ACT Project catalogue

Revised January 2025

2025-01-03

	Core group	ACT-affiliated researchers	Collaborators	PhD student
1. Frailest/osteoporosis		Pia Skott, Charlotta Elleby	Helena Salminen, Sven Nyrén, Holger Theobald, Grethe Jonasson	--
2. Chew and think		Mats Trulsson, Pia Skott, Gunilla Sandborgh Englund, Åke Seiger	Erik Westman, Urban Ekman, J-I Smedberg, Abhishek Kumar	Linn Hedberg
3. Domiciliary dental care		Inger Wårdh, Pia Skott	Petteri Sjögren, Georgios Belibasakis, Niels Ganzer, Kristina Edman, Helena Domeij	Elisabet Morén
4. Oral screen training post stroke		Gunilla Sandborgh Englund, Pia Skott, Åke Seiger	Anita McAllister, Elisabet Åkesson, Jesper Dalum, Emelie Persson, Åsa Karlsson	--
5. Chew and swallow/MoWo		Mats Trulsson, Gunilla Sandborgh Englund, Pia Skott, Abhishek Kumar,	Anastasios Grigoriadis, Tommy Cederholm, Anders Wänman, Anne Söderlund, Elisabeth Rydwik, Kerstin Johansson	--
6. Training paradigms development		Abhishek Kumar, Mats Trulsson, Pia Skott	Anastasios Grigoriadis, Joannis Grigoriadis	Lemming Jia
7. Age-related changes in mastication		Abhishek Kumar	Anastasios Grigoriadis, Joannis Grigoriadis	Linda Munirji
8. Oral health and malnutrition		Gunilla Sandborgh Englund, Abhishek Kumar	Duangjai Lexomboon	--

Principal Investgator:
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(Supervisor)

Co-investigators:
Charlotta Elleby
(PhD student)

Pia Skott
Sven Nyrén
Holger Theobald
(Co-Supervisors)

Grethe Jonasson
(Research collaborator)

2025-01-03

Title

1. **New ways of identifying individuals at risk of frailty and fragility fractures**

Project overview

Project start	**2016**	
Calculated end	2023	
Grants awarded		
Source	ACT FTV Stockholm	
Year	2016-2023	

Aim

The aim is to study methods to identify individuals with augmented risk of frailty and fragility fractures in the dental setting, by assessing the trabecular bone structure in dental radiographs, questions about health status and mobility, comorbidity with other diagnoses, and using the FRAX-tool for fracture risk assessment.

Project description

The REBUS cohort gives possibilities to study the predictive value of risk factors associated with fragility fractures during a follow-up of up to 47 years. Identifying high risk patients enables early inset of effective preventive treatments such as medication and physical activity, which would decrease both the suffering of individuals and high costs for the society. The first three studies are cohort studies with register data using the REBUS cohort. The purpose of the first study is to investigate if risk for future fractures can be determined by assessing the trabecular bone structure in dental intra oral radiographs in the dental part of the REBUS

cohort. In the following two studies the purpose is to find additional risk factors for fragility fractures and frailty. In the fourth study, which is a qualitative study, we investigate patients' thoughts of having their ten-year risk of fragility fractures being assessed in conjunction with a dental appointment. This setting is a previously not identified possibility to find individuals with augmented risk of sustaining fragility fractures, and, hence, frailty. Dental radiographs are taken regularly on individual indication on a large part of the population and the dentists are familiar in analyzing them. The regular dental recall system for check-ups could also enable regular contact with a large part of the population. Altogether this could make the dental setting suitable for identifying patients at risk of fragility fractures and frailty.

Studies included:

Study I: Aim**:** To study two methods of assessment of intra oral radiographs and their association to fragility fractures during a follow up time of up to 47 years using data of 837 individuals in the Rebus dental cohort.

Study II: Aim: To study the association between questions about health status and mobility and hip fractures in the REBUS cohort during a 35-year follow-up using questions from the 1969 postal survey to over 30,000 participants.

Study III: Aim: A nested case control study of the 30 000 individuals from the original REBUS cohort, studying the association of certain medical diagnoses to fragility fractures during a follow-up of up to 47 years.

