“From Spine Deformity Treatment Simulators to the TransMedTech Institute Transdisciplinary Innovation Ecosystem”

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Abstract:
In complex spinal deformities (scoliosis), Dr. Aubin and his team are developing a spectrum of technologies to treat patients appropriately. For mild to moderate deformities, they have developed a computer-aided design and manufacturing technology linked to a computer simulation platform, allowing to optimize the design, effectiveness and comfort of orthotics. They are also working on alternative minimally invasive surgical techniques for larger, progressive cases, which completely reshape the treatment strategies for pediatric spinal deformities. The vertebral body growth modulation technique is first optimized preoperatively using patient-specific 3D finite element models, considering the remaining growth potential. Pre-operative planning is also brought into the operating room to further simulate and refine the planning and assist the decision-making process during the operation. The validated
model allows to predict the evolution of the correction over 2 years of growth within the accuracy of clinical measurements. Similar tools are being developed for surgical instrumentation and fusion of pediatric scoliosis cases as well as for adult/aging spinal deformities.

The interdisciplinary approach (engineering, biology, simulation, surgery) and direct partnerships with decision-makers and industrial partners enable the results to be translated and implemented in practice. Dr. Aubin's approach brings together researchers, students, clinicians and patients in the same environment. The TransMedTech Institute, which he founded after obtaining a Canada First Research Excellence Fund, aims to develop next-generation medical technologies for major complex diseases, as well as to transfer and implement them effectively in the health care system and/or the medical technology industry. The TransMedTech Living Lab provides high-level services to support and structure the scientific strategy. TransMedTech Living Lab is a collaborative incubator that acts as a catalyst to facilitate the development and implementation of new medical technologies. It enables all stakeholders to participate from the early stages of research through to implementation, and simultaneously provides a 360-degree view of the issues to be considered, including expected performance, regulatory considerations and potential adoption by users of the medical technology.

Biography:

Carl-Eric Aubin is a Professor of mechanical/biomedical engineering at Polytechnique Montreal, adjunct professor in the Department of Surgery at Université de Montréal and Scientist and Head of the Musculoskeletal Health, Rehabilitation and Medical Technologies Axis at Sainte-Justine University Hospital Center.

Prof. Aubin holds both the NSERC/Medtronic Industrial Research Chair in Spine Biomechanics and the Canada Research Chair in Orthopedic Engineering.

Prof. Aubin is the Executive Director and Scientific Director of the TransMedTech Institute, which he founded and implemented following a major grant from the Canada First Research Excellence Funds, the Government of Quebec and several other partners.