

# HEALTH FOR ALL

FACULTY OF HEALTH SCIENCES  
UNIVERSITY OF SOUTHERN DENMARK



The Faculty of Health Sciences consists of eight departments:

- DEPARTMENT OF CLINICAL RESEARCH
- DEPARTMENT OF MOLECULAR MEDICINE
- DEPARTMENT OF PUBLIC HEALTH
- DEPARTMENT OF SPORTS SCIENCE AND CLINICAL BIOMECHANICS
- NATIONAL INSTITUTE OF PUBLIC HEALTH
- DEPARTMENT OF REGIONAL HEALTH RESEARCH
- DEPARTMENT OF PSYCHOLOGY
- DEPARTMENT OF FORENSIC MEDICINE





## HEALTH FOR ALL

**Health for all** is intended for readers both at and outside the University of Southern Denmark. **Health for all** provides an insight into what the Faculty of Health Sciences is and what our strategic priorities are.

We focus our efforts on developing health-care in a broad sense. We do this through our research and education programmes, through our cooperation with authorities, private and public organisations and research communication.

Our tradition of collaboration with hospitals and municipalities has given us a position in translational research – a position set to be further strengthened

by the upcoming joining of the University of Southern Denmark (SDU) and Odense University Hospital (OUH) at Campus Odense.

The brochure provides examples of how our research and education programmes are specifically put to use in society and help influence the health agenda in Denmark.

Happy reading!

Ole Skøtt  
Dean



# A COMPRE- HENSIVE PERSPECTIVE DEVELOPS THE HEALTHCARE ARENA

This is the profile brochure of the Faculty of Health Sciences. Here you can read about some of our research and education programmes – and gain an insight into the areas that the faculty considers as currently under rapid development.

Our vision at the Faculty of Health Sciences is to contribute to improving human health. These are not just fancy words, but the focal point of our research, our education programmes and the development of the faculty, all in close collaboration with our numerous partners and stakeholders.

## **RESEARCH CREATING VALUE**

At the Faculty of Health Sciences, we believe in the importance of strong, focused research environments within our strategic priority areas. Strong internal environments form the basis for rewarding partnerships with other research environments at SDU – and for cooperation with the clinical departments at OUH, other hospitals in the region, municipalities, and other public and private organisations.

The strategically important research perspective – translational research – has proved a particular success. We believe that it leads to research of the highest international level, not to mention produc-

tive research that specifically contributes to improving human health.

Our close cooperation with OUH and the other hospitals in Southern Denmark is unique and a key element in, and a prerequisite for, the development of our visions.

Also important to translational research are our students (undergraduate and graduate) who form the link between the university, society and the health sector. Furthermore, this application-oriented perspective paves the way for business innovation.

### A REWARDING COLLABORATIVE CULTURE

Translational research is about building a collaborative structure and culture that supports the rapid transmission of research breakthroughs to its implementation at individual or population level. Barriers between basic research and its implementation are thus broken down, allowing the results to be "translated" into practical application, for the benefit of human health. The close relationships will also allow constant focus on the most important research questions when it comes to improving human health.

The Faculty of Health Sciences sees translational research in a broad perspective. Not only are we involved with the translation of knowledge into implementation, but we also contribute to the debates and decisions that develop the health arena, and where the public can help define key research questions. We see translational research as a method of collaboration whereby we reach out of our own organisation to citizens, decision-makers, the press, the business world and the public wherever research results can influence decisions and attitudes.

### THE FOCUS AREAS OF THE BROCHURE

In this brochure, you can read about research projects that all have strong translational elements and illustrate the fruitful cooperation between SDU, OUH, and other hospitals and partners.

Several of the articles relate to aging research, which was given a significant boost at SDU with the Max-Planck Odense Center on the Biodemography of Aging. It is the first of its kind in the Nordic Region, and it is based on a cooperation between the Max Planck Society, the Faculty of Health Sciences and the Faculty of Science. The Max-Planck label is a recognition

of the high quality of research in this field at SDU.

Aging is and will remain an increasingly important perspective in relation to the social structure, prioritisations and treatment strategies over the coming decades. It is only natural, then, to take advantage of this powerful research in our cooperation with Odense University Hospital (OUH), for example. The articles are: *The grey-haired revolution*; *Can 77-year-old Mrs Jensen tolerate chemotherapy?*; *Prospect of 500,000 diabetics*; and *When grandpa drinks*.