Study IV: Aim: A qualitative study to investigate patients' thoughts about having their fracture risk assessed in conjunction with a dental appointment using the risk assessment tool FRAX. Patients 65-75 years old in Stockholm Public Dentistry will be interviewed.

Project status December 2022

Study I: Published in European Journal of Oral Sciences, E-pub May 2021.

Study II: Submitted manuscript

Study III: Remains: Statistical analysis and manuscript writing

Study IV: Submitted manuscript.

Publications

Elleby C, Skott P, Jonasson G, Theobald H, Nyrén S, Salminen H: Evaluation of the predicted value of two methods to identify individuals with high risk of fragility fractures using intraoral radiographs. Eur J Oral Sci 2021 Oct;129(5):e12801. doi: 10.1111/eos.12801.

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Elleby C, Skott P, Johansson S-E, Theobald H, Nyrén S, Salminen H: Long term association of hip fractures by questions of physical health in a cohort of men and women. Accepted PLOS One.

Elleby C, Skott P, Theobald H, Nyrén S, Salminen H: Patients thoughts about assessment of fracture risk in dental setting using FRAX – a qualitative interview study. Arch Osteoporos. 2023; 18(1): 65.

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2025-01-03

Title

2.	**The CogChew project: The cognitive changes and neural correlate after rehabilitation of mastication in older people – an intervention study**

Project overview

Project start	**2016**	
Calculated end	2025	
Grants awarded	6*425 000	
Source	SOF	
Year	2017-2019, 2020-2022, 2023-2025	

Aim

To evaluate the association between masticatory function in elderly and neurocognitive function. By conducting an intervention study in elderly people with impaired masticatory we aim to evaluate this association, and to establish a causal relationship

Project description

Tooth loss and reduction of masticatory function is a risk factor for dementia and cognitive decline. The question of whether this detrimental effect on cognitive function caused by tooth loss is reversible through oral rehabilitation is of particular importance. Although an association between masticatory impairments and neurocognitive functions seems evident, intervention studies on humans is lacking, and a causal relationship has not been established. We aim to conduct an intervention study on older people where rehabilitation of masticatory functions is

performed and evaluated with cognitive measures and brain imaging. Patients (n=80) between 70 and 79 years of age, who suffer from masticatory impairment (Eichner's index B3- B4 or C1-C4) are recruited at the Eastman clinic. Oral rehabilitation is performed as agreed between the dentist and the patient. Evaluation methods: Subjective and objective mastication ability, neuropsychological assessments (a range of cognitive domains with primary focus on memory and executive functions) and MRI are performed before and 3 months after oral rehabilitation. In a subgroup, retest effects are ascertained by repeated pretest, 3 month after first test. The cognitive tests will be analyzed as repeated measure ANOVAs with group (experimental and control) and Date (pre- and post-rehabilitation) as factors. Group by Date interaction, main effect of group, and main effect of Date analysis will be evaluated. Brain imaging: Pre-processing and statistical analyses of MRI data will be performed with Statistical Parametric Mapping (SPM) run in Matlab (MathWorks). Movement correction will be performed by realign and unwarp to the first image in the series. To consider groupspecific anatomical brain differences, all patients will be normalized to Montreal Neurological Institute (MNI) echoplanarimaging template. To investigate rehabilitating related changes repeated measure ANOVAs will be performed with group (experimental and control) and Date (pre- and postrehabilitation) as factors.

Project status December 2024

The data collection for our project is ongoing and is expected to continue until spring 2025. This year, we have successfully competed baseline data collection from the entire sample of 80 participants including all neurocognitive and MRI measurements.

Additionally, we have gathered six-month follow-up data from approximately 45 participants and one-year follow-up data from about 22 participants.

We have also collected saliva samples from the majority of participants at various time points during their treatment. These samples will be used to estimate levels of stress biomarkers and other measurements related to salivary analysis. The salivary analysis will be completed by spring 2025.

An interview study has been initiated and will be completed by summer 2025.

Publications

Hedberg L, Ekman U, Engström Nordin L, Smedberg J-I, Skott P, Seiger Å, Sandborgh-Englund G, Westman E, Kumar A, Trulsson M. Cognitive changes and neural correlates after oral rehabilitation procedures in older adults - Protocol for a randomized controlled interventional study. BMC Oral Health 2021 Jun 9;21(1):297. doi: 10.1186/s12903-021-01654-5.

