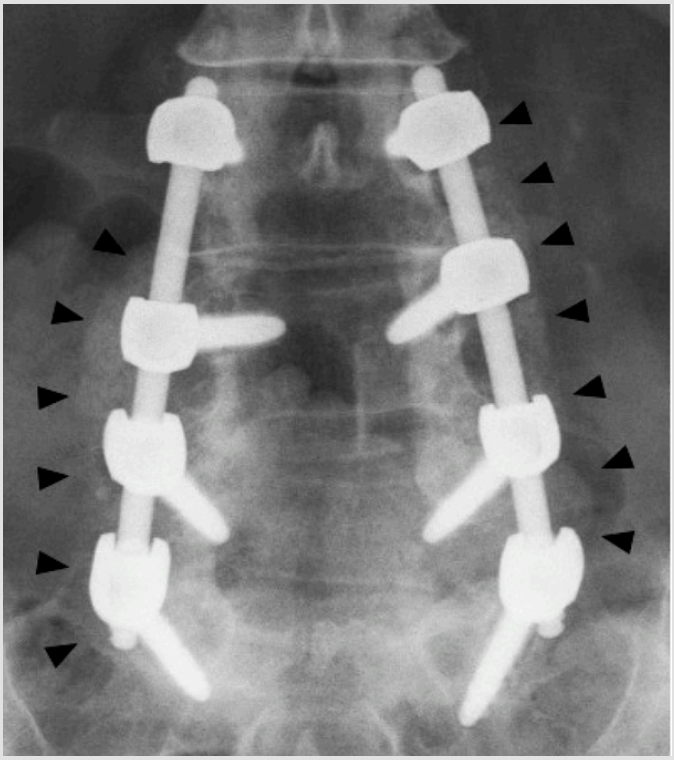
MOLECULAR MATRIX
MATTERS
April 2025, Q1 Vol.1



Is HCCP (Osteo-P® BGS) the Next Gold Standard in Bone Grafting?

Bone grafting just got smarter—and safer. Recent research highlights the transformative impact of our pioneering polysaccharide bone graft platform. This next-generation carbohydrate polymer technology is redefining surgical approaches to bone grafting, offering a safer and more effective alternative.

Explore the groundbreaking results published in Bioengineering MDPI and discover how we are setting a new standard in bone grafting (*Page 2*).

(*Figure to the left*) **L3-S1 posterior instrumented fusion utilizing HCCP.** Bony fusion is annotated with small black arrows, anterior-posterior views. (Kim, et al., 2025)

