

CRITICAL PATH ROADMAP DISCIPLINE(S)	PRIMARY SPECIES / TYPE	GROUND EXPERIMENT TITLE	NASA OBPR - TASK BOOK								
			Year Experiment Was Listed in Book								
			1995	1996	1997	1998	1999	2000	2001	2002	
Clinical Capabilities; Radiation Effects; Environmental Health	Air	Advanced Technology Development - Biosensors							2000	2001	2002
Clinical Capabilities; Environmental Health; Advanced Life Support	Air	Electronic Nose				1998	1999				
Clinical Capabilities; Environmental Health; Advanced Life Support	Air	Electronic Nose Re-Flight							2000		
Clinical Capabilities; Radiation Effects	Animal	Chemoprevention of Radiation-Induced Neoplasms; Chemoprevention of Radiation-Induced Rat Mammary Neoplasms				1998	1999	2000	2001	2002	
Clinical Capabilities; Radiation Effects; Food & Nutrition	Animal	Countermeasures for Space Radiation Biological Effects									2002
Clinical Capabilities; Human Behavior & Performance	Animal	Effects of Circadian Rhythms on Decompression Outcome				1998	1999	2000	2001		
Clinical Capabilities	Animal	Fully Implantable Integrated Silicon Biotelemetry	1995	1996	1997	1998	1999				
Clinical Capabilities; Muscle Alterations & Atrophy	Animal	GH/IGF-I Transgene Expression on Muscle Homeostasis				1998	1999	2000			
Clinical Capabilities; Bone Loss; Immunology, Infection & Hematology; Muscle Alterations & Atrophy	Animal	Healing Response of Injured Rodent Knee Ligaments to Hindlimb Unweighting and the Therapeutic Efficacy of Growth Hormone (This Task began in FY2000)					1999	2000	2001	2002	
Clinical Capabilities; Radiation Effects; Food & Nutrition	Animal	Nutritional Countermeasures to Radiation Exposure								2001	2002
Clinical Capabilities; Bone Loss	Animal	Pharmacological Intervention to Prevent Disuse Osteopenia		1996	1997	1998	N/A	N/A	2001	2002	
Clinical Capabilities; Bone Loss	Animal	The Effect of Microgravity on Fracture Healing/Ultrasound as a Possible Countermeasure								2001	2002
Clinical Capabilities; Cardiovascular Alterations	Animal	Vascular Genomics in Gravitational Transitions								2001	
Clinical Capabilities; Bone Loss; Food & Nutrition	Animal	Role of Vitamin E in Preventing Oxidative Damage to Bone in Near Weightlessness; The Role of Vitamin E in Preventing Oxidative Damage to Bone in Near Weightlessness and its Effects on Bone Quality During Recovery (This Task began in FY2000)					1999	2000	2001		
Clinical Capabilities	Human	An Innovative Physiologically Based Advanced Liquid Cooling/Warming Garment for Routine and Emergency EVA							2000	2001	2002
Clinical Capabilities	Human	Biomedical Investigations with Laser-Polarized Noble Gas Magnetic Resonance (This Task began in FY2000)						1999	2000	2001	2002
Clinical Capabilities	Human	Biophysical, Mathematical Models of Gas Phase Formation	1995	1996	1997						
Clinical Capabilities	Human	Carbon Dioxide-Oxygen Interactions in Extension of Tolerance to Acute Hypoxia	1995	1996	1997	1998	1999				
Clinical Capabilities; Cardiovascular Alterations	Human	Characterization of Autonomic Function, Sodium Handling, and Nitric Oxide Physiology in Astronauts and Patients Known to be Susceptible to Orthostatic Intolerance (This Task began in FY2000)						1999	2000	2001	2002
Clinical Capabilities; Human Behavior & Performance	Human	Clinical Trial of the Efficacy of Melatonin as a Countermeasure for Entrainment to the Sleep/Wake Schedules Required During Shuttle Missions				1998	1999	2000	2001		
Clinical Capabilities; Cardiovascular Alterations; Muscle Alterations & Atrophy	Human	Correlation Between Physiology and Shuttle Emergency Egress (1 year proposal)	1995								
Clinical Capabilities; Human Behavior & Performance	Human	Countermeasures to Neurobehavioral Deficits from Cumulative Partial Sleep Deprivation During Space Flight				1998	1999	2000			
Clinical Capabilities; Cardiovascular Alterations; Muscle Alterations & Atrophy	Human	Design and Validation of a Dynamic Exercise Countermeasure Device								2001	2002
