

## Introduction

The purpose - development and testing of muscle strength building strategy by means of magnetic stimulation of muscles against the background of their voluntary contractions.

## Methods

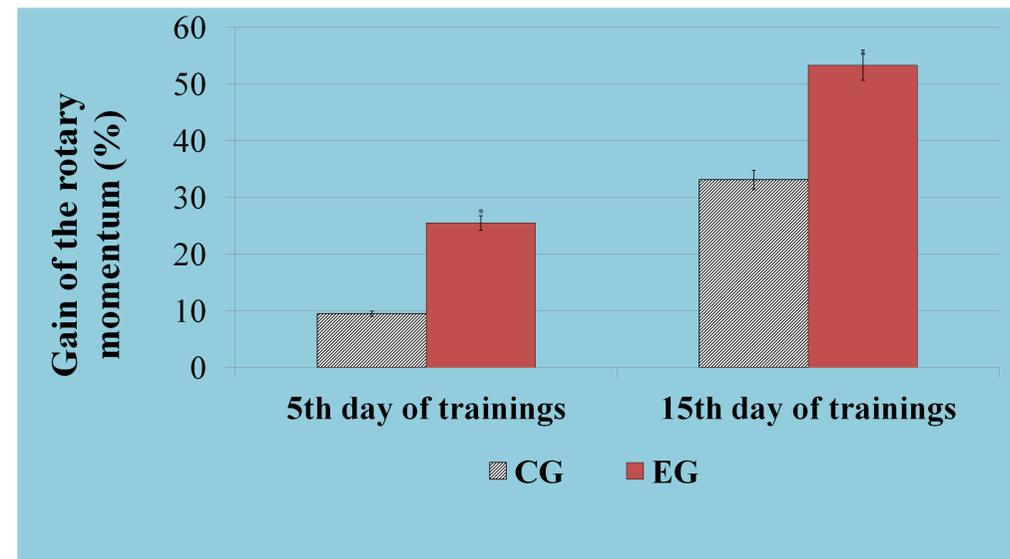
18 participants, male athletes, aged 19-28, were teamed up into a control (CG) and experimental (EG) groups. All the subjects performed planter foot flexion with an 80% effort of the maximal rotary momentum (MRM) during 15 trainings on the «Biodex» complex. Each training included 10 five-second contractions with a 50-second break in between. During muscle contractions 5Hz - magnetic stimulation, 50% of «Magstim Rapid-2» stimulator maximal power, was applied to the EG subjects' muscle gastrocnemius. Prior, in 5 and 15 days of the training both MRM and EMG of shin muscles were simultaneously registered. The same days H-reflex and M-response of gastrocnemius and muscle soleus were registered as well.

## Results & Discussion

As a result of 15 trainings, MRM increased in both groups – higher in the experimental group than in the control group by 15,4% after 5 trainings and by 19,4% after 15 trainings (Table 1, Fig.1).

Reference value	Statistical data		CG		EG	
	M	m				
After 5 days	M	m	119,31	5,33	124,01	8,82
After 5 days	M	m	130,61	6,11*	154,91	10,52*
After 15 days	M	m	158,11	8,34*	188,41	11,23*

**Table 1. Parameters of the rotary momentum (M m, n=18), N·m**  
\* – p < 0,05 – reliability of differences between the respective parameter and its reference value



**Fig.1 Mean group results of increase (%) of strength involving rotary momentum in the ankle joint**

\* – p < 0,05 – reliability of differences

The analyses of EMG parameters (Table 2), H- and M-responses prove the more significant gain of power potential in the experimental group to have been achieved by increase of a descending nerve drive to the spinal motoneurons and increase of gastrocnemius motor-neuron pool reflex excitability.

Group	EMG parameters	Muscles	Reference value		Days of trainings			
			M	m	5		15	
CG	Amplitude, mkV	gastrocnemius	412,44	43,34	606,34	45,91*	615,41	54,97*
		soleus	543,48	76,19	796,11	52,64*	766,74	46,66*
	Frequency, Hz	gastrocnemius	364,58	51,31	498,15	24,05*	513,74	24,51*
		soleus	252,11	28,36	367,15	9,19*	386,15	10,83*
EG	Amplitude, mkV	gastrocnemius	319,41	35,59	546,52	65,49*	686,96	56,91*
		soleus	343,52	34,47	504,19	30,53*	507,19	48,75*
	Frequency, Hz	gastrocnemius	285,92	39,57	431,74	47,59*	513,19	20,43*
		soleus	251,51	31,69	330,85	20,42*	373,37	10,24*

**Table 2. The EMG parameters of shin skeletal muscles at development of a maximal effort (M m, n=18).** \* – p < 0,05 – reliability of differences between the respective parameter and its reference value

## Conclusions

Magnetic stimulation of muscles, against the background of their voluntary contraction, can be used as an extra method of muscle strength building strategy.