Simple measuring method of \( V_02\text{max} \) with a wristband-type accelerometer

Takeshi, TANAKA\(^1\), Hiroyuki KURIYAMA\(^1\), Hirofumi KONDO\(^1\), Takanobu OSAKI\(^1\), Hideyuki BAN\(^1\)

\(^1\) Hitachi, Ltd., Central Research Laboratory

**Purpose:** For health promotion, a simpler measuring method of physical fitness than traditional walking tests is required. We propose the simple and highly accurate measuring method of \( V_02\text{max} \) with a wristband-type accelerometer and a heart rate meter.

**Method:** Firstly, we measured accurate \( V_02\text{max} \) of more 20 men (Age: 20-50) based on indirect measurement with a bicycle ergometer and an expiration gas analyzer. Secondly, we measured 3-axis acceleration and heart rates in 3-min treadmill walking tests (5.5/6.5 km) on the subjects. Thirdly, we estimated \( V_02\text{max} \) of the subjects from their feature values of acceleration, heart rate after walking, age, height and body weight with multiple regression analysis.

**Results and Discussion:** Our multiple regression model achieved \( R = 0.9 \) (SEE < 10%). This regression result is far more accurate than traditional 3-min walking tests with a walking distance and a heart rate.

**Key words:** \( V_02\text{max} \), multiple regression, accelerometer, walking test

---

**P-13** Four-week intake of chlorella-derived multicomponent supplement increases \( V_02\text{max} \): a placebo-controlled study

Sachiro UMEMOTO\(^1\), Yukari ARAKAWA\(^2\), Takeshi OTSUKI\(^1\)

\(^1\) Faculty of Sports and Health Sciences, Ryutsu Keizai University, \(^2\) Sun Chlorella Corporation

**Purpose:** Chlorella, a unicellular green alga, contains much proteins, vitamins, minerals, and dietary fibers. A previous study has demonstrated that swimming time was increased by swim training with chlorella intake compared to swim training mice (Biochem Biophys Res Commun 2011). We investigated whether 4-week intake of chlorella-derived multicomponent supplement increases maximal oxygen uptake (\( V_02\text{max} \)) in young individuals.

**Methods:** Ten healthy subjects (7 men and 3 women) took part in two double-blind trials, placebo and chlorella, in a randomized order. They took placebo or chlorella tablets (15 tablets × twice per day) for 4 weeks. \( V_02\text{max} \) was measured using cycle ergometer before and after each trial.

**Results and Discussion:** Although there was no difference in \( V_02\text{max} \) between before and after placebo supplementation (39.4±2.2 vs 40.1±2.1 mL/kg/min), \( V_02\text{max} \) increased after chlorella intake compared to baseline (37.9±1.9 vs 41.4±1.9 mL/kg/min, \( P = 0.003 \)). The difference in \( V_02\text{max} \) between before and after supplementation was greater in chlorella group (3.5±0.9 mL/kg/min) than placebo group (0.7±0.8 mL/kg/min, \( P = 0.03 \)). We concluded that 4-week intake of chlorella-derived multicomponent supplement increases \( V_02\text{max} \) in young healthy individuals.

**Key Words:** Chlorella, Maximal oxygen uptake, Multicomponent supplement