Introduction:
In order to develop the individually best performance in strength related sports an effective training regulation is required. Generally speaking, this can be achieved by continuous performance diagnostics and the realisation of the results into training practice. In the focus, however, should be those strength parameters which directly influence performance in training and competition [1]. Accordingly, the aim of this study was to investigate the development of classic and modern strength parameters such as maximal force, power, rate of force (RFD) and power development (RPD) etc. dependant on mechanical and electrical stimuli. The relation between load and velocity and the resulting power output will be discussed in this context, too. Aim of the study is to find out classifications and relations between different training stimuli with different loading, movement velocities and power output. On this basis, practical training advice should lead to a professional strength training approach in elite sport.

Methods:
40 sport students with strength training experience were randomized in 4 training groups (n=10): electromyostimulation (EMS), mixed EMS/hypertrophy, hypertrophy, maximal strength group. After pilot training and diagnostics a 4 week long training period took place (2x/week). The traditional strength training was performed 2x/week on the Leg Curl (LC) and the Leg Extension (LE). The hypertrophy group trained with 3 sets, 10RM, 1min. rest between sets and a computer given speed (biofeedback) of 2s con, 0.5s (iso) and 4s (ecc). The maximal strength group performed 3RM, 3 sets with explosive strength development and 3min pause between sets. Training parameters of the EMS group were: 3 sets with 10 contractions each, stimulation/pause ratio 6s/4s, individually 70% intensity, impulse frequency 85Hz, impulse width 350956; impulse type rectangle. Squat and lunge were the exercises of the EMS group. Strength diagnostics took place before, after 2nd, 4th and 6th training week at the LE and the LC (3 tests isometrically and 6 dynamically with 50% and 75% additional load). Reliability of test performance was investigated beforehand with a test-retest study.

Results:
Maximal force, power as well as force development (isometric and dynamic RFD, RvD and RPD) showed different adaptations dependant on the training method. The combined approach (EMS and hypertrophy), however, suggests to use a mixture of different training stimuli to improve a variety of strength related parameters.

Conclusion:
Modern strength diagnostics elucidates differentiated adaptations of different mechanical and electrical stimuli on isometric and dynamic strength parameters. This allows an individually better training regulation and offers new concepts for the use of the individually best composition of strength training methods.

References:

Keywords: Strength Training, Diagnostic, Electrical/Mechanical Stimulation