Hedberg L, Skott P, Smedberg J-I, Kåreholt I, Seiger Å, Sandborgh-Englund G, Engström Nordin L, Westman E, Kumar A, Trulsson M, Ekman U. Vascular changes mediate the association between mastication and cognition. . J Oral Rehabil 2023;50(12):1422-1431.

Lobbezoo F, Lin CS, Trulsson M, Kumar A, Verhoeff MC. Using your jaws sharpens your teeth… and mind!. Journal of Oral Rehabilitation 2024 51;11 2498-2499

Lin CS, Chen TC, Verhoeff MC, Lobbezoo F, Trulsson M, Fuh JL. An umbrella review on the association between factors of oral health and cognitive dysfunction. Ageing Res Rev. 2024
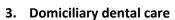
Principal Investigator:
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2025-01-03

Title

3. **Domiciliary dental care**	

Project overview

Project start	**2019**	
Calculated end	2023	
Grants awarded		
Source	SOF	Kamprads stiftelse, Region FTV Dalarna,
Year	2019	2021

Aim

The aim with this project is to develop domiciliary professional oral care. We will compare the effect of different regimens for domiciliary prophylactic professional oral care according to both content and frequency. The overall aim is to establish relevant recommendations for professional domiciliary prophylactic oral care.

Project description

Study 1 To evaluate the effect of domiciliary prophylactic professional oral care for care dependent nursing home living elderly, concerning resident´s oral health and oral care knowledge and attitudes in nursing staff.

Study 2 A systematic review to identify and evaluate interventions to control root caries progression in care dependent home living elderly.

Study 3 To evaluate the effect of domiciliary prophylactic professional oral care interventions for care dependent home living elderly, with focus on root caries progression and oral health related quality of life.

Study 4 To describe the oral microbiome in care dependent home living elderly.

Project status December 2024

Klicka här för att ange text.

Publications

Girestam Croonquist C, Dalum J, Skott P, Sjögren P, Wårdh I, Morén E. Effects of Domiciliary Professional Oral Care for Care-Dependent Elderly in Nursing Homes - Oral Hygiene, Gingival Bleeding, Root Caries and Nursing Staff's Oral Health Knowledge and Attitudes. Clin Interv Aging. 2020 Aug 6;15:1305-1315.

Persson, Jessica & Björns, Sara & Hägglin, Catharina & Grönbeck Lindén, Ingela & Piper, Laurence & Wårdh, Inger. (2024). Decisional needs for older adults, home health care nurses and dental hygienists during team-based oral health assessments in ordinary home settings – a qualitative study. BMC Geriatrics. 24. 10.1186/s12877-024-05367-6.

Morén, Elisabeth & Skott, Pia & Edman, Kristina & Gavriilidou, Nivetha & Wårdh, Inger & Domeij, Helena. (2023). The Effect of Domiciliary Professional Oral Care on Root Caries Progression in Care-Dependent Older Adults: A Systematic Review. Journal of Clinical Medicine. 12. 2748. 10.3390/jcm12072748.

Principal Investigator:
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2025-01-03

Title

4.   Oral screens in post stroke training: a randomized clinical trial

Project overview

Project start	**2015**	
Calculated end	2021	
Grants awarded	3*425 000 SEK	
Source	SOF	
Year	2017-2019	

Aim

The aim is to investigate if 3 months of oral screen training will improve the swallowing capacity and the oral motor function in stroke patients with residual dysphagia 8-12 months after first stroke, in comparison to controls.

Project description

Stroke is a common disease in older people, and often leads to various degrees of disability. Dysphagia is one such consequence which is associated with aspiration pneumonia and malnutrition. There are studies showing that oral screen-training may reduce dysphagia, but the method is insufficiently evaluated. Since treatment with an oral screen is easy, relatively quick and cheap, it is of high relevance to perform a strict and unbiased study to assess the feasibility and efficacy of the intervention. Thus, the aim of the present study is to evaluate the effect of daily oral screen training in post-stroke patients with dysphagia.

We will perform a randomized controlled clinical study in subjects who have had a first stroke 8-12 months earlier and suffer from dysphagia. The intervention consists of daily oral screen training for 3 months. In total 70 subjects will be

randomized to intervention or control. The change in swallowing capacity is the main outcome, and secondary outcomes are subjective swallowing problems, lip force, chewing function and quality of life.

