

MEDICAL BREAKTHROUGHS **RESEARCH SUMMARY**

TOPIC: AUGMENTED REALITY FOR SPINE SURGERY
REPORT: MB #4800

THE SPINE: The spine is a column of 26 bones in an adult body. Twenty-four separate vertebrae interspaced with cartilage, and then additionally the sacrum and coccyx. There are five major regions of the spine. The cervical which is the seven vertebrae in the neck, the thoracic which is the 12 vertebrae in the chest region, the lumbar which are the five vertebrae in the lower back, the sacral which contains only the sacrum and is a single bone in the adult skeleton that is formed by the fusion of five smaller vertebrae during adolescence. It is a flat, triangular bone found in the lower back and wedged between the 2 hip bones. Finally, the coccygeal which is known as the human tailbone and contains only the coccyx which is formed by the fusion of four tiny vertebrae during adolescence.

(Source: <https://www.innerbody.com/image/skel05.html#continued>)

TRADITIONAL SPINAL FUSION SURGERY: A spinal fusion surgery is designed to stop the motion at a painful vertebral segment, which in turn should decrease pain generated from the joint. There are many approaches to lumbar spinal fusion surgery, and all involve adding bone graft to a segment of the spine, setting up a biological response that causes the bone graft to grow between the two vertebral elements to create a bone fusion and the boney fusion - which results in one fixed bone replacing a mobile joint - stops the motion at the joint segment. The procedure for Spine Fusion using the TLIF (Transforaminal Lumbar Interbody Fusion) back surgery is done through the posterior (back) part of the spine. Surgical hardware is applied to the spine to help enhance the fusion rate. Pedicle screws and rods are attached to the back of the vertebra and an interbody fusion spacer is inserted into the disc space from one side of the spine. Then a bone graft is obtained from the patient's pelvis and is placed into the interbody space and alongside the back of the vertebra to be fused. As the bone graft heals, it fuses the vertebra above and below and forms one long bone.

(Source: <https://www.spine-health.com/treatment/spinal-fusion/lumbar-spinal-fusion-surgery>)

NEW TECHNOLOGY: The Augmedics Xvision, Spine System surgical guidance system allows a surgeon to see a patient's 3-dimensional (3D) spinal anatomy through skin as if they have x-ray vision. The Xvision system is revolutionizing how surgery is performed by giving the surgeon better control and visualization, which can lead to easier, faster, and safer surgeries. "Having 3-dimensional (3D) spinal anatomic and 2-dimensional (2D) CT scan images directly projected onto the surgeon's retina and superimposed over the surgical field takes spinal surgery to another level," said Dr. Frank Phillips, Professor and Director of the Division of Spine Surgery and the Section of Minimally Invasive Spine Surgery at Rush University Medical Center. "Being able to place minimally invasive spinal instrumentation extremely accurately and efficiently, reducing surgical time and complication risk, is critical to improving outcomes for spinal surgery. Traditional surgical navigation platforms have been shown to improve accuracy of implant placement, however using augmented reality allows for the advantages of traditional (non-3D) navigation plus the ability to visualize the patients spinal anatomy in 3D through the skin."

(Source: <https://orthospinenews.com/2020/06/17/dr-frank-phillips-is-first-in-the-world-to-use-augmented-reality-surgical-guidance-in-minimally-invasive-spine-surgery/>)

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If this story or any other Ivanhoe story has impacted your life or prompted you or someone you know to seek or change treatments, please let us know by contacting Marjorie Bekaert Thomas at mthomas@ivanhoe.com