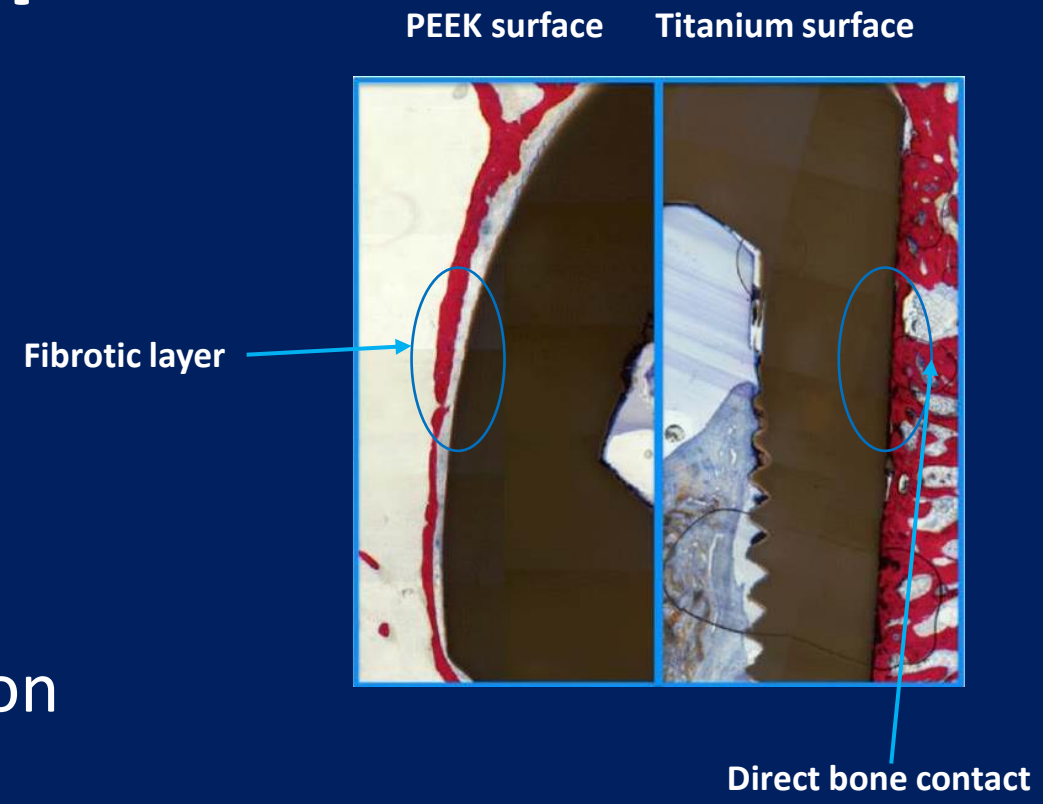
Why Developing a New Cage Technology?

Orthobion
PERFORMANCE IN ORTHOPEDICS

The Benefits of TITANIUM

- Titanium promotes **osteoblasts recruitment**, maturation and differentiation
- **Reduced wear and tear** as compared to PEEK cages