Improved oral motor function and decreased dysphagia in post-stroke patients will result in an improved quality of life for the individual, and also reduce hospitalization and health care costs.

Project status December 2024

The inclusion period was terminated in May 2021. In total 26 patients participated in the study. The project will result in two papers.

Skott P, Åkesson E, Johansson K, Dalum J, Persson E, Karlsson Å, Seiger Å, McAllister A, Sandborgh-Englund G: Orofacial dysfunction after stroke – a multidisciplinary approach. (Reviderad version insänd; Gerodontology)

Skott P, Åkesson E, Johansson K, Dalum J, Persson E, Karlsson Å, Seiger Å, McAllister A, Sandborgh-Englund G: Effect on Orofacial dysfunction after stroke by Oral screen training. (Under preparation)

Publications

Skott P, Åkesson E, Johansson K, Dalum J, Persson E, Karlsson Å, Seiger Å, McAllister A, Sandborgh-Englund G: Orofacial dysfunction after stroke – a multidisciplinary approach. Gerodontology. 2023 Sep 11. doi: 10.1111/ger.12713.

Dalum, Jesper & Skott, Pia & Akesson, Elisabet & Persson, Emmelie & Karlsson, Åsa & Häbel, Henrike & Seiger, Åke & Mcallister, Anita & Johansson, Kerstin & Sandborgh-Englund, Gunilla. (2024). Effect of Oral Screen Training After Stroke-A Randomised Controlled Trial. Gerodontology. 10.1111/ger.12803.

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2025-01-03

Title

5. The MoWo-project - Mouth work-out to prevent malnutrition and sarcopenia

Project overview

Project start	**2022**	
Calculated end	2028	
Grants awarded	900 000 640 000 975 000	
Source	Foundation Nakao VR Klinisk behandlingsforskning SOF	
Year	2018-2020 2021-2022 2022-2024	

Aim

Our long-term goal is to prevent malnutrition which is caused by impaired chewing and swallowing function. Together with dietary advice and an incentivization for behavioural change, mouth workout exercises have the potential to reduce malnutrition in older people. The aims for Phase I (2021-2023) are to determine physiological predictors of good chewing, swallowing and eating behaviours, identify the phenotype profiles of people with chewing and swallowing impairments and estimate the prevalence of people with such problems.

Project description

Ageing causes reduction in muscle mass and strength including the muscles responsible for chewing and swallowing movements. Older people with chewing and swallowing problems often choose to eat a poor diet of "coffee and sweet bread" instead of vegetables, meat and other nutritious, fibrous and protein rich food. The change of dietary patterns is gradual and often unnoticed by the healthcare. Recent research has shown evidence of a vicious cycle involving decreased muscle mass and strength (sarcopenia), chewing and swallowing problems and malnutrition. Here we present a two-phase project to disrupt this vicious cycle. During phase I we will determine the physiological predictors of chewing, swallowing and eating behaviours and identify people with impairments. We will also determine the prevalence of chewing and swallowing impairments and strengthen our multidisciplinary network comprising of researchers from dentistry, swallowing experts, dietitians, physiotherapists and experts is malnutrition and sarcopenia. During phase II we will perform interventional studies on stratified groups identified in phase I and employ a multispecialty clinical approach. This includes mouth workout exercises, diet counselling, and behavioural modifications. We propose that our holistic approach will optimize chewing and swallowing function, improve eating behaviour, and subsequently prevent malnutrition in the older population.

The cross-sectional observational study planned for Phase I will include patients ≥65 years, with no current need of dental treatment that are able to fill in the questionnaires and perform the clinical tests. Phase I is explorative and does not have a primary outcome for hypothesis testing. A convenient sample of 300 participants (equal number of men and women) will be recruited for the study. Our estimation assumes that perhaps 30% will have swallow/chewing problems. A number of Subjective (OHIP, EAT10, MNA) and objective measurements (oral status, bite forces, tongue and lip forces, saliva secretion, TOMASS, food comminution test, mixing ability test, swallowing capacity test, grip force, arm and calf muscle circumference, etc) will be collected in order to identify the phenotype profiles of people with chewing and swallowing impairments.

