

## Academic Research at the Department of Dermatology and Allergology at Tampere University Hospital and University of Tampere

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The Medical Faculty at the University of Tampere, Tampere, Finland was opened in 1972 and Tampere Central Hospital was simultaneously awarded university hospital status. The leadership of the clinic is divided between Professor Erna Snellman, MD, PhD, who is responsible for leadership of teaching and research, and Associate Professor Annikki Vaalasti, MD, PhD, who is the managing chief and employer at the Department of Dermatology and Allergy (Fig. 1) within the University Hospital, excluding only teaching personnel and nomination of dermatology residents.

Research at the department of dermatology is tightly integrated within the hospital clinic in Tampere, but doctoral studies have, in part, also been implemented in the central hospital under the supervision of Professor Snellman, and in some other departments of Tampere University Hospital and University of Tampere. In relation to the size of the clinic, the research activity is noteworthy. Table I shows the staffing level of clinical doctors at the clinic.



Fig. 1. Patient case meeting at the Department of Dermatology, Tampere University Hospital.

Table I. Dermatologist staffing levels at the Department of Dermatology and Allergology, Tampere University Hospital

| Location/Sector               | Specialists | Residents |
|-------------------------------|-------------|-----------|
| Ward /in Patient Wound care   | 1 (100%)    | 1 (100%)  |
| Wound center                  | 1 (20%)     | 1 (20%)   |
| Dermatosurgery                | 3 (300%)    | 1 (100%)  |
| Polyclinics                   | 5 (440%)    | 2 (150%)  |
| Skin allergology              | 2 (150%)    | 1 100%    |
| Sexually transmitted diseases | 1 (20%)     | 1 (30%)   |
| Teaching                      | 3 (300%)    |           |

### Dermatitis Herpetiformis Research

The dermatitis herpetiformis (DH) study group performs clinical and translational research at the Department of Dermatology, Tampere University Hospital, and at the Celiac Disease Research Center, Faculty of Medicine and Life Sciences, University of Tampere. The study group consists of Associate Professor Teea Salmi, MD, PhD, (principal investigator, dermatologist); Kaisa Hervonen, MD, PhD (post-doctoral researcher, dermatologist); Professor Emeritus Timo Reunala (senior advisor), and 4 PhD students: Eriika Mansikka, MD (dermatologist); Anna Alakoski, MD (dermatologist), Elli Turjanmaa, MD (resident in dermatology), and Camilla Pasternack (medical and PhD student). The study group has, for example, published recent articles about decreased incidence of DH (1), reduced mortality in DH (2), and refractory DH (3). Focus areas of the current studies are immune response in DH, burden and long-term prognosis of DH, and the effects and health benefits of dapsone and gluten-free dietary treatment and development of gluten tolerance in DH. Eriika Mansikka's PhD focuses on the clinical picture and small bowel mucosal villous atrophy (4) and the development of gluten tolerance in DH. Anna Alakoski's PhD focuses on gastric

findings (5) and mortality in DH (2) and the effects and health benefits of a gluten-free diet and dapsone medication. Camilla Pasternack's PhD focuses on quality of life (6, 7) and bone complications of DH. Elli Turjanmaa's PhD will focus on skin manifestations beyond DH in coeliac disease and non-coeliac gluten sensitivity. In addition, some of the long-term goals of the research group are to discover peripheral blood cell markers predicting the development of gluten tolerance in DH, and to establish novel serum-based diagnostic methods for DH. The study group works closely with other researchers of the Celiac Disease Research Center, and undertakes national and international collaborations.

### Wound Center at Tampere University Hospital

Tampere University Hospital harbours Finland's first wound centre. A special ward for treating wound patients was established in 2012, and an out-patient clinic in 2016 (Fig. 2). The wound centre has a patient-oriented, multi-professional orientation in treating patients with chronic wounds, with the goal of reducing wound-related morbidity and mortality. Furthermore, Finland's first register for wound patients has been designed and engineered in Tampere University Hospital, and its pilot usage started in autumn 2017. Previous wound-related research has focused, for example, on the incidence of vasculitic ulcers (8), but new projects are underway and have become feasible through utilization of the wound register.



Fig. 2. The wound centre outpatient clinic at Tampere University Hospital is multidisciplinary. Plastic surgeon, Associate Professor Ilkka Kaartinen (left); nurse Annemari Vuorenperä, specialized in wound care (middle); dermatologist, Associate Professor Teea Salmi (right).

