Scanning Confocal Acoustic Diagnostic for Bone Quality

“Scanning Confocal Acoustic Navigation technology has the potential to revolutionize the osteoporosis diagnostic market. SCAN technology can measure both bone quantity (density) and bone quality (strength), all within a small, lightweight, portable device with high resolution capabilities that can be used in clinics.”

— Yi-Xian Qin, Ph.D., Professor and Director, Orthopedic Bioengineering Research Laboratory, Department of Biomedical Engineering and Department of Orthopedics, Stony Brook University

Background:
Musculoskeletal complications such as osteoporosis or the delayed union of fractures are a major societal problem. Early diagnosis of these skeletal disorders leads to prompt treatment and will dramatically reduce the risk of complication. The gold standard for the diagnosis of osteoporosis is the test of bone mineral density (BMD) that uses dual-energy X-ray absorptiometry (DXA). However, DXA has limitations as a reliable and routine diagnostic method due to its high costs, radiation effects, incidence of false negatives, non-repeatability and lack of portability, which limits its availability to diagnostic centers. A new gold standard is needed: one that is reliable, repeatable and portable. A novel diagnostic device could capture a significant share of the market generated by aging baby boomers.

Technology Description:
Dr. Yi-Xian Qin, professor and director of the Orthopedic Bioengineering Research Laboratory in the Department of Biomedical Engineering and Department of Orthopedics at Stony Brook University, has developed a Scanning Confocal Acoustic Navigation (SCAN) technology that could revolutionize the osteoporosis diagnostic market. His unique SCAN technology can measure both bone quantity (density) and bone quality (strength), vital diagnostic capabilities unavailable with existing devices. Bone quality refers to the physical properties of the bone measured. Strength of bone could be a better indication of future fracture. The strength of a subject’s bone can be determined based on the attenuation and change in velocity of ultrasound traveling through bone. Qin’s SCAN technology employs ultrasound instead of X-ray radiation to provide a more complete assessment of a patient’s bone health, making it safe for patients to undergo osteoporosis assessment as often as possible.

Related research opportunities with this technology include combining Low Intensity Pulsed Ultrasound with SCAN to accelerate bone fracture healing, and developing a phased-array SCAN for more efficient and flexible scanning.

Advantages
- Assesses both bone density and strength to provide more complete assessment of a patient’s bone health
- Enables repeatable and safe assessment
- Allows portable setup in physician’s office
- Offers accurate diagnostic potential

Applications
- Osteoporosis and related bone disease
- Bone fracture healing
- Veterinary

Patents / Publications:
- Patent Pending

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