Skill versus strength training in swallowing rehabilitation

Swallowing disorders (dysphagia) can be a consequence of stroke (cerebro-vascular accident), neurodegenerative diseases (Parkinson’s disease, multiple sclerosis, etc), head & neck cancer, traumatic brain injury, or other conditions. According to the New Zealand Ministry of Health Survey for 2006/7, 60,000 New Zealanders are living with the consequences of stroke. Over half of these will have dysphagia (Marik & Kaplan, 2003) with the most common complications of chest infection malnutrition and dehydration (Schindler, Ginocchio & Ruoppolo, 2008).

Several rehabilitation techniques have been developed to address dysphagia, however most of these emphasise enhancement of muscle strength. Effective swallowing requires not only strength but also accuracy, timing, coordination and planning of the motor events. Since stroke damages the brain rather than the muscles themselves, a skill training approach might be more suitable and beneficial in swallowing rehabilitation.

We will evaluate two approaches to swallowing rehabilitation - skill training versus strength training - and measure their effects on swallowing bio-mechanics, muscle size, and excitability of the motor strip in the cortex. Using these variables, we will explore the source of any changes resulting from training and answer critical questions regarding the effects of intervention. Do we see improvement in swallowing due to increased muscle strength or due to changes in brain excitability?

As an initial step in the development of this treatment approach, we will recruit 40 healthy participants. The treatment will take place at the Swallowing Rehabilitation Research Laboratory in the Van der Veer Institute. Both treatment approaches will be provided daily for 2 weeks and will utilise surface electromyography (sEMG) biofeedback, with custom-designed software. Treatment will differ only in the targeted behaviour and treatment approach. For outcome measures, we will use pharyngeal manometry to measure pressure in the pharynx, ultrasound to measure muscle bulk under the chin, surface EMG electrodes to measure the strength of the muscles under the chin, and MEPs (motor evoked potentials) triggered by TMS (transcranial magnetic stimulation) to assess the robustness of communication between the brain and the muscles involved in swallowing.