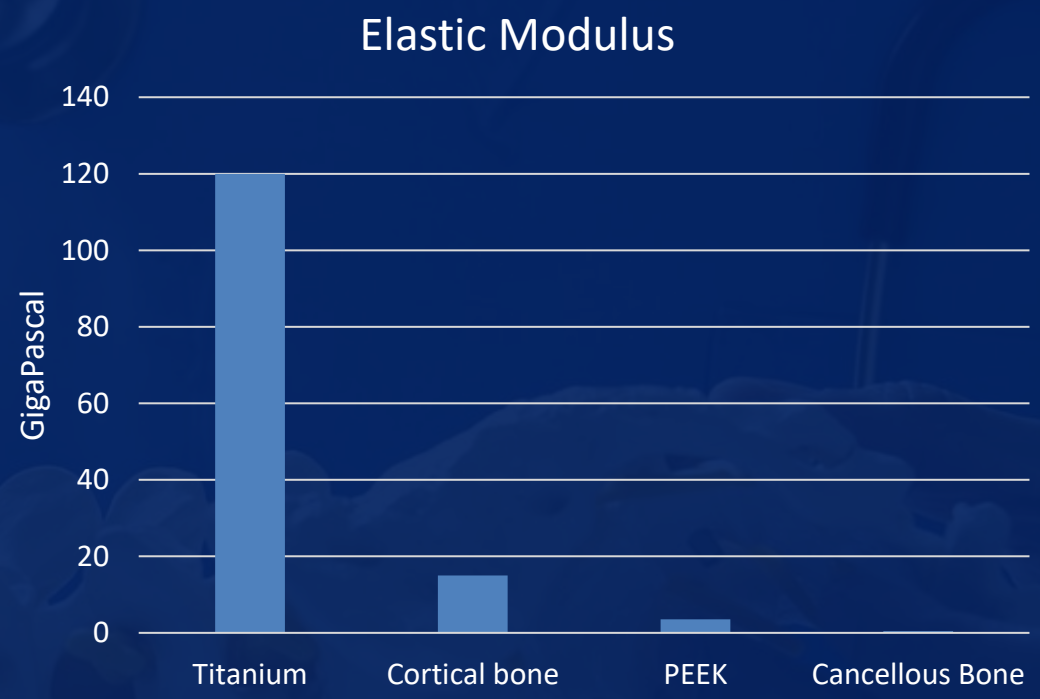


Titanium = Much Better Osteointegration

The Benefits of PEEK

- The PEEK core provides optimal **mechanical properties**
- Less **subsidence** than with pure Titanium cages
- **Radiolucency,** no imaging and MRI artifacts

PEEK = Behavior similar to natural bone



Elastic Modulus = tensile stress / tensile strain, high = less susceptible to deformation, low = more susceptible to deformation

The Idea

Combining both materials:

a PEEK cage coated with TITANIUM

COMBINATION = Best of two worlds but…

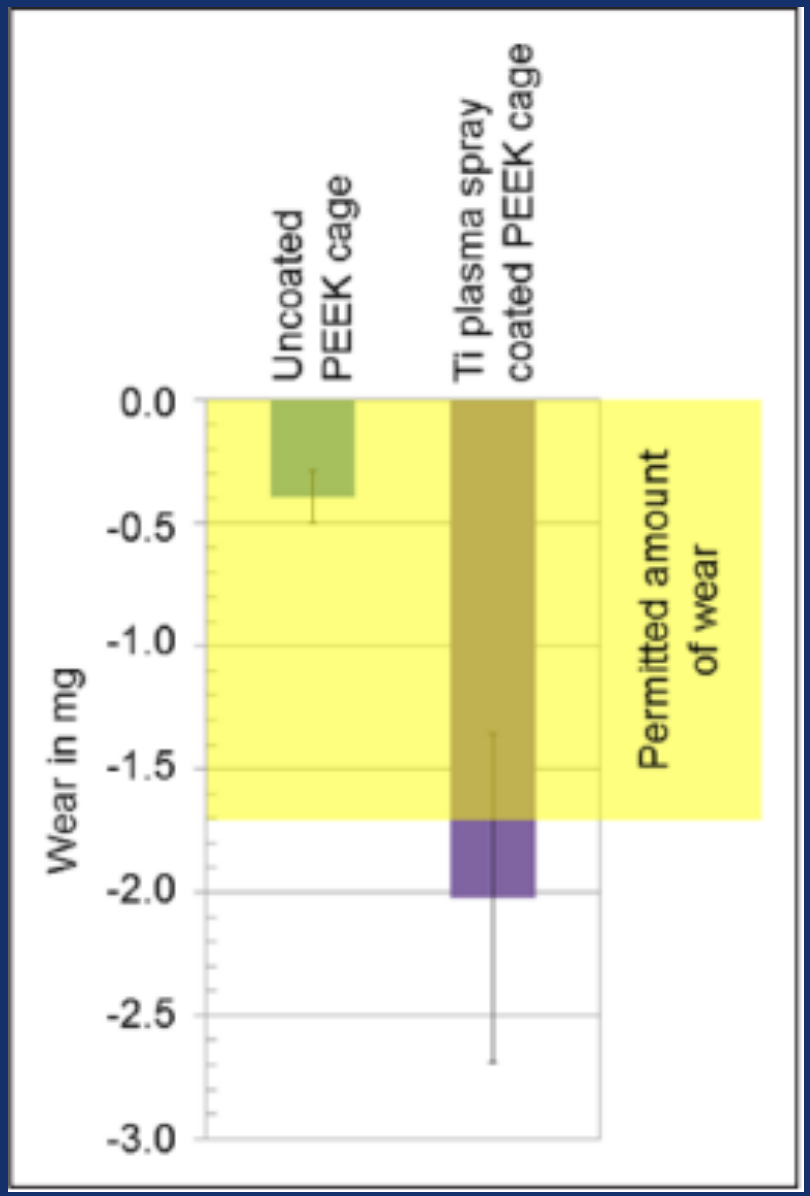
The Issue

Standard coating methods (e.g., plasma coating) result in a **50-500µm porous layer** of Titanium :

- Radiolucency is still impaired due to Titanium thickness
- Surface is sensitive to damages, leading to flakes generation and significant loss of material

