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CUHK Invents Vibration Platform to Improve Human Musculoskeletal System

The Department of Orthopaedics and Traumatology at The Chinese University of Hong Kong (CUHK) has developed an innovative vibration platform that could prevent and improve osteoporosis and related diseases by employing low-magnitude and high-frequency whole-body vibration (LMHFV). The vibration platform also improves blood circulation, relieves pressure and other muscle and bone problems, such as low back pain and poor balance due to degeneration in muscles and neurological diseases. By matching the natural frequency of the human body, the platform provides mechanical stimulation to improve the musculoskeletal system.

Led by Prof. Leung Kwok-sui, Professor of Orthopaedics and Traumatology at CUHK, a research team has consistently proved the effects of LMHFV treatment by human studies and laboratory animal experiments since 2005. The first study was done on normal and induced osteoporotic animals with fracture. Research results showed that fracture healings have accelerated by over 30%. Fracture callus formation, mineralization and remodeling were also enhanced.

Subsequently, a three-month study was conducted on post-menopausal women. Results showed that the treatment has enhanced stability in terms of movement velocity, maximum point excursion and directional control by 39%, 15% and 11% respectively when compared with the control group.

In another study, 29 normal elderly were subjected to a 9-month LMHFV treatment. The results indicated that the muscle strength of both of their dominant legs and sub-dominant legs has shown significant improvement. Besides, their reaction time was reduced by 18%, while endpoint excursion and maximum point excursion were increased by 17% and 12% respectively.

Furthermore, a clinical study on the effect of LMHFV on fracture healing and postoperative rehabilitation was conducted on 40 elderly with trochanteric fractures. After a six-month treatment, their bone mineral densities at the fracture positions and directional control in balance ability have improved by 6% and 10% respectively when compared with the control group. Fracture healing and regaining of lower limb functions were notably enhanced.

In addition, Professor Leung collaborated with the China Astronaut Research and Training Centre to investigate the efficacy of LMHFV on healthy young men who were kept for 60 days of complete bed rest which mimics the space flight with no gravity. The outcome further reinforced the positive impacts of vibration treatment in maintaining muscle strength. For example, the chair-rising time is 17% faster than the control group. With reference to the results of animal experiments, clinical studies on post-fracture elderly and post-menopausal women, as well as studies on prolonged bed rest, LMHFV treatment is proved to be beneficial to the musculoskeletal system.

The LMHFV technology is widely applicable. Besides the elderly, bone fractured patients and post-menopausal women, it can also benefit patients with Osteoarthritis and Parkinsonism, athletes who need to train up their muscles and people who want to maintain their bones and muscles healthy.

Developed with a unique technology, the innovative and low cost vibration platform is designed to achieve high energy efficiency, with low noise in operation and low maintenance needs.



From left: Ms. Alice Ngan, Director, Technology Licensing Office, CUHK; Prof. T.F. Fok, Dean, Faculty of Medicine, CUHK; and Prof. Leung Kwok-sui, Professor of Orthopaedics and Traumatology, CUHK



Prof. Leung Kwok-sui demonstrating the vibration platform