Innovations
UNIVERSITY OF COLORADO
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Novelty Cages Accommodating Individual Endplate Architecture

Product

Interbody cages

Indication

Spinal fusion surgery

Value Propositions

- Tailor to individual patient biomechanical requirements
- Decrease risk of subsidence and complications

Market

- $6.5 billion— Global spinal fusion devices market (3.3% CAGR 2020-2027)

Intellectual Property

- *US patent application pending
- Available for licensing

Contact

Doreen Molk
Doreen.molk@cuanschutz.edu

Ref# CU4732H

303-724-0220
innovations.cuanschutz.edu

Background on CU4752H

Spine interbody devices (cages) are commonly utilized in spinal fusion surgeries. As a replacement for the damaged intervertebral disk, they act as both a spacer and a scaffold to stabilize the spine. However, in 10-30% of spinal fusion surgeries, the device sinks into the endplates of the vertebrate weeks to months post-surgery. This complication is known as subsidence, and causes the diseased segments to misalign, nullifying the intended benefits of fusion surgery. Over the past decade, both the frequency of these procedures coupled with associated costs have increased rapidly. Existing implants consist of solid or porous materials that exceed the mechanical strength of vertebral surfaces. At present, despite subsidence affecting an estimated 10-30% of spinal fusion cases, there is no single solution that satisfactorily addresses the condition.

Technical Innovation

A research team led by Dr. Evalina Burger has developed a novel approach for manufacturing advanced interbody cages by preoperatively mapping the mechanical properties of the patient's vertebral body endplates using conventional computed tomography (CT) scans. Gaining an understanding of the endplate's spatial stiffness distribution and anatomy allows for the creation of a cage optimally fitted for individual endplate architecture. Using a 3D printing technique of laser powder bed fusion, cages are created from a titanium alloy (Ti-6al-4V) that provides increased osseointegration. With this technology's ability to personalize treatment, the inventors envision a marked reduction in postoperative subsidence development while simultaneously increasing the efficacy of spinal fusion procedures.

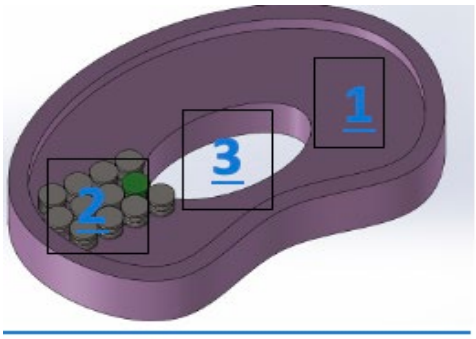

Figure: A design of the proposed cage: 1) solid frame; 2) internal spring which determines the mobile construct axial stiffness of varying heights to match the patient's anatomy; 3) hole for the bone cells in growing and vertebral interbody fusion

*United States patent application pending: 17/266,535. "Patient-Specific Spinal Implants"