it is typically given first, allowing the joint to settle before the next treatment is introduced.

The Research Behind Plasma Protein Concentrate

This plasma protein has been studied by several independent research groups over the past decade, most extensively by an orthopaedic research group at Brown University and by veterinary and orthobiologics researchers studying its use in joints. Two lines of evidence are summarized below.

Animal model of ACL injury and arthritis. In a controlled laboratory study, researchers surgically induced an ACL injury in the knees of laboratory animals to trigger the changes that lead to post-traumatic osteoarthritis. Animals that received intra-articular plasma protein concentrate after the injury showed markedly less cartilage breakdown and lower levels of the destructive enzyme MMP-13 in the joint fluid than animals that received saline alone, whose joints went on to develop the expected osteoarthritic changes. The treated joints were substantially protected from this progression (1).

A note from Dr. Mulvaney: I do not typically base treatment decisions on animal research alone, and I want you to know that. In this particular case, I am making an exception. A human trial with a long enough follow-up to prove that a treatment prevents arthritis years down the road would take many years to complete, and this early animal data is unusually promising. I think it is reasonable to let it inform your care now rather than wait for data that may not be available for a long time.

Additional supporting research.

- A large-animal (minipig) study of post-traumatic osteoarthritis found that a single intra-articular injection of this plasma protein concentrate, given in the acute period after joint injury, lowered inflammatory cytokines in the joint and reduced cartilage damage compared with untreated joints (2).
- Laboratory (chondrocyte) studies show that this plasma protein blocks the interleukin-1 to NF- κ B signaling pathway that drives cartilage breakdown, giving a plausible mechanism for the protective effect seen in animal models (3).
- Plasma-protein concentrating devices for clinical, in-office use have received FDA clearance and are already used in orthopedic practices nationwide, with a track record supporting the safety of injecting concentrated autologous plasma protein into human joints (4).

References

1. Wang S, Wei X, Zhou J, et al. Identification of alpha 2 macroglobulin (A2M) as a master inhibitor of cartilage degrading factors that attenuates post-traumatic osteoarthritis progression. *Arthritis Rheumatol.* 2014;66(7):1843-1853.
2. Sun C, Chang K, Fleming BC, et al. Alpha-2-macroglobulin attenuates posttraumatic osteoarthritis cartilage damage by inhibiting inflammatory pathways in a Yucatan minipig model. *Am J Sports Med.* 2024.
3. Zhang Y, Wei X, Browning S, Scuderi G, Hanna LS, Wei L. Targeted designed variants of alpha-2-macroglobulin (A2M) attenuate cartilage degeneration in a rat model of osteoarthritis induced by anterior cruciate ligament transection. *Arthritis Res Ther.* 2017;19:175.
4. FDA 510(k)-cleared plasma-protein concentrating devices for in-office clinical use, available since 2015.

This sheet is for general patient education and does not replace a conversation with Dr. Mulvaney about whether plasma protein concentrate therapy is appropriate for your specific condition.