Molecular Matrix, Inc. Partners with Okizu

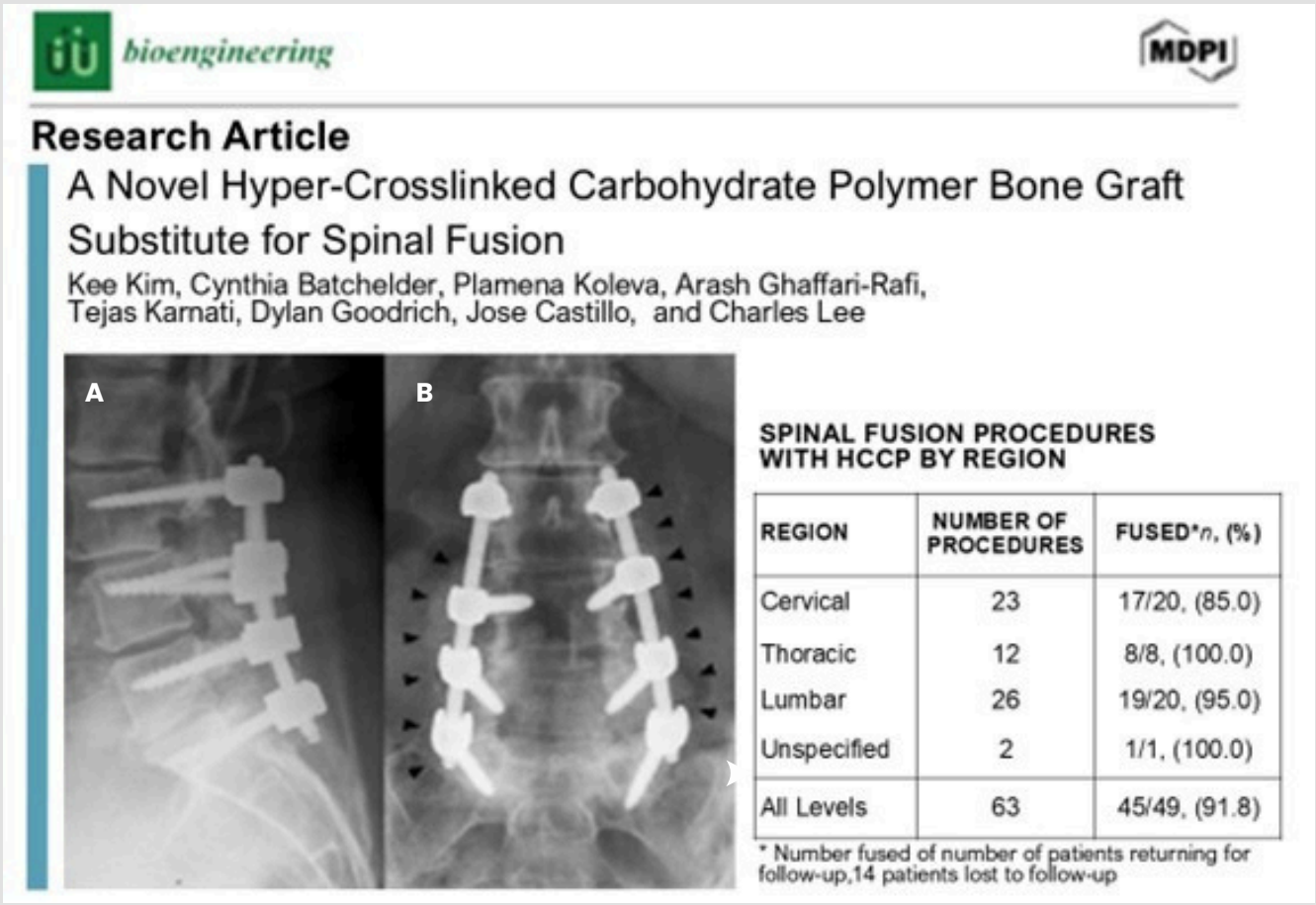
- **Molecular Matrix Inc.** is a proud sponsor of **Camp Okizu**; a place of support for children with cancer and their families.
- Read more on our partnership and the mission of Camp Okizu on *Page 3*.
- Watch for Okizu's *Save the Date* for their annual **Evening Under the Stars** event to be held in September!

MEET THE TEAM: JAY DONOVAN (SALES)

We are incredibly proud of our dedicated sales team who drive our success every day. Today, we want to introduce Jay Donovan; pictured left above with our CEO Charles Lee, PhD. Jay has most recently joined our team as our Director of Sales for the Eastern Region and is already forging new paths for Osteo-P® BGS!

You can reach Jay via email: JDonovan@molecularmatrix.com

(Next Gold Standard continued from page 1)



bioengineering

MDPI

Research Article

A Novel Hyper-Crosslinked Carbohydrate Polymer Bone Graft Substitute for Spinal Fusion

Kee Kim, Cynthia Batchelder, Plamena Koleva, Arash Ghaffari-Rafi, Tejas Karnati, Dylan Goodrich, Jose Castillo, and Charles Lee

SPINAL FUSION PROCEDURES WITH HCCP BY REGION

REGION	NUMBER OF PROCEDURES	FUSED*n, (%)
Cervical	23	17/20, (85.0)
Thoracic	12	8/8, (100.0)
Lumbar	26	19/20, (95.0)
Unspecified	2	1/1, (100.0)
All Levels	63	45/49, (91.8)

* Number fused of number of patients returning for follow-up,14 patients lost to follow-up

***L3-S1 posterior instrumented fusion utilizing HCCP**. Bony fusion is annotated with small black arrows. Upright x-rays were taken 13 months post-operatively: **(A)** lateral, **(B)** anterior-posterior views. (Kim, et al., 2025)*

Demonstrated to be highly effective in animal models and validated by a retrospective human clinical study, fusion rates over 91% were achieved with **Osteo-P® BGS** without the complications associated with traditional graft methods.

- **Preclinical studies showed Osteo-P® BGS was:**
  - **nonimmunogenic**
  - **nontoxic**
  - **supported angiogenesis**
  - **degradation profile matching bone formation rate.**
- **Retrospective clinical trial (N=63) assessed posterolateral fusion success.**
- **No adverse events.**

- **Osteo-P® BGS was used as an adjunct bone void filler in clinical studies with:**
  - **autograft**
  - **allograft**
  - **demineralized bone matrix**
  - **combinations**
  - **with/without BMP-2.**
- **Fusion rates averaged 91.8% with Osteo-P® BGS.**
- **Radiolucent Osteo-P® BGS allowed real-time bone formation visualization.**

Click here to read the full article and join the conversation about the future of bone regeneration

A PARTNERSHIP WITH MOLECULAR MATRIX, INC. IS A PARTNERSHIP WITH CAMP OKIZU

(Continued from page 1)

- The mission of **Okizu** is to support all members of families affected by childhood cancer
- **Okizu provides**:
  - Peer support
  - Camaraderie
  - Mentoring
  - Recreational Programs
- These initiatives are made possible through partnerships with sponsors and pediatric oncology treatment centers across Northern California.
- **Molecular Matrix, Inc. has supported 60 campers to date.**

Learn more about Camp Okizu and how you can get involved *here*

Watch for more updates in our next newsletter!