Other articles focus on how treatment of a disease such as osteoarthritis (degenerative joint disease) is developing from the use of drugs and surgery towards increased use of physical exercise for prevention and treatment, how our psychological research is interacting with the Department of Cardiology at OUH, and finally an article about one of the many widespread diseases we are focusing on: the relationship between kidney function and hypertension.

Under the three general headings of Research, Education and Research-based Public Sector Consultancy and Projects, this brochure focuses on three topical themes:

Research articles that explore the subject. Under Education, we focus on **Master's programmes for graduates**, where, through its work with tailored and research-based master's programmes for graduates such as nurses, physiotherapists, midwives and occupational therapists, the Faculty of Health Sciences is helping to raise the level of competence in Denmark. And finally, **public sector consultancy and projects**, which may be a less familiar concept to many, but which are nevertheless a crucial task for society. Authorities and decision-makers are the recipients of research-based and independent analyses that go towards ensuring decisions, protocols and procedures are adopted that best serve the public and society as a whole.

### NEW OUH/SDU PUTS ODENSE ON THE WORLD MAP

In the brochure, we also refer to the New OUH/SDU project – a unique construction which has already attracted international attention in the introductory phase. New OUH/SDU paves the way for close, direct collaboration between the university hospital and the university's five faculties. This will give SDU a national and international position of strength within translational research that few research institutions in the world can match.

# THE FACULTY OF HEALTH SCIENCES IS AN INTERNATIONAL CENTRE OF EXCELLENCE FOR HEALTH RESEARCH

At the Faculty of Health Sciences at the University of Southern Denmark (SDU), we conduct research at a high international level in areas relevant to public health, and the treatment and diagnosis of diseases. In short, we strive to improve human health.

Research forms the foundation of the work of the faculty. It allows us to provide qualified and demanding education programmes, and to provide effective public-sector consultancy.

The Faculty of Health Sciences excels in the fields of prevention, diagnosis and treatment. We build bridges and work across sectors and systems.

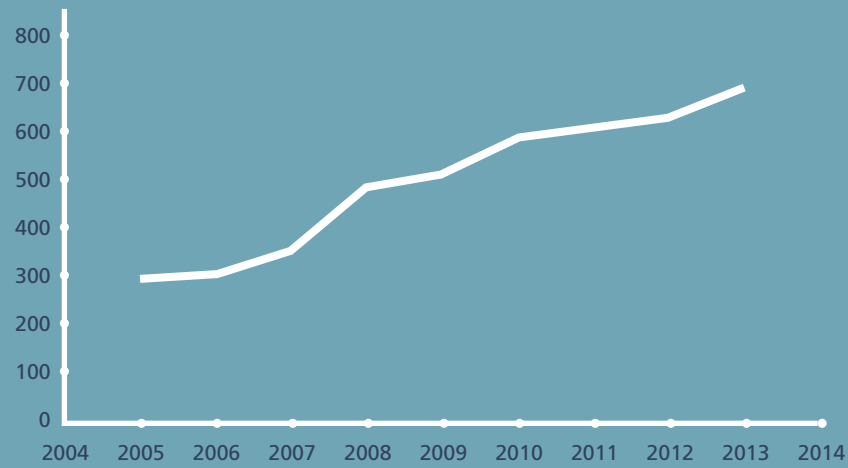
## WORLD RANKINGS

2013	Leiden (Biomedical, Health Science)				ARWU
	Mean Citation Score	Mean Normalised Citation Score	Proportion of 10% publications (PPtop10%)	Proportion of international collaborative publication	(Shanghai) Clinical Medicine-Pharmacy
U Copenhagen	130	109	100	59 (51.4%)	101–150
SDU	193	168	131	47 (53.1%)	101–150
Aarhus U	235	191	197	38 (53.7%)	101–150

