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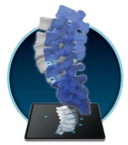
aprevo

The aprevo® Technology Platform is an end-to-end integrated spine surgery solution that leverages AI-enabled 3D visualization software to generate personalized alignment plans and 3D-printed patient-specific interbody devices to help surgeons predictably achieve the pre-operative plan. Using personalized analysis, data from each case is used to aid and inform continuous learning, supporting the goal of achieving enhanced precision and reproducibility.

aprevo® Technology Platform

Pre-Operative: Planning Software

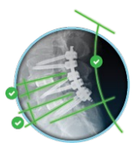


aprevo® pre-operative planning software uses CT images to create a 3-dimensional lumbar spine model from which each vertebral body is individually segmented, and endplate anatomy is mapped. The surgeon's treatment preferences and alignment goals are translated to a surgical plan in which the spine is corrected in all planes to address both sagittal and coronal alignment goals.

Intra-Operative: Custom-made interbody device

Each aprevo® device is custom-made and 3D-printed to match the unique contours of a patient's anatomy, maximizing surface contact area for optimal load distribution. 3D correction is built into each aprevo® device to help surgeons attain precise correction and predictably achieve the pre-operative surgical plan.

Post-Operative: Data Insights



Detailed post-operative aprevo® Insights analysis supports a continuous feedback loop around each surgeon, enabling Data to Device™ through proprietary algorithms. This process not only helps determine if the surgical goals were achieved but also aids in continuous learning and increased reproducibility.

The Application of Personalized Medicine in Spine Fusion Surgery

The studies described in this IJSS Special Issue present data on over 530 patients treated with patient-specific aprevo®, demonstrating an unmatched level of precision in surgically achieved alignment compared to the use of stock devices.

In addition, early data from the COMPASS™ Registry showed the rate of revision surgery attributable to mechanical complications or radiographic malalignment following spinal deformity surgery was 1.5%,[1] whereas a separately published study on 997 patients treated with stock devices showed a revision rate for the same causes by 1-year follow-up of 9.7%.[2]

The application of personalized medicine to spine fusion surgery is a necessary step toward improving care, reducing costs and increasing patient satisfaction. One-in-five older adults regret their decision to undergo spinal deformity surgery, and almost twice as many patients who regret surgery experienced a postoperative complication.[3]

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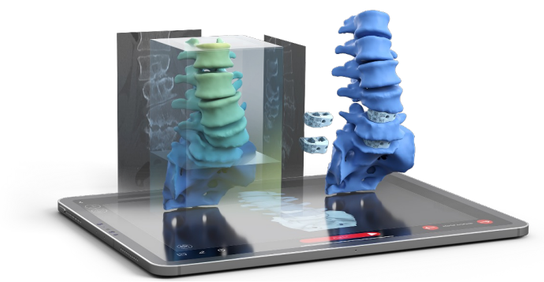


The importance of achieving optimal patient specific alignment to reduce the risk of mechanical complications and revision surgery cannot be overstated. The aprevo® personalized interbody devices improve surgical outcomes by enabling surgeons to more reliably achieve their patient-specific alignment goals, reducing both implant related complications and revision surgery, and improving patient satisfaction.

Learn more about **aprevo®** at carlsmed.com

aprevo® Clinical Highlights

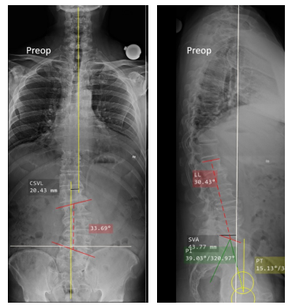
- **Predictable Intervertebral Alignment:** *82% of 365 personalized aprevo® interbody levels achieved targeted alignment within 5°.*[4]
- **Improved Bone Graft Contact:** *94% average device to vertebral endplate contact at 1-year follow-up on CT.*[5]
- **Subsidence Mitigation:** *96% of personalized aprevo® levels with zero subsidence at 1-year follow-up on CT.*[5]
- **Improved Alignment Restoration in Degenerative Cases:** *52% increase in alignment restoration of preoperatively malaligned patients with degenerative conditions using aprevo®.*[6]
- **Improved Alignment in Complex Adult Deformity:** *42% improvement in achieving targeted PI-LL within 5° compared to stock devices.*[7]
- **Reduced Rate of Revisions:** *<2% rate of revision surgery from early data from the COMPASS™ Registry.*[1]

