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Health Network


3D Printing: Interbody Solutions

Boyle C. Cheng, PhD
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Disclosures

- Grant Funding Difusion Technologies
- Grant Funding SI Bone
- Grant Funding Camber Medical
- Consulting Aesculap
- Co-founder IPT

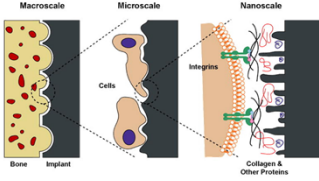



BMP & PEEK Worth It?



Why do materials matter?


- **CELLULAR RESPONSE**
 - ↑ roughness =
 - ↑ cellular adhesion
 - ↑ cellular differentiation
 - Osteoblasts attach to implant surface =
 - cell differentiation +
 - cell proliferation




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Why do materials matter?

- **WOLFF'S LAW**
 - Load ↑ = bone becomes stronger
 - Load ↓ = bone becomes weaker
- **RISK OF SUBSIDIENCE**



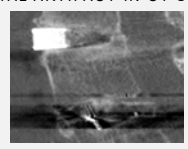
Author	Cage type	# patients	% subsidence		Journal	Year
			Overall	Severe (≥3mm)		
J. Wu	TMC	236	28.6%	nr	Int J Clinical Exp Med	2015
J.W. Jang	TMC	30	93.3%	nr	J Clinical Neuroscience	2014
Y. Fengbin	TMC A & TMC B	28/30	nr	4% / 17%	Eur Spine J	2013
X. Yang	TMC & n-HA poly	77	nr	6% / 22%	Int Orthopedics	2013
Y. Chen	Titanium Mesh Cage (TMC)	300	79.7%	19%	J Spinal Disorders	2008

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Why do materials matter?


While these solutions address the problem of osseo-integration and peri-implant inflammation, they trade-off many of the desirable properties

METAL ARTIFACT IN CT SCAN




- Metal artifacts make assessment of the fusion mass through the interbody cage difficult to see
 - Limits arthrodesis assessments in some patients CT studies

METAL ARTIFACT IN MRI




- Metal in the interbody space may interfere with neural structures in the spinal canal imaging













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PROBLEMS with ALTERNATIVE SOLUTIONS

COMPARISON – CERVICAL CAGES PEEK (A) vs Ti(B)

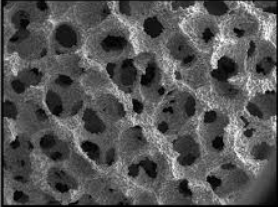


LITERATURE REPORTED MATERIAL COMPARISONS

	Titanium	PEEK	Trabecular Metal	MC+
X-Ray				
MRI				
CT				

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Additive Manufacturing: 3D Printed Interbody Fusion Devices

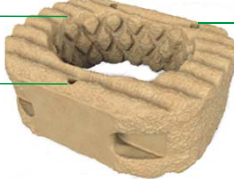



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Fortilink-C w/ TETRAFuse 3D

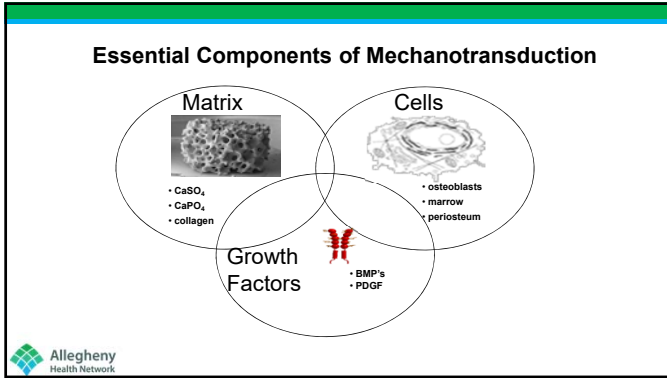
Fortilink-C IBF/VBR System

- 3D printed nano-rough surface
- 530µm avg pore diameter
- Macro/micro structure designed to allow more cells to attach to more of the implant
- Three radiographic markers facilitate visual confirmation of anterior/posterior position and lateral edges of implant



- Multiple footprints
- Heights from 5 to 11mm
- 6° lordotic angle

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- ### Study Design
- Ovine Model
 - Paired Long Bone Sites
 1. Control: PEEK (n=6)
 2. Treated: Ti-Coated PEEK (n=6)
 3. TETRAfuse (n=6)
 - Implantation
 1. Survival 8wks (n=3)
 2. Survival 16wks (n=3)
 - Endpoints
 1. Local Tissue Tolerance – Histology
 2. Bone Implant Interface – Biomechanical Characterization
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Thank You!





Quality of Motion
How you get there...



"Iron Man Audi"