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ORTHOPAEDICS

Stem Cells from Wharton's Jelly

A Patient Guide to Umbilical Cord Tissue and Regenerative Medicine

Wharton's jelly is a naturally occurring connective tissue found inside the umbilical cord. It surrounds and protects the umbilical blood vessels during pregnancy and is rich in water, collagen, hyaluronic acid, extracellular matrix proteins, and numerous biologically active signaling molecules. Because Wharton's jelly also contains multipotent stem cells in its native tissue, it has become an important area of regenerative-medicine research.

What exactly is Wharton's jelly?

The umbilical cord contains two arteries and one vein embedded within a soft, gelatinous matrix called Wharton's jelly. This matrix functions as a protective scaffold: it helps prevent compression or kinking of the vessels while allowing the cord to remain flexible. Wharton's jelly is normally discarded after a healthy delivery, so collection of donated cord tissue does not require a procedure on the baby.

Why is it interesting in regenerative medicine?

Scientists have been able to isolate multipotent stem cells from Wharton's jelly and other regions of the umbilical cord. In laboratory research, these cells can proliferate, produce signaling molecules, interact with immune pathways, and under controlled conditions demonstrate multipotent characteristics. This has created interest in their possible role in tissue repair and inflammation.

Much of the therapeutic interest in multipotent stem cells now centers on their paracrine effects—the chemical signals they release—rather than the older concept that injected cells simply travel to an injured joint and turn directly into new cartilage or tendon. These signals can include cytokines, growth-related proteins, extracellular vesicles, and other molecules that may influence surrounding cells.

Wharton's jelly is more than a collection of cells

The native tissue also contains an extracellular matrix made of structural proteins and glycosaminoglycans, including abundant hyaluronic acid. This matrix provides a biologic environment that supports cells during fetal development. Commercial and educational materials sometimes describe Wharton's jelly as providing a combination of matrix, cytokines, growth factors, and cell-derived signals. These components are scientifically interesting, but their presence in native umbilical tissue does not prove that every processed commercial product contains the same components in the same amounts—or that those components remain biologically active after processing and storage.

Is Wharton's jelly the same as 'umbilical cord stem cells'?

No. This is one of the most important distinctions for patients. Native Wharton's jelly contains cells from which multipotent stem-cell populations can be isolated and expanded in a laboratory. A processed Wharton's jelly tissue product, however, may contain extracellular matrix and soluble proteins with few or no living multipotent stem cells, depending on how it was processed, sterilized, preserved, frozen, thawed, or otherwise manufactured. Therefore, the terms 'Wharton's jelly,' 'umbilical cord tissue,' and 'umbilical cord stem cells' should not be used interchangeably.

How is it different from BMAC or adipose biologics?

Bone marrow aspirate concentrate (BMAC) and many adipose-based procedures use tissue obtained from the patient, making them autologous treatments. Wharton's jelly products come from donated birth tissue and are therefore allogeneic. This distinction affects sourcing, donor screening, processing, storage, immunologic considerations, and FDA regulation. It also means that evidence for one type of orthobiologic cannot automatically be applied to another.

What are researchers studying?

Umbilical cord-derived multipotent stem cells and Wharton's jelly-derived cells are being studied in laboratory experiments, animal models, and human clinical trials across a wide range of conditions. In orthopedics, investigators are interested in osteoarthritis, cartilage biology, tendon and ligament healing, inflammation, and other musculoskeletal applications. Early studies provide biologic rationale and some encouraging signals, but the strength of human clinical evidence varies substantially by indication, preparation, dose, and method of administration.

What might this mean for a patient with joint or tendon pain?

For a patient considering a regenerative procedure, the relevant question is not simply whether Wharton's jelly contains promising biology. The important questions are what is actually present in the specific product being administered, whether those components remain viable or biologically active, how the product was manufactured, and whether controlled human studies support its use for that particular condition. Mechanistic laboratory data should not be presented as proof that a treatment regrows cartilage, reverses arthritis, heals a tendon, or prevents the need for surgery.

Product quality matters

A Wharton's jelly product can be affected by donor selection, infectious-disease screening, tissue recovery, processing, sterility controls, preservation, storage temperature, shipping, and thawing. Products marketed under the same general name may differ significantly in cell viability, particle or protein content, extracellular matrix composition, sterility testing, and potency. For this reason, patients should ask for clear information about the manufacturer and the specific product rather than relying on the generic phrase 'Wharton's jelly injection.'

The bottom line

Wharton's jelly is a biologically rich component of the umbilical cord and an important source of cells and signaling molecules for regenerative-medicine research. Its cellular biology and extracellular matrix make it scientifically compelling, but native Wharton's jelly, laboratory-expanded umbilical cord-derived multipotent stem cells, and commercially processed Wharton's jelly products are not the same thing. When I discuss these therapies with a patient, I focus on the exact product, the quality of the human evidence, manufacturing and safety controls, regulatory status, and whether the proposed treatment offers a reasonable benefit for that individual patient.

Patient note: *This guide is educational and does not recommend a specific Wharton's jelly or umbilical cord product. Treatment decisions should be individualized after review of the diagnosis, established alternatives, available evidence, risks, and applicable regulatory requirements.*

Sources reviewed: R3 Stem Cell Wharton's jelly educational materials and current FDA regenerative-medicine safety/regulatory guidance (August 2026).