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Primary Research Interest:	Orthopedic Surgery
Description of Research:	<p>The Boden Laboratory conducts research into the control of bone cell differentiation, with the broad clinical interest being in potential therapeutic measures to control bone formation. Specifically, Dr. Boden's laboratory performs studies investigating local and systemic factors that enhance or inhibit differentiation of osteoblasts, the cells responsible for bone formation. Both chemical factors (cytokines and growth factors) and physical factors (ultrasound and mechanical load) are considered to have important effects on osteoblast function. A second area of interest focuses on understanding and improving the responsiveness of cells to bone morphogenetic proteins, the key signaling molecules in osteoblast differentiation. Another focus of Dr. Boden's laboratory has involved the development and validation of small animal and primate models for spinal fusion.</p>
Relevance to VA:	<p>There is a need to regenerate bone in the Veteran population when treating both traumatic war injuries and age-related spinal disorders. Traumatic long bone fractures and spine fusions are among the most difficult bone healing challenges and are among the greatest causes of chronic disability and lost productivity. Bone graft taken from the patient's pelvis, may fail to heal in up to 40% of patients with chronic donor site pain in 25%. A recent advance with great potential is the use of osteoinductive proteins, such as BMP-2, to result in more consistent and faster bone healing than the patient's own bone. Unfortunately, the large doses required for success make the use of BMP-2 very costly. My research seeks to develop strategies to enhance BMP-2 induced bone formation so the dose can be lowered. This knowledge could make bone growth factors more available and safer for millions of Veterans suffering from traumatic extremity injuries or spinal disorders, including back pain.</p>