aprevo® Case Example: L4-L5 Interfixated ALIF

Courtesy of Jeffrey P. Mullin, MD

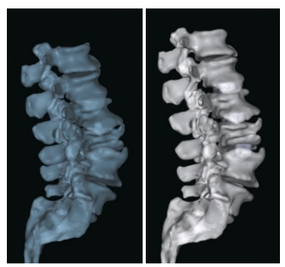
Patient

A 73-year-old man presented with chronic back pain and severe bilateral lower extremity radiculopathy associated with new onset foot drop and leg weakness. The patient continued to have axial lower back pain and difficulty standing fully upright.



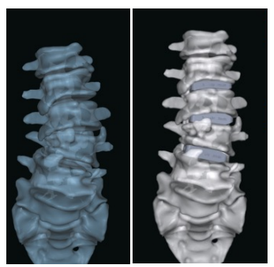
Pre-operative Plan

The primary goal of this procedure was to restore L2-L5 disc height and maintain lumbar lordosis.



PREOP

			40° PI	30° LL	10° PI - LL	9° CORONAL
LEVEL	LORDOSIS	ANGLE TO S1	CORONAL	H-ANT (mm)	H-POST (mm)	
L1/L2	0°	30°	-4°	6.3	6.2	
L2/L3	3°	37°	6°	7.3	6	
L3/L4	6°	40°	10°	8.2	5.2	
L4/L5	10°	32°	5°	8.9	3.6	
L5/S1	16°	18°	-10°	9.6	1	

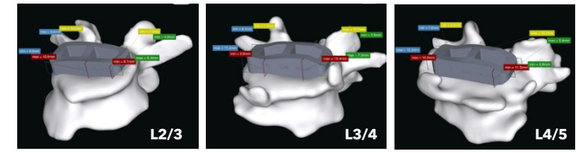


PLAN

			40° PI	31° LL	9° PI - LL	0° CORONAL
LEVEL	LORDOSIS	ANGLE TO S1	CORONAL	H-ANT (mm)	H-POST (mm)	
L1/L2	0°	31°	-4°	6.3	6.2	
L2/L3	2°	36°	1°	10.4	9.6	
L3/L4	5°	39°	6°	11.9	9.3	
L4/L5	10°	32°	5°	15	9.7	
L5/S1	16°	18°	-10°	9.6	1	

Patient-specific Devices

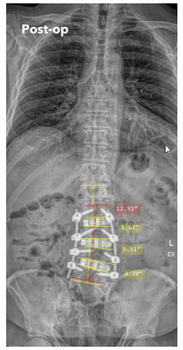
Three levels of aprevo® LLIF devices were designed to achieve the planned correction and match the patient's endplate anatomy. aprevo® instruments and devices were delivered in a sterile kit prior to surgery.

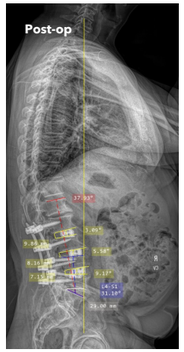


Post-operative Insights Analysis

aprevo® 6-week Post-operative Insights analysis compared the pre-operative plan and post-operative parameters. The planned correction was achieved in the first stage of the procedure, allowing the surgeon to adjust the plan from a 2-stage surgery (requiring a second stage open L2-5 instrumented decompression) to a percutaneous construct that was performed during the first stage. The patient had an uneventful post-operative course and was discharged on day 4 post-op.

Parameter	Plan	Post-op	Achieved
L2-L3			
Lordosis	2°	3°	✓
Post. Height	10mm	10mm	✓
Coronal Angle	1°	2°	✓
L3-L4			
Lordosis	5°	6°	✓
Post. Height	9mm	8mm	✓
Coronal Angle	6°	5°	✓
L4-L5			
Lordosis	10°	9°	✓
Post. Height	10mm	7mm	✓
Coronal Angle	5°	4°	✓
Lumbar			
Lordosis	31°	38°	✓
Coronal Angle	0°	2°	✓





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