

TECHNICAL INSIGHTS'
MEDICAL DEVICE TECHNOLOGY ALERT

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Novel Motion Preservation Device for Improved Spinal Health

Vertebrae, or spine segments, are the ‘backbone’ for active life. Surprisingly, even a relatively small disorder of the spine could lead to a life crippling experience with prolonged excruciating pain. Spinal fusion surgery aims to relieve the pain and ‘resolve’ the disorder caused by a motion segment of the spine by fusing or restricting motion within the segment. Although fusion surgery effectively reduces pain, it also reduces range of motion. Patients’ active lifestyles have led to the development of motion preservation devices intended to restore motion rather than restrict it.

This sector within the medical sciences and procedures is a rapidly emerging field. The orthopedics industry, in general, has been developing implants for hips and knees for decades, from the 1940’s and 50’s; however, spinal implant developments have been far more recent. The industry first saw early spinal instrumentation in the 60’s, which ultimately led to the development of highly specialized lumbar implants commercialized in the early 90’s.

In order to provide better stability, patients sometime have to undergo spinal fusion surgery approached from both the front and back (anterior and posterior) of the spine. As a result, some trends including minimally invasive applications for fusion procedures, in addition to biologic enhancements and the future of motion preservation devices (artificial discs) have evolved significantly. To help advance these objectives, medical device companies specializing in orthopedics innovate surgeon- and patient-friendly devices to keep pace with today’s lifestyles.

One such company is Stratford, Connecticut based VERTEBRON Inc. VERTEBRON is developing both fusion products, including a pedicle screw, cervical plate and allograft systems, in addition to cervical and lumbar motion preservation devices. VERTEBRON’s fusion products have initiated release within the US market, including an evolutionary low-torque (65 in-lbs) pedicle screw system uniquely designed with threadless initial locking and unparalleled screw angulation. Motion preservation devices are expected to be commercially available within the next five years.

VERTEBRON’s ‘motion preservation device’ (MPD) technologies aim to provide greater implant stability through numerous innovations. Proper anatomic positioning (posterior center of rotation) improves biomechanical loading through the disc while modular inserts further minimize wear and accommodate variations in spinal anatomy. Other novel concepts designed to address the potential for revision surgery and multi-level procedures have also been incorporated apart from evaluating new surgical approaches for implantation.

Discussing VERTEBRON’s marketing strategy, Anan Natarajan, Vice President of Marketing, VERTEBRON Inc., tells *Technical Insights*, “There are a number of motion preservation devices in various stages of development for both lumbar and cervical applications. However, what we have not yet seen is better utilization of technologies which have been previously developed in the total joint replacement market. Although

many early-generation designs have been improved upon, there is still a large technological gap between what is currently available in artificial disc designs and the state of the art with total joints, particularly mobile bearing knees.”

Continuing on how the company approaches product development, Natarajan states, “VERTEBRON is actively developing niche technologies from various orthopedic specialties and improving upon them for spinal applications. Our design philosophy is to promote evolution through the integration of technologies, specialties and applications. We not only integrate concepts from the total joint replacement market, but also from other specialties including trauma, maxillo-facial, extremities, and sports medicine. As a result, we feel our designs better address biomechanical requirements of both cervical and lumbar vertebra.”

Motion preservation devices (MPDs) commonly have endplates composed of metal alloys, such as titanium or cobalt chrome, which are attached to the vertebral endplates generally through some type of fixation (spikes), which may also incorporate surface coatings. Surface treatments allow for bone on-growth and long-term fixation of the implant. VERTEBRON may be able to draw upon its strategic alliances with both Musculoskeletal Transplant Foundation (MTF) in select international markets and U.S. Tissue & Cell (UST&C) domestically to support these efforts. The tissue-based alliances could lead to enhanced product development efforts, potentially integrating both porous metallic and biologic coatings designed to improve implant fixation.

“VERTEBRON has developed fusion products and motion preservation devices to address patient needs for both today and tomorrow. Our current emphasis is focused on marketing our evolutionary fusion products. We will then introduce our revolutionary motion preservation devices destined to become our flagship technologies. We plan to enter clinical trials with our motion preservation devices sometime during Q2 of 2005, starting first with our cervical device then following with our lumbar designs. VERTEBRON plans to commercially release these products within the next 4 to 5 years” concludes Natarajan.

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