OUR INNOVATION IN NUMBERS

Osteo-P® BGS delivers value not only through improved patient outcomes but also through measurable benefits in its application.

- **$122,000** Annual cost savings through room temperature storage (estimated)
- **>3500** Patients with no adverse effects

Open Journal of Orthopedics and Rheumatology

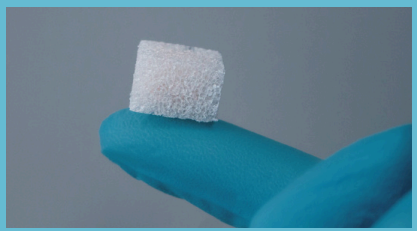
Case Report

Successful Bridging and Repair of First Metatarsal Fracture with Chronic Pseudoarthrosis Following Multiple Surgical Interventions Using a Minimally Invasive Approach

Michael Scarpone and Charles Lee

Radiographic Evaluation of First Metatarsal Fracture. *Plates and screws were removed* ***(A)*** *prior to the implantation of HCCP and BMAC. Radiographic evaluation of the first metatarsal fracture (yellow arrows) showed bony bridging at 5 weeks* ***(B)*** *and further fusion at 12 weeks* ***(C)*** *post-implantation.*

- Metatarsal fractures are a common foot injury that can lead to chronic pain and disability if the fracture site fails to heal properly, resulting in pseudoarthrosis.
- Our recent Case Report in *Open Journal of Orthopedics and Rhematology* (https://dx.doi.org/10.17352/ojor.000050) describes a new, innovative and minimally-invasive treatment option for forefoot and midfoot fractures.
- Although many metatarsal fractures heal well without immobilization or surgery, pseudoarthrosis may develop when fracture nonunion results in a fibrous joint-like structure.
- This condition is especially painful in the first metatarsal which is enlarged and strengthened for its load-bearing role in standing and mobility.
- A 58-year-old man with no known risk factors suffered from chronic pain and first metatarsal pseudoarthrosis after four unsuccessful bone fusion surgeries.
- With amputation imminent, **Osteo-P® BGS** offered a new hope. Follow the story of minimally invasive, successful bridging, fusion and repair by clicking here.



Click here to read the full article and join the conversation about the future of bone regeneration

FROM OUR BLOG SERIES: CELLULAR CONVERSATIONS – BIOLOGICAL SIGNALS IN ORTHOPEDIC TISSUE REPAIR (PART 1)

Find more on this series and other posts here

Biological signals are molecular instructions that guide critical processes like inflammation, cell migration, and tissue reconstruction. In orthopedic repair, they play vital roles in activating bone and cartilage repair, modulating inflammation, and coordinating various cell types. These signals can be grouped into three categories: biochemical, mechanical, or electrical. This blog post, the first in a three-part series, delves into biochemical signals and sets the stage for a deeper exploration of each signal group.

Understanding these signals has led to new therapeutic strategies for bone repair, such as BMP-based bone grafts and gene therapy techniques. At Molecular Matrix, Inc., we leverage this knowledge to develop effective treatments for fractures and bone injuries, helping patients recover faster and regain full mobility.

- **Growth factors are proteins that stimulate cell growth, proliferation, and differentiation, playing crucial roles in bone repair.**
- **Cytokines mediate inflammation, essential for tissue repair.**
- **Chemokines attract stem cells and immune cells to injured tissues.**
- **The Extracellular Matrix (ECM) influences cell behavior during bone repair by releasing biochemical cues that direct cells to grow, migrate and differentiate.**

TEST YOUR KNOWLEDGE:

How do osteocytes respond to mechanical stress in bones?

A) They release biochemical signals that regulate bone formation and resorption

B) They dissolve and get replaced by osteoblasts

C) They generate electrical signals that directly stimulate healing

D) They secrete enzymes that dissolve surrounding bone

(Correct Answer: A)

For more information contact:

jhkeefer@moleculamatrix.com

www.moleculamatrix.com

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