

## Academic Strengths of St. Olavs hospital, Trondheim University Hospital

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The Department of Dermatology at St. Olavs hospital, Trondheim University Hospital is one of 5 dermatological university clinics in Norway, and is part of the Norwegian University of Science and Technology (NTNU).

The Department of Dermatology was established in 1971 and initially was located in several different buildings across the city. Today the Department is the referral centre for approximately 720,000 inhabitants of mid-Norway and is an integrated part of the newly built, highly modern university hospital. This integration offers a unique opportunity for clinicians and researchers to collaborate closely on clinical research and technological innovation. Researchers Moser & Moser at the NTNU were awarded the Nobel Prize for Physiology or Medicine in 2014 for their discovery of cells that constitute a positioning system in the brain.

Over the past 15 years, researchers at the Department of Dermatology have focused on the following main topics; photodynamic therapy; wounds/inflammation; and epide-

### *Facts*

St. Olavs hospital, Trondheim University Hospital was founded in 1902.

The Department of Dermatology was founded in 1974 and Per Wulf-Jürgensen was appointed first professor. Since 2015 no professor has been appointed.

Our research team at the Department of Dermatology in Trondheim comprises:

- 3 Associate Professors
- 2 PhD/Researchers
- 1 resident
- 2 registered PhD students
- 1 post doc
- 1 research nurse
- 2 research student/PhD student

The Department has produced 29 original articles in the past 5 years. During the last 5 years, 3 doctoral theses have been defended, and a further thesis will be defended in 2018.

miology. A brief description of our ongoing research projects is given below.



Employees at the Department of Dermatology, St Olavs hospital, Trondheim, Norway.



Kunnskapsenteret, where the Department of Dermatology is located. Photograph: M. Herzog; www.visualis-online.com.

### Photodynamic therapy

Since 1997 the Department has offered topical photodynamic therapy to patients with non-melanoma skin cancer. In parallel with treatment, clinical studies on long-term follow-up after photodynamic therapy of basal cell carcinomas have been carried out. The research concentrates on diagnostics and evaluation of clinical and histological characteristics of basal cell carcinomas prior to photodynamic therapy.

In recent years, the department has been the driving force behind a national, randomized, controlled-blinded, multi-centre study with the aim of investigating whether a simpler and more flexible photodynamic therapy schedule is as effective as today's standard treatment of basal cell carcinomas. The study is a collaboration between private dermatological practices, a central hospital and university clinics. It is founded by the liaison committee between the Central Norway Regional Health Authority and the NTNU. The study includes a 3-year follow-up after treatment.

### Wounds and inflammation

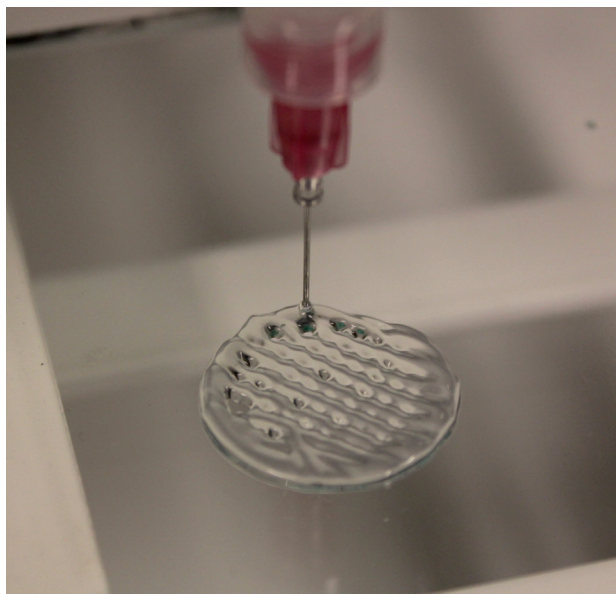
NanoHeal is a multi-disciplinary research programme funded by the NANO2021 Norwegian Research Council, and a collaboration with the Paper and Fibre Research Institute (RISE PFI AS), the University of Wales, Cardiff, and Swansea University, Wales. The goal has been to develop novel material solutions for use in advanced wound healing, based on nano-fibrillated cellulose structures.

