2019-12-18

ACT Project catalogue

Revised December 2019

AKADEMISKT CENTRUM FÖR ÄLDRETANDVÅRD

2019-12-18

	Core group	ACT-affiliated researchers	Collaborators	*PhD student*
1	***Objective and subjective masticatory ability***	Inger Wårdh, Mats Trulsson	Ann-Marie Boström, Gerd Faxén Irving, Karin Zingmark	Per Stjernfedt
2	***Frailest/osteoporosis***	Inger Wårdh, Pia Skott, Åke Seiger	Helena Salminen, Elisabet Rydwik, Erika Berggren, Gerd Faxén Irving	Charlotta Elleby
3	***The impact of tooth loss on cognitive aging and dementia***	Inger Wårdh	Weili Xu, Nancy Pedersen, Debora Rizzuto, Anna Marseglia	Christina Dintica
4	***Chew and think***	Gunilla Sandborgh Englund, Mats Trulsson, Pia Skott	Erik Westman, Urban Ekman, Åke Seiger, J-I Smedberg	Linn Hedberg
5	***Domiciliary dental care***	Inger Wårdh, Pia Skott	Petteri Sjögren, Georgios Belibasakis, Niels Ganzer, Kristina Edman	Elisabet Morén
6	***Polypharmaci and oral health***	Gunilla Sandborgh Englund	Dorota Religa, Johan Fastbom, Kristina Johnell, Maria Eriksdotter, Duangjai Lexomboon, Edwin Tan	
7	***Oral screen training post stroke***	Gunilla Sandborgh Englund, Pia Skott, Åke Seiger	Anita McAllister, Elisabet Åkesson, Emmelie Persson, Åsa Karlsson	
8	***Chew and swallow***	Mats Trulsson, Gunilla Sandborgh Englund	Abhishek Kumar, Karin Wendin, Elisabeth Rothenberg	
9	***Hyperparathyroidism and oral health***	Gunilla Sandborgh Englund	Inga-Lena Nilsson, Anders Ekbom, Peggy Näsman, Kåre Buhlin	

Karolinska Institutet · Folktandvården · Stockholms Sjukhem · Region Stockholm

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Principal Investigator:
Inger Wårdh

PhD student
Per Stjernfeldt

Co-investigators:
Ann-Marie Boström
Mats Trulsson
Gerd Faxén Irving

Angelika Lantto, Karin Zingmark, Robert Lundkvist

Title

1. Objective and subjective masticatory ability in older individuals

Project overview

Project start	**2014**	
Calculated end	2021	
Grants awarded	KI-stiftelser 2015	
Source	ACT FTV Stockholm	
Year	2016-2019	

Aim

The aim of this project is to understand which factors affect an older individual's objective and subjective masticatory ability and how they can be measured. As a second aim, the project may reveal knowledge about which treatments should be prioritized to preserve or enhance masticatory ability.

Project description

The importance of masticatory ability increases with increasing age. It is not only of importance for food intake and nutritional status, but also cognitive function. A correlation between cognitive function and masticatory ability has recently been shown in humans and animals. However, understanding which factors affect an older individual's masticatory function is a complicated process. Aspects other than occlusal contacts, occluding pairs or supporting zones may have more significant

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importance than previously expected. Therefore it is important to address such factors to identify the type of oral rehabilitation for implementation in older patients. A significant number of older patients in Sweden, in need of dental care, are eligible for financial support through the county council. This support covers "necessary dental care" allowing both the counties and the dentists to make an informed decision on relevant therapy. In that decision process masticatory ability is an important aspect as one of the intentions with the support is improved nutrition. The aim of this project is to understand which factors that affect an older individual's objective and subjective masticatory ability and how they can be measured.

