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Publications of the Space Physiology and Countermeasures Program, Musculoskeletal Discipline: 1980–1990

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PREFACE

This bibliography contains publications resulting from research supported by the Musculoskeletal Discipline of the NASA Space Physiology and Countermeasures Program during the years 1980-1990. It is one of a series of four bibliographies being published in 1992 of the disciplines of the Space Physiology and Countermeasures Program. Others in this series include publications from the Regulatory Physiology, Cardiopulmonary, and Neuroscience Disciplines. Portions of this compilation have been published previously as part of a series of bibliographies of space biomedical research. Previous editions in this series cover the years 1980-1982 (NASA CR-3587), 1982-1983 (NASA CR-3739), 1983-1984 (NASA CR-3860), 1984-1986 (NASA CR-4184), and 1987-1988 (NASA CR-187840).

This bibliography is divided into four sections: Bone, Mineral, and Connective Tissue; Muscle; General Musculoskeletal; and General Physiology. The last section is included to provide the reader with additional, background material in space physiology research. NASA-funded investigators whose work resulted in these publications are identifed by an asterisk. A principal investigator index, as well as a list of investigators and their affiliations, is also included in the bibliography.

As part of our continuing interaction with the scientific and professional community, we are pleased to present this bibliography in an effort to stimulate an exchange of information and ideas among scientists working in this discipline. I would like to thank April Commodore Roy and Audrey Robin Brown for their technical assistance in the production of this bibliography.

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INTRODUCTION

The Musculoskeletal Discipline is part of the Space Physiology and Countermeasures Program of the NASA Life Sciences Division. Space life sciences research was initiated in 1960 with the goal of enabling human survival in space. Now, in the late 20th century, the program is evolving to ensure human health and productivity on space missions: on the space shuttle in the 1990s, then on Space Station Freedom, and ultimately on the Moon and missions to Mars.

The goals of the Musculoskeletal Discipline are to understand the musculoskeletal system's adaptation to spaceflight and to ensure the provision of adequate physiological and performance countermeasures. It encompasses two primary research areas: bone, mineral, and connective tissue; and muscle. This multidisciplinary effort incorporates basic, applied, and operational research, both ground-based and in-flight. Research conducted at NASA centers and in universities includes human and animal (rats and non-human primates) subjects and utilizes various ground-based analogs of weightlessness (including horizontal and head-down bedrest, water immersion, immobilization, and hind-limb suspension) as well as actual space shuttle missions.

Specific objectives of the program include: determining the responses and consequences of muscular and skeletal adaptation to microgravity; determining crew performance or mission consequences of muscular and skeletal responses to microgravity; understanding the mechanisms of muscular and skeletal adaptation to microgravity; developing and verifying muscular and skeletal countermeasures that will facilitate a rapid physiological transition from microgravity to gravity; developing and verifying ground-based human and animal models to study musculoskeletal changes; developing and verifying biomechanical models to investigate neuromuscular and musculoskeletal mechanisms during activities in varying gravity environments; and developing and verifying computer models of adaptation to study muscle and bone at the tissue level.

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INDEX OF PRINCIPAL INVESTIGATORS

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