Clinical Capabilities; Human Behavior & Performance	Human	Designing a Smart Medical System for Psychosocial Support								2001	2002
Clinical Capabilities; Cardiovascular Alterations	Human	Diagnostic Three Dimensional Ultrasonography: Development of Novel Compression, Segmentation and Registration Techniques for Manned Space Flight Applications								2001	2002
Clinical Capabilities; Cardiovascular Alterations	Human	Digital Echocardiography in Manned Space Flight: Remote Diagnosis and Quantitative Analysis				1997	1998	1999	2000		
Clinical Capabilities; Cardiovascular Alterations	Human	Echocardiographic Assessment of Cardiovascular Adaptation and Countermeasures in Microgravity								2001	2002
Clinical Capabilities	Human	Effect of Bed Rest on Simulated Shuttle Emergency Egress		1996	1997						
Clinical Capabilities	Human	Emergency Medical Procedures on ISS: An Independent Human Factors Analysis and Review									2002
Clinical Capabilities; Cardiovascular Alterations	Human	Facilitated Blood Pressure Control by Skin Cooling: Autonomic Mechanisms	1995	1996	1997	1998	1999	2000			
Clinical Capabilities	Human	Factors Affecting Decompression Sickness in Astronauts During Extravehicular Activity	1995	1996	1997	1998	1999				
Clinical Capabilities	Human	Feedforward Active Noise Reduction Headphones for Otoacoustic Hearing Assessment of Space Station Crews (This Task began in FY2000)						1999	2000	2001	2002
Clinical Capabilities; Cardiovascular Alterations; Neurovestibular Adaptation	Human	Heart Rate Dynamics During Microgravity Exposure: Data Analysis	1995	1996	1997	1998	1999				
Clinical Capabilities; Food & Nutrition	Human	Impact of Microgravity on Drug and Nutrient Absorption (This Task began in FY2000)						1999	2000	2001	2002
Clinical Capabilities; Cardiovascular Alterations	Human	Instrumentation for Non-Invasive Assessment of Cardiovascular Regulation				1998	1999	2000			
Clinical Capabilities; Food & Nutrition	Human	Intestinal Adaptation in Microgravity Drug and Nutrient Adsorption		1996	1997	1998					
Clinical Capabilities	Human	Investigation Of Laser-Polarized Xenon Magnetic Resonance		1996	1997	1998	1999				
Clinical Capabilities; Food & Nutrition; Muscle Alterations & Atrophy	Human	Measurement of Body Composition For Nutrition Assessment in Microgravity				1998	1999	2000			
Clinical Capabilities; Cardiovascular Alterations	Human	Mechanisms of Antiarrhythmic Drug Action	1995	1996	1997	1998					
Clinical Capabilities	Human	Microcapsule Gel Formulation of Promethazine Hydrochloride for Intranasal Administration								2001	2002
Clinical Capabilities; Human Behavior & Performance	Human	Microgravity Investigation and Crew Reactions in 0-G (MICRO-G)				1998	1999	2000	2001	2002	

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Clinical Capabilities	Human	Multipurpose Crew Restraints for Long Duration Space Flights										2002
Clinical Capabilities	Human	Near Infrared Brain Imaging for Space Medicine										2001 2002
Clinical Capabilities	Human	Neuronal Vulnerability and Informatics in Human Disease; Neuronal Vulnerability and Informatics in Human Disease [Human Brain Project]	1995	1996	1997	1998						
Clinical Capabilities; Cardiovascular Alterations	Human	Non-Invasive Assessment of Susceptibility to Ventricular Arrhythmias During Simulated Microgravity				1998	1999	2000				
Clinical Capabilities; Cardiovascular Alterations	Human	Noninvasive Measurement of Blood and Tissue Chemistry										2001 2002
Clinical Capabilities; Bone Loss	Human	Noninvasive Monitoring of Bone Resorption and Sweat Calcium Using Skin Patches					1999	2000	2001			
Clinical Capabilities; Food & Nutrition; Muscle Alterations & Atrophy	Human	Nutritional Interventions to Improve Muscle Protein Metabolism During Stress (This Task began in FY2000)					1999	2000	2001	2002		