The following issues are addressed:
1. A systematic literature review: To identify valid and reliable instruments for assessing objective masticatory ability.
2. A qualitative interview study: To explore older individuals' experience of their masticatory ability and factors related to this ability.
3. A clinical study: To examine relationships between objective and subjective assessments on masticatory ability and oral status including prosthetic therapy.
4. A clinical study: To examine relationships between objective and subjective assessments on masticatory ability, texture modification and nutritional status.

Project status December 2019

Part 1: Finished
Part 2: Finished
Part 3 Ongoing
Part 4 Ongoing

Publications

Elgestad Stjernfeldt P, Wårdh I, Trulsson M, Faxén Irving G, Boström AM. Methods for objectively assessing clinical masticatory performance: protocol for a systematic review. Syst Rev. 2017 Jan 26;6(1):20. doi: 10.1186/s13643-016-0403-5.

Elgestad Stjernfeldt P, Sjögren P, Wårdh I, Boström AM Systematic review of measurement properties of methods for objectively assessing masticatory performance. Clin Exp Dent Res. 2019 Jan 31;5(1):76-104. doi: 10.1002/cre2.154.

Submitterat manus
Stjernfeldt Elgestad P, Faxén Irving G, Wårdh I. Masticatory ability in older individuals: An interview study.

Principal Investgator:
Helena Salminen
(Supervisor)

Co-investigators:
Charlotta Elleby
(PhD student)

Pia Skott
Sven Nyrén
Holger Theobald
(Co-Supervisors)

Grethe Jonasson
(Research collaborator)

2019-12-18

Title

2. New ways of identifying individuals at risk for frailty and fragility fractures

Project overview

Project start	**2016**	
Calculated end	2023	
Grants awarded		
Source	ACT FTV Stockholm	
Year	2016-2019	

Aim

The aim of this study is to find and compare methods to identify individuals with augmented risk of frailty and fragility fractures by assessing the trabecular bone structure in dental radiographs combined with other risk factors

Project description

The purpose of the study is to investigate if risk for future fractures can be determined by assessing the trabecular bone structure in dental intra oral radiographs and if the identified individuals exhibit additional risk factors for developing hidden illness and frailty. The Rebus cohort gives possibilities to study the predictive value of risk factors associated with fragility fractures during a follow-up of up to 45 years. Identifying the 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. Dental radiographs are taken regularly on individual indication on a large part of the

population and the dentists are familiar in analyzing them. The use of bone structure analysis as a tool to determine risk of future fractures and frailty would put additional value to the regular dental appointment.

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 predictive value of certain risk factors for elevated fracture risk during a follow-up period of up to 47 years. Using data of the 30 000 individuals that participated in the original Rebus cohort

Study III: Aim: To study the correlation of different medical diagnoses to fragility fractures in a longitudinal cohort with a follow-up of up to 47 years. Using data of the 30 000 ind from the original Rebus Cohort

Study IV: Aim: To study changes in trabecular structure of the mandibular bone on intra oral radiographs from examinations that took place in 1970, 1980 and/or 1990 in a longitudinal cohort with a follow-up of up to 47 years, and the association to medical diagnoses. This will be done on 900 subjects in the Rebus dental cohort.

Project status December 2019

The Rebus longitudinal dataset, including radiographs, was organized at the start of the study. Etihical approval was obtained from Regional Ethical Review Board in Stockholm for the four planned studies. The Ethical Review Board in Gothenburg has also approved of a pilot study, using data from two existing cohorts with DXA values for testing of the methods. Data from the Swedish national Patient Register and Cause of Death Register for all four studies has been acquired. All radiographs have been digitized and assessed using the two methods.

Study I: Final details of statistical analysis is being done, the manuscript is almost finished, and it will be submitted for publication in the next couple of months.

Study II: Remains: Statistical analysis and manuscript writing.

Study III: Remains: Statistical analysis and manuscript writing

Study IV: Remains: Statistical analysis and manuscript writing.

