

European Respiratory Society Annual Congress 2013

Abstract Number: 1241
Publication Number: P3729

Abstract Group: 1.2. Rehabilitation and Chronic Care

Keyword 1: Respiratory muscle **Keyword 2:** Physiology **Keyword 3:** Rehabilitation

Title: Activation of respiratory muscles during respiratory muscle training

Dr. Stephan 13916 Walterspacher stephan.walterspacher@uniklinik-freiburg.de MD ¹, Mr. Fabian 13917 Pietsch fabian.pietsch@gmx.de ¹, Dr. David 13918 Walker david.walker@uniklinik-freiburg.de MD ¹, Prof. Dr Kai 13919 Röcker kai.roecker@uniklinik-freiburg.de MD ² and Dr. Hans-Joachim 13920 Kabitz hans-joachim.kabitz@uniklinik-freiburg.de MD ¹. ¹ Department of Pneumology, University Hospital Freiburg, Freiburg, Germany, 79106 and ² Department of Rehabilitative and Sports Medicine, University Hospital Freiburg, Freiburg, Germany, 79106 .

Body: Introduction Respiratory muscle training (RMT) is applied by athletes and in patients with respiratory muscle dysfunction. Yet it is unknown which respiratory muscle groups are mainly activated by RMT. Objective This study aimed at evaluating three RMT methods (Inspiratory Threshold Loading [POWERbreathe] (ITL), Targeted Resistive Breathing [RespiFit S] (TRB), Normocapnic Hyperpnoea [SpiroTiger] (NH)) with regard to their electromyographic (EMG) activation of three specific inspiratory muscle groups (M. sternocleidomastoideus (EMGsterno), 2nd intercostal parasternal muscles (EMGpara), Diaphragm (EMGdi)) in healthy subjects. Methods EMG recordings were analyzed as their RootMeanSquare (RMS) at the end of each randomized training session and normalized using the peak EMG recorded during maximum inspiratory maneuvers (Sniff nasal pressure: SnPna, maximal inspiratory mouth occlusion pressure: PImax) and expressed as EMG%max. Main Results 41 subjects were included. Recordings for EMGsterno and EMGpara were higher in ITL and NH than for TRB (p<0.05). EMGdi was higher applying ITL compared to TRB or NH (p<0.05).

Effects of respiratory muscle training on muscle activation

	EMGsterno	EMGpara	EMGdi	p	
	RMS	RMS	RMS		
PImax	269±131±	83±96	68±43	Sterno vs Di: p<0.001	Sterno vs Para: p<0.001
SnPna	324±110	82±64	65±31	Sterno vs Di: p<0.001	Sterno vs Para: p<0.001
	%max	%max	%max		
ITL	59±21	46±28	47±21	Sterno vs Di: p<0.05	Sterno vs Para: p<0.05
TRB	25±21	23±17	24±10	-	
NH	54±28	45±25	34±15	Sterno vs Di: p<0.001	Sterno vs Para: p<0.001

Conclusion ITL, TRB and NH differ in their activation of inspiratory respiratory muscles. Whereas all methods mainly stimulate accessory respiratory muscles, diaphragm activation was predominantly increased by ITL.