As a result of the NanoHeal project we are developing a standardized *in vitro* wound healing model to be used in several projects, including student projects, collaborator projects with plastic surgeons at St. Olavs hospital and translational projects with the Department of Physics and the Department of Electronics and Telecommunications at NTNU.

### Epidemiology and HUNT

The Nord-Trøndelag Health survey (HUNT) is an extensive population-based health study with both personal and family medical information from >120,000 individuals collected during 3 recruitment phases spanning 3 decades since 1984–1986 (HUNT 1, 2 and 3). The 4<sup>th</sup> recruitment phase has just started (planned for 2017–2019). Data have been collected from multiple questionnaires, standardized clinical examinations, urine and non-fasting blood samples. The HUNT study provides us with a unique opportunity to study different diseases at the population-based level. From HUNT 3 we have collected information on psoriasis, and used this in our research projects on psoriasis and cardiovascular disease, osteoporosis and quality of life.

More than 70,000 individuals from HUNT have been genotyped through a collaboration between researchers at the K.G. Jebsen Center for Genetic Epidemiology, NTNU, and the University of Michigan, USA. By using already available genotypes from HUNT, we are currently performing genetic association analyses on psoriasis and atopic dermatitis. Our



3D Printable wood nanocellulose for wound dressings. Photo: Gary Chinga Carrasco, RISE PFI AS.

main goal is to identify new genetic factors with obvious functional consequences that contribute to the risk of disease. In addition, we plan to study gene expression and protein levels in samples from our newly established psoriasis tissue collection. By examining synergies between DNA, RNA and proteins, we aim to reveal novel biological mechanisms that have the potential to lead to new therapeutic targets.

### Extracorporeal photopheresis

Extracorporeal photopheresis using 8-methoxypsoralene and ultraviolet A (UVA) is an established method for treatment of cutaneous T-cell lymphoma and graft-versus-host-disease.

This modality is normally given to patients over a long period of time and provides only partial response in the majority of treated cases. 8-MOP binds to both diseased and normal cells and thus kills both types of cells after UVA irradiation. However, a precursor of the potent photosensitizer protoporphyrin IX (PpIX), has been shown to selectively induce PpIX

in activated T cells. Thus, for some years continuous research has been carried out with the aim to enhance photopheresis technology using porphyrin precursors instead of the approved drug. This has provided data with promising results. Patients are now included in a phase I/II clinical trial.

### Venereology

Medical students are a valuable resource. Together with the student organization working with sexual health information (MSO, medisinerne seksualopplysning) and the Department of Microbiology at St Olavs University Hospital, we have organized a total of 8 STI (sexually transmitted infection) testing days. Test sites have alternated between the two main NTNU campuses in Trondheim. A total of 1,600 students have been recruited and they participated in different research spin-off projects connected to these STI testing days. One result of these testing days is the implementation at our hospital of a new method for detection of macrolide resistance in patients with *Mycoplasma genitalium* infection.

### Allergy

The Prevention of Allergy Among Children in Trondheim (PACT) study is a population-based intervention study focused on the impacts on childhood atopic diseases of interventions to reduce tobacco exposure, increase consumption of n-3 polyunsaturated fatty acids and reduce indoor dampness. Since 2000, a large research database consisting of questionnaire-based information on exposure and health outcomes has been established. A randomized sub-study, ProPACT, included 415 pregnant women who received fermented milk supplemented with 3 probiotic strains or pasteurized placebo fermented milk from 4 weeks before expected due date until 3 months postpartum. Numerous biological samples, including stool, blood, breast milk and bacterial swab samples, were collected and used to identify possible mediators of the preventive effect of maternal probiotic supplementation on the development of atopic dermatitis. Researchers at the Department of Public Health and Nursing are conducting PACT, and researchers at the Department of Dermatology have collaborated in the project.