Publications

-

Principal Investigator:
Weili Xu
(Supervisor)

Co-investigators:
Christina Dintica
(PhD student)

Nancy Pedersen
Inger Wårdh
Debora Rizzuto
Anna Marseglia

2019-12-18

Title

3. The impact of tooth loss on cognitive aging and dementia

Project overview

Project start	**2016**	
Calculated end	2020	
Grants awarded	Salary for PhD student	
Source	KID	
Year	2016-2019	

Aim

The ultimate goal of this project is to investigate the impact of tooth loss on cognitive aging and possible mechanisms (genetic background, inflammation, vascular and nutritional pathways) linking dental health to cognitive decline. The general goal can be achieved through addressing four specific aims below to answer a series of research questions

Project description

In this doctoral project, four individual studies are designed to address the four specific aims above, by which the ultimate goal of this project can be achieved. The four studies will be conducted using the data from SNAC-K, SATSA and HARMONY.

Study I: “Tooth loss and cognitive functions among dementia free elderly people”. This study is based on the cross sectional data in the SNAC-K addressing Aim 1.

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Study II: “Effect of tooth loss on cognitive decline over Date: findings from a 30-year longitudinal study”. This study addresses Aim 2 using follow up data from the SATSA.

Study III: “Tooth loss in relation to the risk of cognitive impairment: a population based twin study”. This study is carried out to address Aim 3 using data from the HARMONY study.

Study IV: “The impact of tooth loss on the progression from cognitive impairment to dementia”. This study is based on the 6-year follow up data and MRI data from the SNAC-K for Aim 4.

Project status December 2019

Dissertation is planned for May 2020. The thesis will include two studies based on tooth loss and one on olfaction, due to the lack of dental information in the used data bases

Publications

Dintica CS, Rizzuto D, Marseglia A, Kalpouzos G, Welmer AK, Wårdh I, Bäckman L, Xu W. Tooth loss is associated with accelerated cognitive decline and volumetric brain differences: a population-based study. Neurobiol Aging. 2018 Jul;67:23-30. doi: 10.1016/j.neurobiolaging.2018.03.003.

Dintica CS, Marseglia A, Rizzuto D, Wang R, Seubert J, Arfanakis K, Bennett DA, Xu W. Impaired olfaction is associated with cognitive decline and neurodegeneration in the brain. Neurology. 2019 Feb 12;92(7):e700-e709.
doi: 10.1212/WNL.0000000000006919. Epub 2019 Jan 16.

Submitterat manus

Dintica C, Marseglia A, Wårdh I, Debora Rizzuto D, Ying S, Xu W, Pedersen N. The relation of poor mastication with cognition and dementia risk: a population-based longitudinal study. Under revision in “Aging”

Principal Investigator:
Urban Ekman
Mats Trulsson
(Supervisor)

Co-investigators:
Linn Hedberg
(PhD student)

Eric Westman
Åke Seiger
Pia Skott
Gunilla Sandborgh Englund

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Title

4. The cognitive changes and neural correlate after rehabilitation of mastication in older people – an intervention study

Project overview

Project start	**2016**	
Calculated end	2024	
Grants awarded	3*425 000	
Source	SOF	
Year	2017-2019	

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 are lacking, and a causal relationship has not been established. We aim to conduct an

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intervention study on older people where rehabilitation of masticatory functions is performed and evaluated with cognitive measures and brain imaging. Patients (n=50) between 70 and 79 years of age, who suffer from masticatory impairment (Eichner's index B3- B4 or C1-C4) are recruited. 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.
Brain imaging: Preprocessing 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 group specific 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 2019

Enrollment ongoing

Publications

-

Principal Investigator:
Inger Wårdh

Co-investigators:

PhD student Elisabeth Morén

Georgios Belibasakis
Petteri Sjögren
Pia Skott
Kristina Edman,
Niels Ganzer

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Title

5. Domiciliary dental care

Project overview

Project start	**2019**	
Calculated end	2023	
Grants awarded		
Source	SOF	
Year	2019	

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.