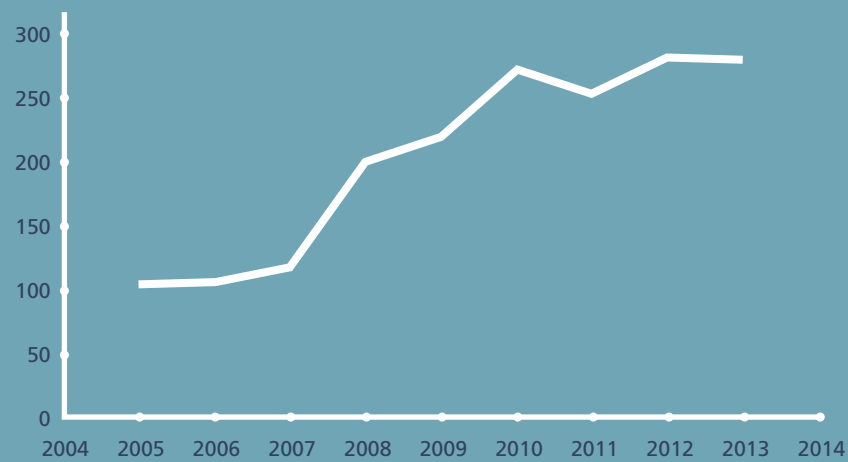
Leiden: Citations are counted until the end of 2012 in the above indicators. Author self citations are excluded. The PP(top 10%) indicator is more stable than the MNCS indicator, and we therefore regard the PP(top 10%) indicator as the most important impact indicator of the Leiden Ranking.

	2009	2011	2013
Articles, peer reviewed	1066	1359	1803
PhD theses	40	55	94

**TOTAL TURNOVER AT THE FACULTY OF HEALTH SCIENCES (MDKK PER YEAR)**



**EXTERNAL TURNOVER AT THE FACULTY OF HEALTH SCIENCES (MDKK PER YEAR)**



# WHEN GRANDPA DRINKS





**The number of elderly patients receiving outpatient alcohol treatment has doubled in recent years, placing high demands on the treatment. A new international study from the Faculty of Health Sciences examines the effect of a card and network-based intervention for the elderly. The foundation of good research is strong cooperation between alcohol research, mental health services and the municipalities.**

More and more elderly people have such a severe drinking problem that they have been referred for outpatient alcohol treatment. In the past, seven per cent of referrals were for people aged 60+. That figure is now around 14 per cent. The old age dependency ratio is increasing, so even more elderly people with alcohol problems can be expected.

"This group of patients has been shown to have not nearly as many problems as younger patients with alcohol problems. So our basic theory is that elderly patients require a shorter intervention. In the research project, we investigate the effect of an intervention of four weeks as opposed to the normal intervention of six months. At the same time, many of the patients are widows or widowers, so we also focus on how their network can help them with their alcohol problems," explains Bent Nielsen, Consultant and

Clinical Professor of Psychiatry. He is head of research at the Research Unit of Clinical Alcohol Research at the Research Unit of Psychiatry, which is part of the Region of Southern Denmark and the Faculty of Health Sciences at the University of Southern Denmark.

#### **CLINICAL AND PERSONAL RECOVERY**

The research project is being conducted in collaboration with Odense Municipality, Aarhus Municipality, the City of Copenhagen and two "municipalities" in Germany and in the US. This broad cooperation is essential to bridge the gap between research and everyday life in the municipalities.

"All prevention and follow-up work is carried out in the municipality, and they have significantly more contact with patients than the health service. If you

want to create new methods of treatment and continuity of care for patients, the municipalities have to be involved. We focus on clinical recovery – that the patients recover or become free of symptoms. There is a lot of talk in the municipal system about personal recovery – the ability to learn to live with one's illness and still have a good quality of life. These are two different angles, but both angles are key," says Nielsen.

The broad cooperation headed by the Faculty of Health Sciences has, among other things, developed the Odense model, which has inspired alcohol treatment elsewhere in Denmark.

Cooperation: SDU – Mental Health Services in the Region of Southern Denmark – Danish and international municipalities – Department of Clinical Research

#### **FACTS: JOINT EFFORT BETWEEN MENTAL HEALTH SERVICES AND THE JOB CENTRES**

- SDU has been specifically conducting research into alcohol since 1990.
- Alcohol treatment used to come under mental health services, but became an independent area in Odense, when the new municipalities were formed.
- Alcohol and psychiatric research is conducted in close cooperation, often also involving regions, municipalities, etc.
- The Research Unit of Psychiatry is cooperating with the job centres in Odense on a major randomised trial investigating the possibilities for integrating the severely mentally ill into the labour market.
- In a randomised trial, patients are randomly split into groups to either receive an experimental treatment or a control treatment.
- The trial is called IPS, Individual Placement with Support. More than 100 patients are currently involved.

A high-angle photograph of a woman with short blonde hair and glasses, wearing a black blazer, black pants, and black boots. She is standing on a reddish-brown baseball field, looking down. White chalk lines of the field are visible around her. A dark blue rectangular box is overlaid on the right side of the image, containing the title text.