Project status December 2022

Study 1: A systematic review on chewing as a physiological contributor to the processes of swallowing, digestion, and nutrition has been published.

Study 2: Determinants of Oral Functions in Older People: A Comprehensive Analysis

The project involves a cross-sectional assessment of a relatively large group of older individuals (>65 years) for factors determining chewing and swallowing efficiency with a battery of chewing and swallowing function tests. We have collected data from about 240 participants (approx.) from the Academic Center for

Geriatric Dentistry, Stockholm, Folktandvården Fridhemsplan, Stockholm Sjukhem, Centrum för Äldretandvård, Folktandvården, Västra Götaland. The data analysis is in the process where we will be able to investigate and determine the important clinical predictors of good chewing and swallowing behaviors.

The current study aims to comprehensively evaluate the different determinants of oral functions and their age-related changes. Specifically, the study aims to explore the relationships between oral function determinants such as dental status, saliva secretion, orofacial muscle strength, masticatory performance, and swallowing function in older adults. By examining these relationships, the study seeks to identify key determinants that influence oral functions. Additionally, the study aims to determine if these factors can predict age-related changes in oral function and estimate the prevalence of people with poor oral functions. We hypothesize that there is a linear relationship between age and the determinants of oral function, such that with increasing age, there will be a progressive decline in dental status, orofacial muscle strength, and masticatory and swallowing function.

Publications

1. Kumar A, Almotairy N, Merzo JJ, Wendin K, Rothenberg E, Grigoriadis A, Sandborgh-Englund G, Trulsson M. Chewing as a physiological contributor to the processes of swallowing, gastrointestine and nutrition-related parameters: A systematic review. Critical Reviews in Food Science and Nutrition. https://pubmed.ncbi.nlm.nih.gov/35837677/
2. Sumit K, Vikram K, Rajlaxmi M, Ranjitkumar P, Anastasios G, Kumar A. Evaluation of oral health, taste perception, nutritional status and emotional well-being in post-menopausal women. Journal of oral rehabilitation 2024 51;9 1833-1838

2025-01-03

Principal Investigator:
Anastasios Grigoriadis

PhD student
Linda Munirji

Co-investigators:
Abhishek Kumar
Joannis Grigoriadis

Title

6.	Development and age-related changes in the determinants of masticatory function.

Project overview

Project start	**2023**	
Calculated end	**2029**	
Grants awarded	Klicka här för att ange text.	
Source		
Year		

Aim

The overall aim of the project is to study and establish normality indicators of orofacial muscle strength, chewing, and swallowing function and optimum chewing behavior in growing children and adults with purpose of developing and optimizing an artificial intelligence-based masticatory function application.

Project description

Oral functions are important components of oral and general health. Oral functions are primarily dependent on the state of the dentition, orofacial muscles, and other orofacial structures in and around the oral cavity. The orofacial structures are subjected to developmental changes in children and age-related changes in younger and older individuals. In the current project we will determine the age-related changes in orofacial muscle strength, masticatory and swallowing function, and age dependent changes in dietary choices/preferences and nutrition in younger and older individuals. The knowledge thus generated will be used to

customize and optimize an artificial intelligence-based masticatory function application (TUGGAai). The TUGGAai application will incorporate the important physiological determinants of chewing functions along with the performance in a food comminution masticatory function test.

Project status December 2024

PhD student registered June 2023

Etical approval obtained.

Publications

2025-01-03

Principal Investigator:
Abhishek Kumar

Co-investigators:
Mats Trulsson
Anastasios Grigoriadis
Pia Skott
Joannis Grigoriadis

7. Develop training paradigms and strategies for optimizing oral functions in older individuals

Project overview

Project start	**2023**	
Calculated end	2027	
Grants awarded	1 500 000 42 000	
Source	(SOF: Styrgruppen för Odontologisk Forskning). American Dental Society of Sweden	
Year	2025-2028	

Aim

The overall aim of the project is to study the oral motor training needs and end-user perspective in the development of oral motor training paradigms. Further, the aim is to develop the oral motor training paradigm and test its effect on oral functions, dietary habits, and oral and general quality of life in older individuals.

