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Exercise and Osteoporosis Prevention

A Decade of Bone Research
at the Institute of Medical Physics

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Introduction

During the last decade (1998 to 2009) the main objective of the Osteoporose Forschungszentrum (OFZ) of the Institute of Medical Physics (IMP), University of Erlangen-Nuremberg, Germany was to develop and implement exercise strategies that reduce fracture risk in post-menopausal women. Concerning the exercise strategy it is obvious that the content of an exercise regime dedicated to elderly subjects greatly differs from that focused on younger, early postmenopausal females. While both endpoints, “bone strength” and “falls”, are important factors of an exercise program for elderly subjects exposed to considerable risk factors for falls, increased bone turnover with accelerated bone loss places emphasis on bone strength in exercise programs for females in the early post-menopause.

Structuring our studies along the main pathways – fall rate, fall impact and bone strength - we developed and carried out a series of studies with early postmenopausal females:

- Erlangen Fitness und Osteoporosis Study (EFOPS) I and II,
- Training and Cimi-fuga Erlangen (TRACE)-Study
- Senior Fitness and Prevention Study (SEFIP) for elderly females
- Erlangen Longitudinal Vibration Study (ELVIS) I and II

Beside conventional supervised exercise programs with endurance, strength and coordination type exercises, we also evaluated the effect of alternative exercise strategies (Whole Body Vibration and Whole Body Electromyostimulation) on osteoporotic risk factors.

All of our studies were approved by the ethics committee of the Friedrich-Alexander University of Erlangen-Nuremberg (FAU) and the Bundesamt für Strahlenschutz. Written informed consent was provided by each participant. The SEFIP-, ELVIS I- and II- and the TRACE-Study were fully registered under www.clinicaltrials.gov. Statistical power of all studies was either based on BMD-changes at the Lumbar Spine or number of falls (SEFIP and ELVIS-I).

In this contribution we will give a summarized report on each of these different studies regarding the methods, interventions, measurement, results, and conclusions.