Clinical Capabilities	Human	Optical Biosensors for In-Flight Measurement of Hormone Levels							2000	2001	2002	
Clinical Capabilities; Neurovestibular Adaptation	Human	Pharmacological Countermeasures for Space Motion Sickness								2001	2002	
Clinical Capabilities	Human	Physiological Effects of a Mechanical Counter Pressure Suit							2000	2001	2002	
Clinical Capabilities; Bone Loss; Muscle Alterations & Atrophy	Human	Prevention of Bed Rest Osteoporosis: Resistive Exercise			1997	1998	1999	2000	2001	2002		
Clinical Capabilities; Radiation Effects	Human	Radiation Anticarcinogenesis by Thiazolidine Prodrugs		1996	1997	1998						
Clinical Capabilities	Human	Smart Medical System for Detection of Microorganisms; Smart Medical System for the Detection of Microorganisms									2001	2002
Clinical Capabilities	Human	Spatially Oriented Database for Digital Brain Images; Spatially Oriented Database for Digital Brain Images [Human Brain Project]	1995	1996	1997	1998	1999					
Clinical Capabilities; Human Behavior & Performance	Human	The Development and Human Factors Analysis of Advanced 3D-Visualization for Telepresence								2000	2001	2002
Clinical Capabilities; Cardiovascular Alterations	Human	The Effects of Exercise-Enhanced Denitrogenation on Altitude Decompression Sickness (DCS) Protection	1995	1996	1997	1998	1999					
Clinical Capabilities	Human	Visual Anatomic Guidance to Facilitate Ultrasound Image Acquisition							2000	2001		
Clinical Capabilities; Bone Loss	Human	Vitamin D RDA from Supplement of Light		1996	1997	1998	1999					
Clinical Capabilities; Cardiovascular Alterations	Human	Physiological Effects of Decompression-Induced Venous Bubbles	1995	1996	1997	1998	1999					
Clinical Capabilities; Bone Loss; Muscle Alterations & Atrophy	Other	Compact, High Precision, Multiple Projection DEXA Scanner				1998	1999	2000				
Clinical Capabilities	Other	Development of Analytical Tools to Process and Apply Digitally Scanned Anthropometric Data										2002
Clinical Capabilities; Bone Loss	Other	Dual-Energy System for Precision Bone Mineral Densitometry and Diagnostic Radiography; Dual-Energy X-Ray System for Bone Mineral Densitometry and Diagnostic Radiography; Dual-Energy X-ray System for Precision Bone Mineral Densitometry and Diagnostic Radiography (This Task began in FY2000)					1999	2000	2001	2002		
Clinical Capabilities; Environmental Health; Advanced Life Support	Other	Environmental Biomedical Research Data Center; Environmental Biomedical Stress Data Center	1995	1996	1997	1998	1999					
Clinical Capabilities	Other	Guided High Intensity Focused Ultrasound for Mission-Critical Care									2001	2002
Clinical Capabilities; Radiation Effects	Other	High-resolution Digital Mammography/NCI	1995	1996	1997	1998						
Clinical Capabilities; Cardiovascular Alterations	Other	Hyperpolarized 129Xe MRI of the Brain, Lungs and Plants				1998	1999	2000	2001	2002		
Clinical Capabilities; Environmental Health	Other	Improved Bubble Detection for EVA								2001	2002	
Clinical Capabilities; Radiation Effects; Human Behavior & Performance; Environmental Health	Other	Miniature Time of Flight Mass Spectrometer				1998	1999	2000				
Clinical Capabilities; Environmental Health	Other	Multianalyte Biosensor with Chips for Human and Environmental Monitoring							2000			
Clinical Capabilities; Environmental Health; Advanced Life Support	Other	Multianalyte Biosensor with Chips for Human and Environmental Monitoring							2000	2001	2002	
Clinical Capabilities; Bone Loss	Other	Non-Invasive Monitoring of Physiological Analytes							2000	2001		
Clinical Capabilities; Bone Loss	Other	Non-Invasive Monitoring Through Transdermal Sweat Detection					1999					
Clinical Capabilities; Radiation Effects	Other	Real-Time Analysis of Biomarkers and Countermeasures Using a Miniature Time of Flight Mass Spectrometer									2001	2002
Clinical Capabilities	Other	Space Qualifiable Magnetic Resonance Imaging System									2001	2002