Simulated impaction study: loss of material above FDA limit

Standard plasma coating is not an optimal solution

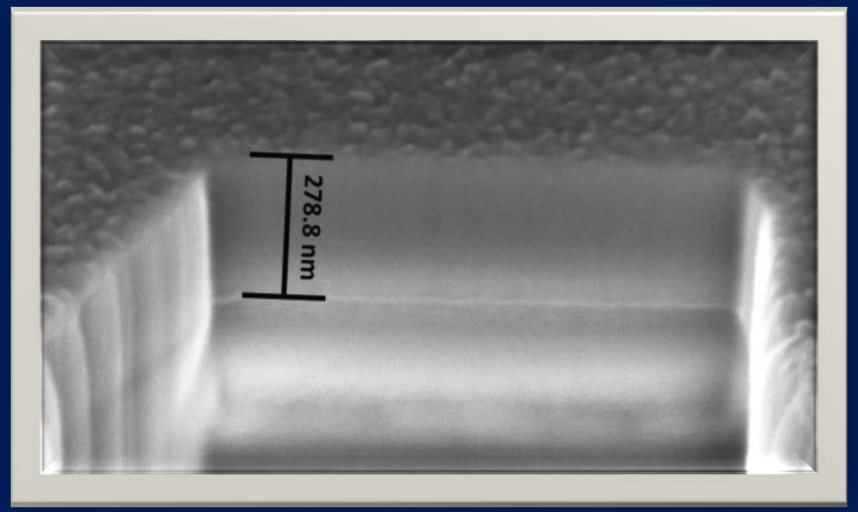


A. Kienle et al. (2018)

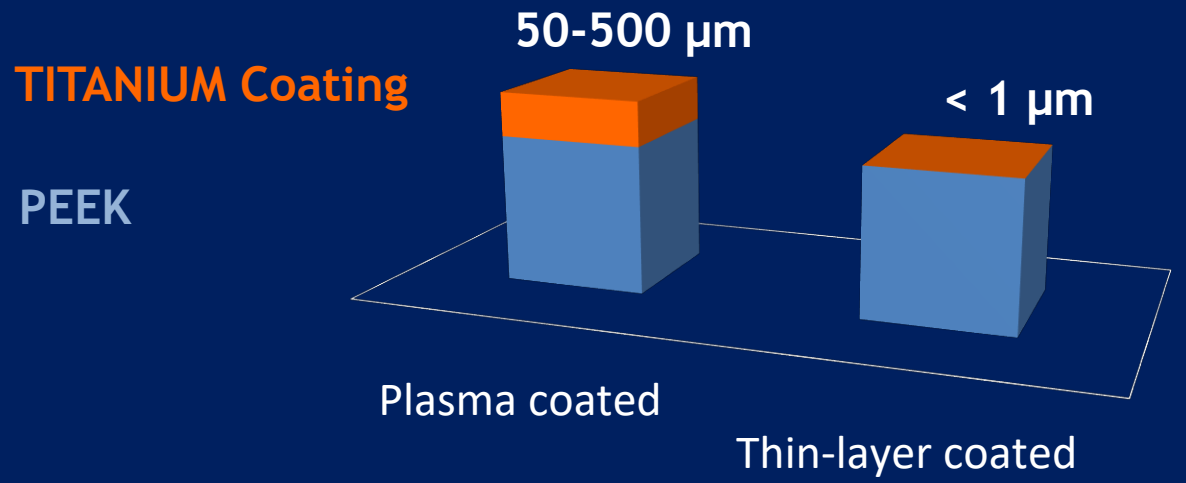
The Solution Thin-Layer Coating

A thin, dense, non-porous coating of Titanium **(about 1.000 times thinner)**

Titanium surface secured without need of a thick layer



Thin-layer coating on glass to illustrate the thickness



The Real Best of Two Worlds

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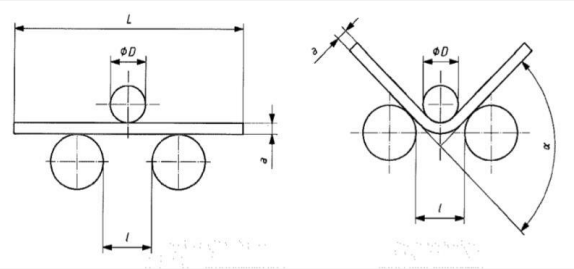
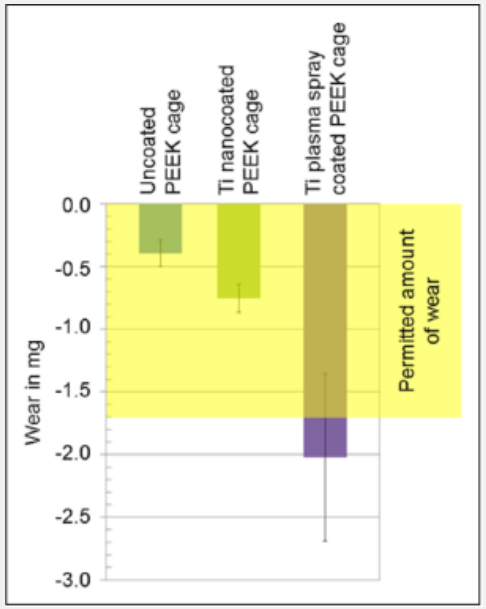
The Outcome

Simulated bending study:
no damages in bending area



Simulated impaction study:
loss of material within FDA limit



A. Kienle et al. (2018)

Radiolucency:
Impairment and artifacts eliminated

Test setup EN ISO 7438

Plasma coated
Damaged surface with cracks

Thin-layer coating
No cracks

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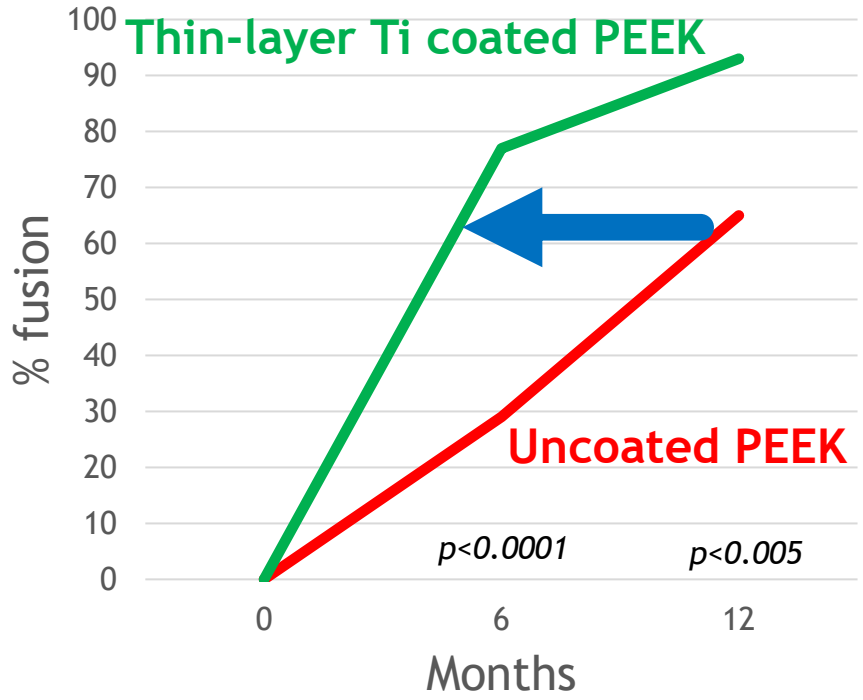
The Clinical Benefits