# FIGHT PAIN WITH EXERCISE

**More than 832.000 Danes suffer from osteoarthritis, costing society 11.5 billion a year - for osteoarthritis alone. The rheumatic disease osteoarthritis (degenerative joint disease) is the main culprit, each year triggering a flood of prescriptions for painkillers and operations. But it does not have to be like that. Research shows that physical exercise is effective in preventing and treating the disease.**

Around one in 5 adults in Denmark self-report osteoarthritis. It is a societal challenge because it is so common and because it is so expensive. For the individual, osteoarthritis means pain, loss of function and poorer quality of life.

A direct consequence of the disease osteoarthritis is that large amounts of painkillers are prescribed and many surgical procedures are performed. However, research conducted over the past 15 years shows an effective alternative to the "hard" treatment methods. Ewa M. Roos, Professor at the Department of Sports Science and Clinical Biomechanics and Head of Research at the Research Unit for Musculoskeletal Function and Physiotherapy, Faculty of Health Sciences at the University of Southern Denmark, explains:

"Research shows that both pain and loss of function can be avoided, and – if you suffer from osteoarthritis – treated early and effectively with patient education, physical exercise and weight loss. We have,

for example, seen that supervised exercise provides effective pain relief and improves physical function in patients with knee and hip osteoarthritis, without the negative side effects of medicine. The analgesic effect of six weeks' training is actually about three times greater than the effect of painkillers."

#### **COMBINES APPROACHES**

The Faculty of Health Sciences and Odense University Hospital (OUH) are key players in research into joints and diseases, and a special area of focus is the importance of the patient's own input. A current joint research project is looking at whether surgery can be postponed or avoided entirely with physical exercise.

"We have a number of translational research projects with OUH in the new 3D motion laboratory and research clinic for sports medicine. We combine the various tools and options in our toolbox – physiological, psychological, pharmacological, surgical, etc. – to find the most effective

treatments with as low risk as possible," explains Roos.

Our cooperation with primary practice and municipalities has increased, and we are also in the process of establishing pilot projects that focus on early treatment of osteoarthritis patients in the Region of Southern Denmark. This approach is fully in line with the new clinical guidelines of the National Board of Health and thus improves the quality of the treatment available in the Region of Southern Denmark.

Surgery is relevant for very few. Osteoarthritis develops slowly over many years, and with the new knowledge we have about risk factors the possibility of treating early and preventing the development of the disease is good.

"Traditionally, patients suffering from musculoskeletal pain were offered painkillers as the only treatment when they contacted the primary care sector. But

**FACTS:  
WHY "OSTEOARTHRITIS" AND  
NOT "WEAR AND TEAR  
DISEASE"?**

Osteoarthritis and wear and tear disease are one and the same thing – the changing and destruction of joint cartilage and bone tissue around the joints – but osteoarthritis is the modern, precise name of the disease. Osteoarthritis becomes more common with age and has many

risk factors such as gender and heredity, but also sports injuries, body weight and muscle weakness, which can be prevented. The term "wear and tear disease" is erroneously associated with the idea of wear and tear the disease being an inevitable fact of aging and suggests that there is no possibility of prevention or treatment.

**FACTS:**

In Denmark, more than 18,000 hip and knee replacements are carried out each year.

modern osteoarthritis treatment should follow the so-called Pyramid model, which means that patients should be offered basic treatment with education, exercise and possible weight loss first. If that is not enough, medication can be added, with surgery as a last resort. This minimises the risks and optimises the effect of the treatment," says Roos.

She also explains that surgery is relevant for very few. An English study actually shows that it is only relevant for around 12% of people with knee pain, who approach primary practice.

And even if surgery is considered, it is effective to combine it with exercise. Interdisciplinary studies have shown that people who exercise prior to surgery recover faster.

Cooperation: Department of Sports Science and Clinical Biomechanics – primary health care – OUH – Department of Clinical Research



**FACTS:**

- Osteoarthritis is the most common rheumatic disease in Denmark.
- More than 18% of the adult population suffer from osteoarthritis.
- 832.000 Danes suffer from osteoarthritis, costing society 11.5 billion a year - for osteoarthritis alone.

**FACTS:**

The Faculty of Health Sciences plays a pivotal role in the research into and dissemination of knowledge about musculo-skeletal disorders in Denmark. A number of researchers from the faculty are members of the Danish Council on Health and Disease Prevention (Vidensråd for forebyggelse).

