Physiological effects of immersion to consider when referring for Aquatic Physiotherapy.

Research demonstrates clients with stable chronic conditions such as: diabetes, cardiac disease, respiratory disease, renal disease, thermoregulatory disorders and cancers can benefit from exercise in water with appropriate screening and monitoring.

The following table highlights the Physiological effects of Immersion to consider when referring.

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• 700ml shift of extracellular fluid central (2/3 to lungs, 1/3 to heart) Cardiac disease Unstable conditions Hailing • Increase in CBV ~ 20-40% Postural Myocardial infarct < 6weeks Bee • Increase in stroke volume ~ 50% hypotension Myocardial infarct < 6weeks Bee • Increase in cardiac output ~ 34% Nyotension Myocardial infarct < 6weeks Bee • 30% increase in heart size (in 6 sec) PVD Severe and symptomatic aortic Bee • Decreased PR Poctreased Pripheral Resistance PVD Stress test prior Thrombophibitis Recent systemic or PE • Decreased Nork of breathing COPD COAD Resting Systolic BP > 200mmHG • Increased ing compliance COPD COAD Clients who are SOB at rest Gained • Decreased lung compliance Asthma Obesity Elderly Anxiety Arma • Decreased iung volumes VC (5-10%), TLC, FRC and ERV. COPD Clients who are SOB at rest Gaine • Decreased lung volumes VC (5-10%), TLC, FRC and ERV. Asthma Obesi	
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PUDDY • Increase in stroke volume ~ 50% hypotension Myocarditis < 6 months et if (20) • Increase in cardiac output ~ 34% • 30% increase in heart size (in 6 sec) • Approx. 13mmHg increase of CVP • Increased pulmonary artery pressure • Decreased HR (10-15bpm) • Decreased Peripheral Resistance • PVD Haemodilution in 1 st 30 mins of immersion. PVD Severe and symptomatic aortic stenosis Hypertrophic cardiomyopathy • Decreased Peripheral Resistance • Haemodilution in 1 st 30 mins of immersion. Stress test prior to aquatic exercise recommended Resting diastolic BP > 100mmHg • Increased work of breathing • COPD COAD Resting diastolic BP > 100mmHg • Decreased thoracic expansion • COPD COAD SoB at rest (20) • Diaphragm elevation • Decreased lung compliance secondary to central vascular engorgement. Obesity Elderly Arxiety Arxiety Arxiety Ariet y Previous addition a	1550)
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YOUGUST • Increase in cardiac output ~ 34% Hypertension Unstable ischaemia AP • 30% increase in heart size (in 6 sec) Approx. 13mmHg increase of CVP PVD Severe and symptomatic aortic AP • Approx. 13mmHg increase of CVP Increased pulmonary artery pressure PVD Severe and symptomatic aortic AP • Decreased HR (10-15bpm) Decreased Peripheral Resistance PVD Severe pulmonary hypertension Thrombophlebitis • Haemodilution in 1 st 30 mins of immersion. Stress test prior to aquatic exercise recommended Recent systemic or PE Resting faastolic BP > 200mmHG • Increased work of breathing COPD COAD Clients who are Me • Decreased lung compliance secondary to central vascular engorgement. Obesity Clients who are Me • Increased iung volumes VC (5-10%), TLC, FRC and ERV. Spirometry LFTS recommended to guide immersion safety (VC, FEV_J) Acute Asthma An • Decreased Bus with increased Wol was in water. Spirometry LFTS recommended to guide immersion safety (VC, FEV_J) Huppelycaemia ≤ 4.0 mmol/L Ho	et al. (2009)
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• Decreased bols with increased of onstable bols inpograte in a 24.0 minor L	Horden MD
et:	et al.
	2012)
conditions Hyperglycaemia ≥ 15 mmol/L and	APA (2015)
hypertension ketones present	(2015)
Peripheral	
neuropathy Unable to self-test BGLs pre, post	
Cardiovascular and during Xs	
Signature neuropathy Unable to self-test BGLs pre, post Cardiovascular and during Xs autonomic neuropathy	
Retinopathy Stress test recommended for	
PVD previously sedentary clients with	
Obesity additional CV risk factors	
Renal disease	

Pain Management	CNS & ANS	 Increased PN Meditative ereduction Gate effect of temperature Muscle relax Joint swelling 	g reduction	Anxiety Disorders Epilepsy/seizure		Becker BE et al. (2009) Bender T et al. (2005)
GENITO-URINARY		 Increased so excretion Decreased B Increased ren renal sympatic vascular presactivity. Regular super 	uresis up to 7 x dium and potassium P nal efficiency – lower thetic N activity, renal ssure and plasma renin ervised aquatic exercise onic Kidney Disease	Renal conditions Clients on fluid restrictions Cardiac conditions Urinary Incontinence		Hall, J et al (1990) Pechter U et al. (2014)
HEAT	SENSITIVE	(34-36 degre	pool at thermoneutral es) eases core temperature	MS Lymphedema Active inflammatory conditions (RA)		Bender T et al. (2005)
CANCER	Lympnedema	compression	pressure provides to assist with lymph to vascular system	Using cytotoxic agents Severe Cachexia Compromised immune function	Neutrophil count < 500m/mm3 Current radiation therapy Current cytotoxic agents and incontinent	APA (2015) Smith SE (2013)

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