The project has now got funding for a licentiate exam but we hope for funding up to a full PhD

Project description

Study 1 To evaluate the effect of domiciliary prophylactic professional oral care interventions for care dependent nursing home living elderly, and to establish

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evidence-based recommendations for domiciliary prophylactic professional oral care in this patient group.

Study 2 The aim is to evaluate the effect of domiciliary prophylactic professional oral care interventions for care dependent home living elderly, and to establish evidence-based recommendations for domiciliary prophylactic professional oral care in this patient group.

Study 3 To be planned if extended financial resources, but will preliminary test the use of silver diamine fluoride in the context of home care for dependent elderly

Study 4 To be planned if extended financial resources, but will preliminary describe the microbial flora in care dependent home living elderly

Project status December 2019

Study 1 Manuscript writing

Study 2 Enrollment ongoing

Publications

-

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Principal Investigator:
Gunilla Sandborgh Englund

Co-investigators:
Duangjai Lexomboon
Edwin Tan
Kristina Johnell
Johan Fastbom
Maria Eriksdotter

Title

6. The effect of polypharmacy on oral health in older people

Project overview

Project start	**2016**	
Calculated end	2021	
Grants awarded	450 000 x 3 SEK	
Source	SOF	
Year	2016-2018	

Aim

To investigate whether drug treatment causes deteriorating oral health among elderly people, and to create a risk assessment tool for druginduced hyposalivation.

Project description

1. Develop a risk score for druginduced hyposalivation A systematic literature search will be performed with the aim of developing a risk score for druginduced hyposalivation. Databases: Medline, EM-BASE, CINAHL, PsycINFO, and Web of Science. Literature appraisal: The systematic review will be conducted according to the international PRISMA guidelines to ensure high quality and unbiased assessments. Predetermined criteria for inclusion and exclusion will be applied. Initially, abstracts and full text articles will be assessed independently for relevance and quality. The final assessment will subsequently be agreed on by the reviewers. Methodological quality of the studies will be assessed by using the

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Newcastle Ottawa Scale. The risk score for drug induced hyposalivation will be derived from the odds ratios obtained by metaanalysis.

2. In order to elucidate the impact of drug induced hyposalivation on oral health, the relationship between longitudinal use of prescribed drugs and polypharmacy versus dental care consumption and tooth loss will be investigated. All individuals >65 years living in Sweden are included. The Swedish Prescribed Drug Register will be linked to the Dental Health Register. Longitudinal drug consumption and polypharmacy during 2012-2015 will be determined and classified according to the hyposalivation risk score

3. Refined analysis of drug classes affecting salivation.

4. Validation and refinement of models. We will apply our models in a new large data set, including a patient and a control cohort

The project will result in a deeper understanding of the impact of drug induced hyposalivation on oral health, which adds important arguments against polypharmacy in elderly people. Our goal is to influence medical staff to critically evaluate prescription drugs.

Project status December 2019

Part 1 & part 2 finished, part 3 ongoing, part 4 ongoing

Publications

Tan ECK, Lexomboon D, Sandborgh-Englund G, Haasum Y, Johnell K: Medications That Cause Dry Mouth As an Adverse Effect in Older People: A Systematic Review and Metaanalysis. *J Am Geriatr Soc* 2018, 66(1):76-84.

Lexomboon D, Tan EC, Hoijer J, Garcia-Ptacek S, Eriksdotter M, Religa D, Fastbom J, Johnell K, Sandborgh-Englund G: The Effect of Xerostomic Medication on Oral Health in Persons With Dementia. *J Am Med Dir Assoc* 2018, 19(12):1080-1085 e1082.

Submitted manuscript

Tan ECK, Lexomboon D, Häbel H, Fastbom J, Eriksdotter M, Johnell K, Sandborgh-Englund G: Xerogenic medications and dental health intervention in people with dementia

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Principal Investigator:
Gunilla Sandborgh Englund

Co-investigators:
Pia Skott
Elisabet Åkesson
Åke Seiger
Anita McAllister

Åsa Karlsson
Emmelie Persson

Title

7. 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.

