System specific loading in aquatic physical therapy: A comprehensive update

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Target audience:

All physical therapists, interested in APT or working in APT working with patients with musculoskeletal, orthopaedic or neurological conditions.

Summary:

Aquatic physical therapy and exercise is a popular training method for ageing adults with or without function impairments and/or activity limitations. However, commonly the interventions prescribed are non-specific and do not achieve optimal loading for maximal physiological adaptation. This course will combine both the latest research of the effect of aquatic physical therapy and immersion on higher order neural regulation and the myofascial system within the body with the significant clinical experience of the teachers to provide a unique teaching experience.

Learning objectives:

1. Justify benefits of aquatic physical therapy for nervous tissue loading with (an)aerobic training, environmental enrichment and functional balance during posture and gait.

2. Adapt and implement different aquatic training programs for specific therapeutic effects in the musculoskeletal and aerobic systems.

3. Understand the basics of fascia loading, adapt these to the aquatic environment and develop aquatic exercises for fascial resilience.

4. Application of the principles using different known aquatic physical therapy approaches include water specific therapy, Bad Ragaz Ring Method

Description:

Musculoskeletal and neurological conditions as well as ageing cause adaptation in many different systems within the human body including the nervous, cardiovascular and myofascial systems. These changes lead to decreased physical activity, influencing functional capacity, participation and quality of life, which increase the risk of co-morbidities with increased dependence and less well-being. Aquatic physical therapy and exercise is a popular training method for ageing adults with or without function impairments and/or activity limitations. However, commonly the interventions prescribed are non-specific and do not achieve optimal loading for maximal physiological adaptation (Waller et al, 2016).

The workshop part about the nervous system will focus on executive functions, which are engaged to deal with tasks in which routine – motor – behaviour would not be sufficient for an optimal performance. These functions decline during normal ageing and even more so in neurodegenerative (Leh et al 2010) or metabolic diseases. A variety of (sub)cortical networks are involved in executive dysfunction and in compensatory mechanisms. Hippocampal recruitment is frequently seen in e.g. Parkinson patients (Leh et al, 2010). The neuroplastic basis of recruitment relate to growth factors which have been shown to have a much higher expression during aquatic (an)aerobic activities, compared to land (Bansi 2012). Research has shown that executive function training in water induce moderate to large clinical effect sizes compared to land (Albinet 2016, Fedor 2015). Underlying mechanisms might be neurophysiological, circulatory and immunological changes in the brain, which have been well documented, showing changes in cerebral blood flow during immersion, changes of corticospinal excitability and increases of growth factors like the Brain Derived Neurotropic Factor. Nervous tissue loading by immersion, (an)aerobic training and environmental enrichment will be addressed in the course, using the model of neuroprotective exercise and will be related to balance and gait.

Executive function output needs a proper structure and function of the myofascial system, therefore the effects of immersion on the central nervous system needs to be augmented with optimal loading from aquatic resistance training, which has been shown to have a positive therapeutic effect on the neuromuscular system, cartilage, pain, functional capacity, performance and body composition in subjects with lower limb musculoskeletal conditions, specifically osteoarthritis and post arthroplasty (Pöyhönen et al 2002, Valtonen et al 2010, Munukka et al 2016, Waller et al 2017).

Intra- and intermuscular fascial tissue needs a proper resilience to transfer forces and transform movement energy during ADL. Inactivity and passive, sedentary lifestyle makes the fascia inelastic and stiff (Klinger 2014), decreasing e.g. gait efficiency (in addition to loss of executive functions). Dynamic training with rebound character increases the resilience of this tissue. This part of the course will address how to adapt the present research for optimal loading of the myofascial system.

In conclusion, it is clear that - based on the latest evidence - therapeutic aquatic exercise programs can be created to impact specific systems within the body. This course will take the latest scientific evidence combined with the many years of clinical experience the course lecturers have. This course will give new clinical tools to the participants working with a wide range of different patient populations.

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