A summary of the relationship between mastication, cognition, and quality of life in elderly persons with dementia.

Mastication and oral health in elderly persons with dementia. The relationship with cognition and quality of life.

Oral health care is an important part of the daily care for elderly persons. However, it is often not adequate in the senior population, neither for community dwelling individuals nor for nursing home residents. When oral health deteriorates, the risk for (amongst others) pneumonia, cardiovascular problems such as endocarditis and stroke, diabetes, and even Alzheimer’s disease (AD) increases. Loss of masticatory function has also been associated with loss of cognitive performance. As the cognitive skills from persons suffering from dementia, such as AD, are vulnerable, providing them with adequate oral health care to maintain general health and perhaps even cognition, is of the utmost importance.

In this thesis, the relationship between mastication, cognition, and quality of life (QoL) in elderly persons suffering from dementia is investigated, both in the literature and in a clinical setting. The topic is introduced in chapter 1, including a description of the most common subtypes of dementia.

In chapter 2, a review of the available literature on the relationship between mastication and cognition is presented. From experimental animal studies, a causal relationship between inhibition of masticatory activity and cognitive performance emerged. The results from these studies indicated that the stress system (i.e., the hypothalamic pituitary adrenal axis) is likely to play an important role in the modulation of cognition by mastication. For example, neuronal growth is limited by stress, a negative effect which can be countered by chewing. In human studies, with healthy adults, it was found that cognitive performance improved during, or immediately after, chewing a piece of gum. This effect is temporary, and subsides quickly after the participant stops chewing. Although not all studies unanimously confirm this acute effect with regards to the specific cognitive domain, there seems to be agreement on the existence of a general acute positive effect; with individual differences in design explaining the sometimes ambiguous results. Apart from this
Transient effect, a more permanent outcome is also reported; the effect of improved cognition which is achieved by improving masticatory function through the application of dental prostheses. Elderly persons with improved masticatory function show better performance on a variety of neuropsychological tasks, and persons who have received prosthodontic treatment show brain perfusion associated with positive cognitive outcomes. Possible explaining physiological mechanisms, besides reduced stress, are the positive effect of an enriched environment due to sensory input of the mouth, the positive effect of increased blood flow due to increased masticatory activity, or a mediating effect of nutrition.

It might also be possible that the presence of pain has a role to play. However, pain is typically hard to diagnose, if it is not self-reported. Due to the diminishing communicative skills in older persons with dementia, their pain is, in general, underrecognized and undertreated. There are a few observation scales available for the assessment of pain in elderly persons with dementia, which are discussed in chapter 3. However, none of these scales were found to pay specific attention towards orofacial pain (i.e., pain relating to the mouth and face). Typical pain indicators are: a contorted expression or rapid blinking, heavy breathing, verbalizing (shouting, crying), and defensive or withdrawn behaviors. Recommended to be included in observation scales, as they are typically indicating orofacial pain, are behaviors such as putting the hands to the affected orofacial area, exhibiting changed eating patterns, making careful (i.e., small and/or slow) oral movements, and resisting oral care.

Besides a review of the literature, a clinical study was performed as well. An intervention to increase masticatory activity, through changes in diet and the implementation of the Dutch Oral health care Guideline for Older people in Long-term care Institutions (OGOLI; Richtlijn Mondzorg voor zorgafhankelijke cliënten in verpleeghuizen; Nederlandse Vereniging van Verpleeghuisartsen, 2007), was studied in several nursing homes in the Netherlands, using a longitudinal design. The main outcome variables were cognition and quality of life (QoL). The protocol for this randomized clinical trial (RCT) is presented in chapter 4. Over a hundred elderly persons suffering from dementia, attending daycare or receiving residential care, participated in the RCT. They were studied over a period of 6 months, and at several predefined moments, repeated measurements were taken (viz., at baseline, 6 weeks later, 12 weeks later, and 24 weeks later).

A test that assesses the ability to mix two-color (pink and blue) chewing gum samples through mastication was developed, for objectively measuring masticatory performance. It was found to have adequate sensitivity for change, and reliability, as described in chapter 5. Validity needs to be further established.

The associations between masticatory performance, measured with this mixing ability test, and cognition, assessed with a test battery of neuropsychological tests have been studied in the data from the baseline assessment. Positive associations
between masticatory performance and the cognitive functions global cognition and verbal fluency were found, and these results are discussed in chapter 6.

The results from the intervention were comparable to recent reports with regard to implementing the guideline. It was found that offering clinical lessons and support to the nursing staff was not enough to effectively change the oral health care routine. There were serious concerns with regards to implementation success, and these are described in chapter 7. Based on these results, it was decided to end the trial, and to focus on devising alternative approaches.

The final recommendation from this thesis, as described in chapter 8, is that daily oral health care for elderly persons suffering from dementia should be organized in the person of a designated, dedicated, oral care nurse. This is preferably someone who has received specialized training in both providing oral care and managing uncooperative and resistant behavior. We suggest that this is arranged as a specific profession, or job description, the ‘Denticure’.