

NASA	OCCUPATIONAL RISK SURVEILLANCE FOR BONE: PILOT STUDY- EFFECTS OF IN-FLIGHT COUNTERMEASURES ON SUB-REGIONS OF THE HIP BONE	HIP QCT
Principal investigator		
<i>Jean Sibonga, PhD.</i>		
Experiment Description		
<p>This study is proposing QCT as a surveillance technology to monitor changes in hip sub-regions in response to in-flight countermeasures because these parameters of hip morphology are determinants of fracture risk. This study will also evaluate if the observed responses during spaceflight are consistent with expected responses reported in the literature for ground-based studies, both clinical and preclinical. These results will substantiate that countermeasures, based upon mechanical loading of the hip, will expand the cross-sectional area of whole hip bone because of the apposition of bone mass to the outer, periosteal surface of cortical bone; in contrast, countermeasures based upon the biochemical suppression of bone resorption will result in the preservation of baseline hip trabecular BMD.</p> <p>Not only does this study assert that QCT monitoring of hip morphology would have delineated the effects of the bisphosphonate and exercise countermeasures, but QCT would provide additional information to define the response of hip bone morphology to spaceflight, to countermeasures and to recovery on earth.</p>		
Objectives		
<ol style="list-style-type: none"> 1.) Identify which and how many astronauts have reached the clinical trigger for further medical evaluation (for Space Medicine) 2.) Provide failure loads for the hip (for two loading orientations) for fracture probabilistic risk assessments (for Exploration Medical Capabilities and Space Medicine) 3.) Describe the effects of countermeasures on hip bone morphology to optimize implementation, if required (for Human Health Countermeasures) 4.) Inform the modifications of Bone medical standards (for Office of Chief Health and Medical Officer) 5.) Inform the development of clinical practice guidelines (Space Medicine and Chief Health and Medical Officer) 6.) Validate the recommended use of QCT for transition to medical operations (for Human Adaptation and Countermeasures Division) 		
Relevance		
<p>This study will provide human surveillance data to define the risks for early onset osteoporosis and for bone fracture due to long duration spaceflight.</p>		
BDC Summary		
<p>L-45/30 : QCT Scan R+5, R+360, R+720: QCT Scan</p>		
In-flight Operations Summary		
N/A		
Subject Selection/Participation Criteria		