# CAN 77- YEAR-OLD MRS JENSEN TOLERATE CHEMO- THERAPY?

In 2020, two out of three Danish cancer patients will be older than 65 years , posing a huge challenge to the treatment system. AgeCare at OUH and SDU is to develop effective ways of assessing elderly patients individually and thus determine the best treatment for them. Advanced genetic studies will help predict whether a person can endure and would benefit from intensive chemotherapy, or whether it would make for a better quality of life to omit treatment completely.

Cancer particularly affects elderly people, and with the ageing population in Denmark, there is the prospect of a wave of elderly cancer patients. Today, more than 40% of those diagnosed with cancer are aged 70 years or older and forecasts show that this figure will become much higher in the coming years, pushing the entire treatment system. More people will be having treatment and that treatment will be different, because the elderly often suffer from other diseases at the same time and may be unable to tolerate conventional chemotherapy, for example.

“We know far too little about our elderly cancer patients today. How do their body and organs react to the treatments? How can we help them cope best with the often demanding treatment? What particular problems do the elderly experience

in addition to the treatment itself? These are just some of the questions AgeCare has to answer,” says Jørn Herrstedt, Consultant and professor at OUH and SDU.

#### **FACTS: AGE CARE**

AgeCare (Academy of Geriatric Cancer Research) is a new elite research centre at Odense University Hospital and SDU. AgeCare is centered on seven areas of research: Epidemiology, cancer biology, surgery, radiotherapy treatment, medical oncology treatment as well as two areas in connection with supportive care, which is about the patient's quality of life.

“Our aim is to find the cancer patients who can be helped by and tolerate our treatments, and leave those who cannot tolerate the treatments and do not get anything other than side effects from them alone. Here we lean heavily on basic and translational research at the Department of Molecular Medicine at the Faculty of Health Sciences and Proteomics at the Department of Biochemistry and Molecular Biology at the Faculty of Science. We hope to be able to pick out certain properties genetically, which can tell us in advance whether someone is a suitable candidate for treatment,” concludes Herrstedt.

### MOLECULAR STUDIES

Specifically, the cooperation between clinical and basic research means that blood and tissue samples are taken from all patients included in the clinical studies conducted under the auspices of AgeCare, which are then studied in the laboratory.

“We examine the samples in the laboratory for the amount of specific proteins, protein modifications and RNA, and we look for DNA mutations. In the past, only a few markers could be examined at a time, but advanced technology means we can now perform an analysis that looks at all the individual’s genes at once, providing a far more accurate picture of the status of

the disease. We try to find molecular alterations that may provide an indication of what the patient can tolerate and how treatment can be tailored accordingly. In this way, the research is translational – it goes from the patient to the laboratory and back to the patient,” says Professor Henrik Ditzel, Dr. Med., SDU.

The AgeCare research project initially runs until 2019.

Cooperation: Department of Clinical Research – OUH – Department of Public Health – Department of Molecular Medicine – Department of Biochemistry and Molecular Biology, Faculty of Science, SDU

**FAKTA:** Studies of new cancer treatments and medicine are generally conducted on younger and middle-aged patients today, despite the fact that the elderly account for the majority of patients. AgeCare cooperates with Clinical Pharmacology at SDU and OUH, which is headed by Professor Kim Brøsen, Dr. Med.

Among other things, the researchers will look at how different cancer drugs are absorbed into the body, and assess whether there are differences in efficacy and side effects in younger and older patients.



## CANCER RESEARCH AT THE REGIONAL HOSPITALS

**International research collaboration with the University of Southern Denmark and the biotech company Genmab as the Danish participants leads to improved treatment of bone marrow cancer.**

Based on extensive preclinical studies conducted by the Danish company Genmab and researchers at the University Hospital in Utrecht, Torben Plesner, Consultant at Vejle Hospital, Sygehus Lillebælt, and Professor at the Department of Regional Health Research, SDU, since 2007, has been involved in clinical trials with the monoclonal antibody Daratumumab for treatment of bone marrow cancer, multiple myeloma.

The treatment is based on the isolation of immunoglobulins derived from monoclonal cells. Monoclonal cells are a family of cells derived from a single cell and therefore identical with regard to the antibody (immunoglobulin) they secrete. The antibody thus reacts in a well-defined manner with a particular type of molecule. In the case of Daratumumab, the molecule binds to the surface of cancer cells in the bone marrow cancer called multiple myeloma.