COATED VS UNCOATED – LUMBAR FUSION

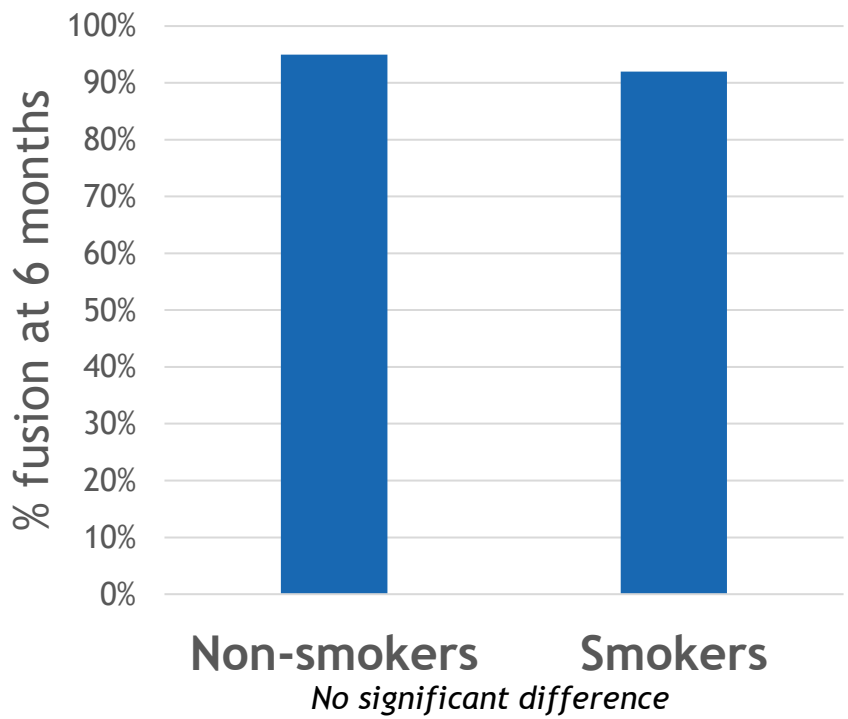
127 patients (single level) – Dr. Willems and Prof. Lauweryns



Much faster fusion than PEEK

SMOKER VS NON-SMOKER – CERVICAL FUSION

63 patients (99 fusions) – Dr. Mahieu



No significant difference

Almost 100% fusion achieved in both groups

The Real Best of Two Worlds

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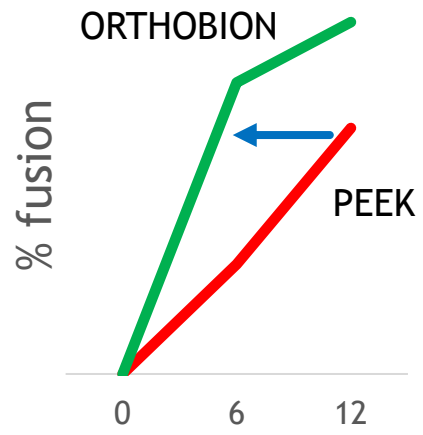
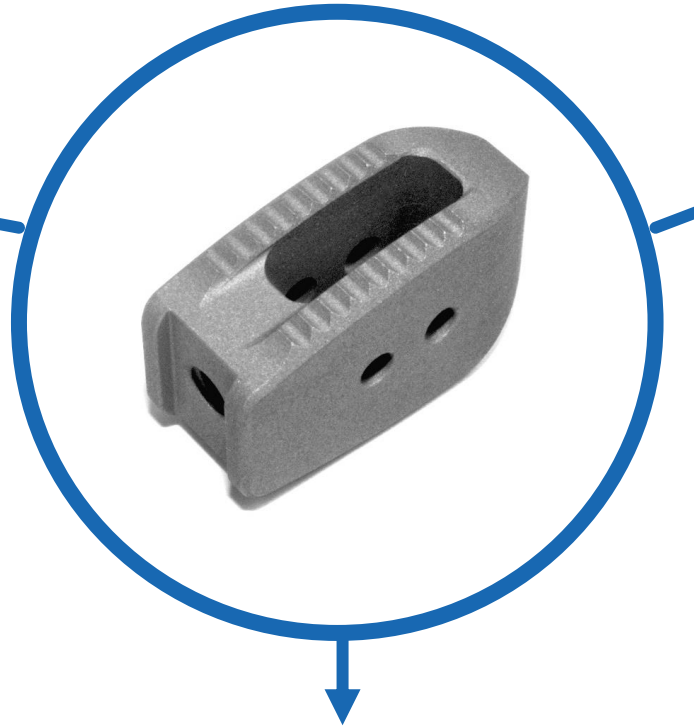
The Conclusion: The Real Best of Two Worlds