### Photodermatology Research Group

Photodermatology research is an important field of research at Tampere University Hospital/University of Tampere. The group leader is Professor Erna Snellman, and the other members are Emeritus Professor Timo Reunala, senior scientist Meri Lauha (Alahouhala), MD, PhD; residents of dermatology and allergology Toni Karppinen, MD, PhD; PhD student and dermatology resident Anna Toledo (Jussila), MD; PhD student, dermatology resident Veera Nikkola, MD; and, as a new member, medical student Annina Raita. We have established collaboration with senior scientist Lasse Ylianttila, and director Riikka Pastila, PhD, from the Radiation and Nuclear Safety Authority (STUK), Finland, with dermatopathologist Riitta Huotari-Orava, MD, from the University of Tampere; psychiatrist Professor Timo Partonen from the National Institute for Health and Welfare (THL), Helsinki, Finland, head of department Mari Grönroos, MD, PhD, from Päijät-Häme Central Hospital, Lahti, docent Piia Karisola from the Medicum, University of Helsinki, and Senior Scientist Kaisa Lakkala from the Finnish Meteorological Institute (FMI).

Since 2010, 3 doctoral dissertations have been published on photodermatology targeting heliotherapy, narrow-band ultraviolet B (UV-B) therapy and vitamin D, by doctors Vähäviho, Alahouhala and Karppinen (9–11). More recently, 2 doctoral students have studied UV radiation-induced neuroendocrine changes in the skin, suggesting that exposure to narrow-band UV-B radiation increases the expression of beta-endorphin in the skin (12). As-yet unpublished results of Anna Toledo (Jussila) suggest such an effect also on mood in healthy individuals, and that sunbathing could develop into an addiction. However, the mechanism of action awaits further elucidation. Currently, it is not known whether ultraviolet radiation influences the activity of brown adipose tissue, albeit the key circadian clock components (i.e. cryptochromes) in the skin are known to absorb 340–400 nm wavelengths, and our earlier experimental study indicated that cryptochromes also play a role in narrow-band UV-B (309–313 nm) induced erythema in the human skin *in vivo* (13), as shown by doctoral student Veera Nikkola.

Exposure to UV radiation relates closely to skin cancers, and studying skin cancer is one of the targets of our Photodermatology Research Group. In 2015, dermatologist and present dermatopa-

thology resident Noora Neitaanmäki, MD, PhD from our group published her doctoral dissertation considering photodynamic therapy (PDT) and hyperspectral imaging (14). Doctoral students Mari Salmivuori, MD, (15) and Janne Räsänen, MD, continue their research in the field of PDT. Doctoral student Maria Lagerstedt, MD, has finalized her doctoral studies on lichen sclerosus and vulvar carcinoma and will defend her thesis in February 2018 (16). Other ongoing studies in our clinic are assessing skin cancers treated in our region, Drs Leea Ylitalo, MD, PhD, and Dr Niina Korhonen, MD, PhD, being responsible for the project. Post-doctoral researcher Toni Karppinen, MD, PhD, has recently launched his own research group within photodermatology.

### Atopy and Allergy Research

Research into allergy and atopic diseases has been active in Tampere due to our distinguished Associate Professor Kristiina Turjanmaa, who retired some years ago. The present senior scientist is Dr Taina Hasan, MD, PhD, who has specific expertise in contact allergy and photosensitivity. The present Atopic Disease Research Group studies, for example, the association between exposure to microbes in childhood and the development of atopic sensitization and atopic disease. The research group has access to the clinical data and biological samples of 3 prospective birth-cohort studies: the Diabetes Prediction and Prevention (DIPP), the DiabImmune, and The Environmental Determinants of Diabetes in the Young (TEDDY) studies. Evaluation of microbe exposure is based on serology and detection of specific microbes by direct PCR, and on stool microbiome/virome analyses. Dr Laura Korhonen, MD, from our department is finalizing her PhD work, and Dr Tiina Palmu has recently started her PhD project under the supervision of docent Maria Lönnrot, MD, PhD.

### Conclusions

Our research community is at its best in research into DH, wound care, photodermatology, PDT, skin cancers and atopic diseases. We welcome visitors from the other Nordic countries, who can contact the group leaders to find out more about our research.

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