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Stanford Health Care Now

ORTHOPAEDICS AND SPORTS MEDICINE INNOVATIONS AND ADVANCEMENTS

Regenerative Medicine for Orthopaedic Conditions

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Degenerative orthopaedic conditions are a common cause of chronic pain and disability in the United States. Musculoskeletal pain and dysfunction are the reason behind many physician visits, whether due to trauma, obesity, or aging.



Treatment options, for osteoarthritis (OA) in particular, remain limited and represent a heavy burden on patients and their families. Stanford Medicine is actively studying new approaches in regenerative medicine to improve outcomes.

LEADING THE WAY IN REGENERATIVE MEDICINE

[Constance Chu, MD](#), Stanford Health Care sports medicine surgeon, is a prominent voice on joint preservation and regenerative medicine. She serves as Vice Chair Research, in the Department of Orthopedic Surgery at Stanford University, and is leading innovative research in this area.

“My passion is helping people maintain or restore younger, stronger, and healthier joints,” she says. “For example, we can take blood or skin cells from older adults and turn those cells into induced pluripotent stem cells that can become younger versions of that same person’s cartilage cells or other tissue repair cells.”

OPTIMIZING THE USE OF BIOLOGICS

This is just one example of the robust research program in regenerative medicine that exists in the Stanford Orthopedic Surgery practice. The team uses biologics such as stem cells, 3D printed scaffolds, molecular biology, and other advanced strategies to repair and restore damaged tissues.

“These exciting discoveries in the laboratory aren’t ready for use in patients yet, but have generated a lot of interest in biologics,” says Dr. Chu. “In the clinic, we have been able to treat patients by concentrating platelets or cells from their own blood and tissues with the idea of improving healing or treating symptoms. These new treatments show promise but need to be studied and monitored. Unfortunately, most treatments advertised as stem cells therapies on the internet do not meet minimal criteria to be considered stem cells and have not been well studied.”

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CONSTANCE CHU, MD



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To address this problem, Dr. Chu and [William J. Maloney, MD](#) hosted the “Optimizing Clinical Use of Biologics in Orthopaedic Surgery” symposium at Stanford Medicine. As the overall scientific leader, Dr. Chu brought together experts from around the world to determine priority areas for continued research and study. Top-level recommendations include:

Classification of available biologics

Participants sought standards to guard against the misclassification of autologous minimally manipulated blood and cell products which are being erroneously marketed as stem cells.

Development of endpoints and metrics

The group recommended key clinical outcome metrics for the biologic treatment of tendon, ligament and muscle injuries, soft tissue repair, and knee osteoarthritis (OA).

Using platelet-rich plasma (PRP) for knee osteoarthritis

Dr. Chu is evaluating the use of PRP as a biological therapy for musculoskeletal conditions, with a focus on knee osteoarthritis.

CREATION OF A BIOLOGICS REGISTRY

Dr. Chu also serves as Director of the Joint Preservation Center at the Veteran’s Hospital in Palo Alto, California where she established a biorepository-linked registry for biologics.

She advocated this model—which stores PRP samples for later comparison with patient outcomes—to yield comprehensive clinical data on whether and how patients might benefit from this treatment.

This concept has become a model for similar programs at other high-profile medical centers. Learn more about [Optimizing Clinical Use of Biologics in Orthopaedic Surgery](#).

CLINICAL TRIAL OF PRP FOR OA

Developed through a clinical trial funded by the Veterans Administration, Dr. Chu’s biorepository-linked registry determines the effects of PRP treatment of early knee osteoarthritis on knee pain, function, and cartilage health. This trial is also open to women being treated for early knee OA at Stanford Health Care.

Dr. Chu’s federally funded clinical trial examines the following after patients complete a three-injection series of PRP to treat early knee OA. Study measures include:

- Pain-Reported Outcome Measures (PROM) using the Knee Injury and Osteoarthritis Outcome Score (KOOS) to evaluate pain and function to daily activities.
- Gait analysis to determine whether PRP treatments improve how patients with knee osteoarthritis walk. Some clinical trial participants may be fitted with wearable biosensors to support monitoring efforts.
- X-rays and standard MRI scans to evaluate changes of osteoarthritis in the knee.
- Quantitative MRI scans, to generate color maps reflecting cartilage health.
- Proteomic analyses to determine the role of the cytokines, chemokines, and growth factors in the injected PRP on knee pain, function, and cartilage health.

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“Historical use of PRP has made it a leading candidate for biologic therapy,” she says. “We are focusing on knee osteoarthritis because it is common and results in so much pain and disability. There is no effective pharmacological treatment for knee OA and the economic and societal costs are substantial.”

Referring patients with knee OA to Stanford Health Care

Dr. Chu is preparing to publish the first set of results from the clinical trial showing that pain relief after PRP treatment is accompanied by improved use of the knee while walking.

To refer a patient or to discuss eligibility, please call the PRP study coordinator at .

Find out more about our current [clinical trials](#).

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