Project description

As people age, they lose muscle mass and strength (Keller & Engelhardt, 2013). There is no doubt that the orofacial muscles are susceptible to aging. A weak orofacial muscle, including those responsible for chewing and swallowing, can lead to poor chewing and swallowing function. We

hypothesize that there is a vicious cycle-like relationship that involves decreased muscle mass and strength (sarcopenia) of masticatory muscles, chewing and swallowing problems, food avoidance, and gradually, malnutrition. Therefore, interventional studies are needed to disrupt the effects of this vicious cycle. In the current project, we propose oral exercises as a simple method of preventing oral impairment and optimizing chewing function. During the course of the project, we will design a screening questionnaire (Oral Exercises Prescription Screening tool) to better understand the user needs that will help us in "prescribing" exercises for improving oral functions. We will study the available literature and evaluate the oral exercises for clinical use from the end-user perspective. Based on this we will design an Oral Function Interventional Program that would involve a multidimensional approach to improve chewing and swallowing functions. We will test and study the short-term and long-term effects of the Oral Function Interventional Program on oral functions, dietary habits, and oral and general quality of life in older individuals.

Project status December 2024

PhD student registered November 2023

Study 1: The Effect of Oral Exercises on General Health: A systematic review

Objective (PICO): To investigate the effect of oral exercises related to chewing and swallowing function on enhancing overall general health, including nutritional status, cognitive function, and associated quality of life and to identify potential barriers in the incorporation of oral exercises within the rehabilitation paradigms for older populations. We have screened 11,513 articles with title and abstract searches. Preliminarily we have shortlisted 93 articles for full-text analysis.

Study 2: End user perspective in developing oral motor training exerises

Ethical approval granted and pilot stuies conducted.

Publications

Principal Investigator:

Gunilla Sandborgh
Englund

Co-investigators:

Duangjai Lexomboon

Abhishek Kumar

Weili Xu

8.	Oral health and malnutrition

Project overview

Project start	**2023**	
Calculated end	2027	
Grants awarded	--	
Source	--	
Year	--	

Aim

To investigate whether poor oral health is a risk factor for nutritional status in older adults

Project description

As people age, they lose muscle mass and strength (Keller & Engelhardt, 2013). There is no doubt that the orofacial muscles are susceptible to aging. A weak orofacial muscle, including those responsible for chewing and swallowing, can lead to poor chewing and swallowing function. We hypothesize that there is a vicious cycle-like relationship that involves decreased muscle mass and strength (sarcopenia) of masticatory muscles, chewing and swallowing problems, food avoidance, and gradually, malnutrition. Therefore, interventional studies are needed to disrupt the effects of this vicious cycle. In the current project, we propose oral exercises as a simple method of preventing oral impairment and optimizing chewing function. During the course of the project, we will design a screening

questionnaire (Oral Exercises Prescription Screening tool) to better understand the user needs that will help us in "prescribing" exercises for improving oral functions. We will study the available literature and evaluate the oral exercises for clinical use from the end-user perspective. Based on this we will design an Oral Function Interventional Program that would involve a multidimensional approach to improve chewing and swallowing functions. We will test and study the short-term and long-term effects of the Oral Function Interventional Program on oral functions, dietary habits, and oral and general quality of life in older individuals.

Project status December 2024

Study 1: Investigated whether chewing ability increases the risk of malnutrition and compared its impact with other contributing factors. This longitudinal study included individuals aged 60+ who lived in a community setting in Kungsholmen County in Sweden. Data was collected from the medical examination, the nurse interview, and the national patient registry at the baseline (2001–2004) and 6-year follow-up. The exposures were chewing ability at baseline and change in chewing ability at the follow-up. The outcomes were risk for malnutrition, as assessed by the Mini Nutritional Assessment Short-Form (MNA-SF), and percent weight loss at the follow-up. It is concluded that poor chewing ability may be a moderate risk factor for malnutrition in older individuals. Although the findings have limited generalization, any self-reported difficulty chewing hard foods should be taken into consideration.

Study 2: Oral health vs cariogenic food consumption and its implication on nutritional status in older individuals has been initiated.

Publications

1. Duangjai Lexomboon, Abhishek Kumar, Sara Freyland, Weili Xu, Gunilla Sandborgh- Englund. Is poor chewing ability a risk factor for malnutrition? A six-year longitudinal study of older adults in Sweden. Submitted, reviewers comments received, revision ongoing.