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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 changes 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 2019

Enrollment is ongoing. Recruitment is difficult. Patients fulfilling inclusion/exclusion criteria are hard to find. We have broadened the recruitment to several other areas in Stockholm.

So far, 17 patients have been included and 13 pts have finished the trial. We will continue to recruit during 2020.

Publications

-

Principal Investigator:
Mats Trulsson

Co-investigators:
Gunilla Sandborgh Englund
Abhishek Kumar,
Karin Wendin,

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Title

8. Chew and swallow – A concept for improved health and wellbeing in older people

Project overview

Project start	**2018**	
Calculated end	2019	
Grants awarded	500 000	
Source	Vinnova UDI 1	
Year	2018	

Aim

Early identification of patients at risk combined with smart interventions may prevent malnutrition, frailty and illness during ageing.

Project description

The goal is to secure smooth food oral processing at high age, i. e. secure the ability to eat and process food in the oral cavity, and then swallow it safely. We hypothesize that early identification of patients at risk and individually adapted rehabilitation will improve their nutritional status. The first part of the concept involves the preparation of methods for identification and diagnostics of decreased abilities of chewing and swallowing. Thereafter the concept will be elaborated and complemented with nutrition assessment, treatment and rehabilitation, and follow-up of chewing and swallowing abilities. The point of departure is to develop

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an effective e-application for identification of decreased abilities of chewing and swallowing. The process of chewing and swallowing will be documented and analysed using various types of test food in healthy and impaired persons. The application is developed from recordings and by use of AI and machine learning. The project is performed in close collaboration between partners with complementing expertise.

Project status December 2019

A systematic review is being finalised. Pilot data has been collected. We will apply for funding to continue the project.

Publications

Bozorgi C, Holleufer C, Wendin K. Saliva Secretion and Swallowing—The Impact of Different Types of Food and Drink on Subsequent Intake. Nutrients 2020, 12, 256; doi:10.3390/nu12010256

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Principal Investigator:
Gunilla Sandborgh Englund

Co-investigators:
Inga-Lena Nilsson
Anders Ekbom
Henrike Häbel
Kåre Buhlin

Title

9. Primary hyperparathyroidism and oral health

Project overview

Project start	**2018**	
Calculated end	2024	
Grants awarded		
Source		
Year		

Aim

The main objective of the present research program is to study the effects of primary hyperparathyroidism (pHPT) on oral health.

Specific aims:

- To explore to what extent the oral health of pHPT patients is affected by the disease, with focus on periodontal and endodontic health
- To determine if pHPT entails the loss of teeth, and if this is dependent on the severity of the disease
- To form a basis for assessment of pHPT patient's need of targeted dental support and interventions

Project description

The project is a nationwide register based study, with high power to detect clinical effects by pHPT on oral health. A large cohort of pHPT patients and a control cohort are followed during three years prior to diagnosis through linkage of data from

national and quality registers. The main outcomes are based on the characteristics of pHPT disease and our previous results: the loss of teeth, and periodontal and endodontic disease. The research will form a basis for the assessment of pHPT patient's need of prophylactic measures to avoid disease-related oral complications and may potentially contribute to the detection of pHPT in dental care.

Project status December 2019

We have finalized a pilot study and are now applying for funding of a national register based study. We also apply for a larger grant which will cover both the register based study and a clinical study. If funding is granted we aim to recruit a PhD student.

Publications

Koman A, Nasman P, Discacciati A, Ekbom A, Nilsson IL, Sandborgh-Englund G. 2019. Increased risk for tooth extraction in primary hyperparathyroidism and hypercalcemia: A population study. Clin Oral Investig. Dec 2. doi: 10.1007/s00784-019-03137-y.