1-RM BENCH PRESS PERFORMANCE ESTIMATED WITH ACCELEROMETER METHOD
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INTRODUCTION
It is important to have a reliable estimation method for one repeated maximum (1-RM) to plan and follow up strength training sessions. The use of muscular endurance repetitions has been implemented to estimate the 1-RM e.g. in the bench press (1, 2, 3, 4). Maximal tests of dynamic strength are commonly used for athletes but for the elderly and physically inactive subjects the tests may be difficult to perform. The 1-RM testing has also been considered as dangerous due to dealing with heavy loads and impractical because the method is time-consuming (2, 3). The purpose of this study was to examine if bench press 1-RM could be reliably predicted with a new accelerometer based method.

METHODS
The data was obtained from 22 Finnish male floor ball players. The subjects’ mean age, weight and length were 22 (16–30) years, 72.5 (61–87.5) kg and 177.5 (163.5–186) cm. The new method was based on acceleration analysis of one submaximal lift in bench press. The accelerometer was integrated to wrist equipment. The measurement signals were recorded and the total acceleration and the estimated 1-RM results were calculated and analyzed in PC with Lab View based software. The estimation equations were based on the maximum acceleration of the submaximal weight lifted and was developed individually for each load. The used load levels were 50, 60, 70, 80 and 90 % of the measured 1-RM result. The results were analyzed against measured 1-RM results with Pearson correlation coefficient test and Student T-test.

RESULTS
The mean (±SD) of measured 1-RM result was 69.86 kg (±15.72) while the mean of estimated 1-RM values was 69.85–69.97 kg depending of the used load. These values were not significantly different from each other. Significant correlations were observed between the measured and estimated 1-RM results (0.89-0.97, p<.001). The standard error of estimate (SEE) values varied between 3.5-7.1 kg. The best estimation accuracy was obtained with a load of 80 % (SEE was 3.5 kg and the mean absolute error was 2.6 kg and 4.1 %).

DISCUSSION
The results of this study showed that it is possible to estimate bench press performance by performing just a single submaximal bench press lift using a new accelerometer method. The estimation accuracy is competitive with other known estimation methods. The SEE values of 1-RM with repetitions-to-fatigue have been 4.9 kg (1), 4.0-14.9 kg (4), 8.5-47.3 kg (3), 2.7-8.2 kg (2). Further development is, however, still needed in order to be able to cover a wider dynamic load level area with a single estimation equation.

REFERENCES:
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