Faster fusion thanks to Titanium surface





Excellent mechanical and radiolucency behavior thanks to PEEK frame

No coating issue thanks to thin-layer technology

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The TSC Cage Formats

ACIF

	Small cage	Middle cage	Large cage
Length (mm)	13	15	15
Width (mm)	14.5	17	19
Height (mm)			
4	03.500	03.507	*
5	03.501	03.508	03.519
6	03.502	03.509	03.514
7	03.503	03.510	03.515
8	03.504	03.511	03.516
9	03.505	03.512	*
10	*	*	*

PTLIF

	22 mm cage				25 mm cage			
Lordosis (°)	0	3	6	9	0	3	6	9
Height (mm)								
7	*	-	-	-		-	-	-
8	*	-	-	-	06.131	-	-	-
9	06.122	-	-	-	06.132	-	-	-
10	-	06.123	-	-	-	06.133	-	-
11	-	-	*	06.424	-	-	06.134	*
12	-	-	*	06.425	-	-	06.135	*
13	-	-	*	06.426	-	-	06.136	*
14	-	-	*	06.427	-	-	*	*
15	-	-	*	06.428	-	-	*	*

	28 mm cage				32 mm cage			
Lordosis (°)	0	3	6	9	0	3	6	9
Height (mm)								
7	*	-	-	-	*	-	-	-
8	06.141	-	-	-	*	-	-	-
9	06.142	-	-	-	*	-	-	-
10	-	06.143	-	-	-	*	-	-
11	-	-	06.144	*	-	-	*	-
12	-	-	06.145	*	-	-	*	*
13	-	-	06.146	*	-	-	*	*
14	-	-	06.147	*	-	-	*	*
15	-	-	*	*	-	-	*	*

TLIF

	28 mm cage		32 mm cage	
Lordosis (°)	6	12	6	12
Height (mm)				
7	*	*	07.110	07.130
8	*	*	*	*
9	*	*	07.112	07.132
10	*	*	*	07.133
11	*	*	07.114	07.134
12	*	*	*	*
13	*	*	07.116	07.136
14	*	*	*	*
15	*	*	07.118	07.138

* Available if needed, depend on order size - not available

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ACIF

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4	03.500	03.507	*
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7	03.503	03.510	03.515
8	03.504	03.511	03.516
9	03.505	03.512	*
10	*	*	*

PLIF

	25 mm cage		28 mm cage
Lordosis (°)	4	8	4
Height (mm)			
9	05-109	-	05-748
10	05-110	05-116	05-749
11	05-111	05-117	05-750
12	05-112	05-118	05-751
13	05-113	05-119	05-752
14	05-114	05-120	05-753
15	05-115	-	05-754

TLIF

	28 mm cage		32 mm cage	
Lordosis (°)	6	12	6	12
Height (mm)				
7	*	*	07.110	07.130
8	*	*	*	*
9	*	*	07.112	07.132
10	*	*	*	07.133
11	*	*	07.114	07.134
12	*	*	*	*
13	*	*	07.116	07.136
14	*	*	*	*
15	*	*	07.118	07.138

* Available if needed, depend on order size - not available