"Köhler and Milstein's invention of hybridoma technology back in the 1970s made it possible to produce monoclonal antibodies with defined specificity and on a large scale. This invention has paved the way for the development of more effective cancer treatments within many disease entities," explains Dr Plesner.

Monoclonal antibodies can often be used with little or no side effects and are used both alone and in combination with conventional chemotherapy.

Clinical trials with the antibody Daratumumab, conducted in a collaboration between clinical scientists from Denmark, the Netherlands, Sweden, Italy, France and the US, have shown very promising results.

"The U.S. Food and Drug Administration FDA has, on the basis of these promising results, granted Daratumumab 'break-

through designation' in order to stimulate the continued rapid development towards marketing and availability of the antibody to patients with bone marrow cancer," says Dr Plesner, who along with his colleagues at Vejle Hospital has taken the long haul to success for the new antibody.

"The process has been slow because the safety measures surrounding the testing of a new antibody are, justifiably, extensive. We have been able to gradually increase the dose of the antibody, whilst learning how to optimise dosing and minimise the side effects. We are now through dose escalation in phase I of the trial and have found the correct dose, which patients are now treated with in phase II and now also phase III trials," says Dr Plesner.

Monoclonal antibodies can often be used with little or no side effects, and can be used both alone and in combination with conventional chemotherapy.

"The exciting thing about Daratumumab is that the antibody on its own is surprisingly active in bone marrow cancer with few side effects," says Dr Plesner.

The clinical trial is now being extended with combinations of Daratumumab and other drugs that are active against multiple myeloma, both in phase II and phase III trials. Genmab has entered a partnership with Janssen allowing launch of many phase III clinical trials and thus ensuring that, if successful, Daratumumab will become available to the patients in need as soon as possible.

# 500,000 DIABETICS IN THE FUTURE





**Diabetes is eating its way into the population. Today, 300,000 people in Denmark suffer from diabetes, and this number increases by five per cent every year. A large proportion of them are elderly people with other diseases at the same time, and this puts pressure on the treatment system. SDU and OUH are working to design tailored treatments by combining biomarkers with the latest clinical knowledge.**

The number of people with diabetes is increasing by around five per cent per year, and if this trend continues, half a million people in Denmark – i.e. almost one-tenth of the population – will be diabetics in 2020.

"Unfortunately, there is nothing to suggest that we can do anything about the five per cent. It is the same in almost in all countries and has been for some years. The number of diabetics is a huge burden on the health system. This poses challenges in terms of how to organise their treatment, and how to ensure that everyone receives good treatment," says Professor Henning Beck-Nielsen, Head of Research at the Endocrine Elite Research Unit at Odense University Hospital and the Department of Clinical Research, SDU.

#### **IMPORTANT TRANSLATIONAL RESEARCH**

Diabetes research at OUH and SDU is internationally recognised, due, not least, to the unique interplay between basic and clinical research.

"We focus on translational research and maintaining an application-oriented perspective at all times. As clinicians, we treat patients every day, but it is also important that we are closely associated with and involved in the basic research to ensure that it matches the reality of people with diabetes. You could say it is about finding the right pill for the right mouth," says Beck-Nielsen.

#### **RISK OF OVERMEDICATION**

The Endocrine Elite Research Unit at the Department of Clinical Research is assisted by the Department of Molecular Medicine, which is investigating biomarkers to find a more effective treatment for diabetes. Once the biomarkers have been identified, blood samples can be taken from the patient and from them determine what the patient needs.

"This way we can tailor the treatment. This may involve a change of diet, surgery for obesity or special medication. There is an increasing number of elderly people with

diabetes, and they often suffer from several diseases at the same time. If a patient has to take medication for cardiovascular disease, COPD and diabetes, we can easily find ourselves in a situation where we are giving the patient too much medicine. This is a problem, so it is important to identify what is good for the individual patient," says Beck-Nielsen.

He explains that the increase in the number of elderly people with diabetes also has an impact on the organisation of future treatment. This applies both to the small practicalities – e.g. that some patients may have difficulty getting to the hospital for check-ups – to the overarching development of new drugs, which are today based exclusively on younger people.

Worldwide, around 371 million people have been diagnosed with diabetes, corresponding to around eight per cent of the world population aged 20–79.

Cooperation:  
Department of Clinical Research – OUH – Department  
of Molecular Medicine – Faculty of Science, SDU

#### **FACTS:**

- Endocrine Elite Research Unit was established as an elite unit in 2013.
- It is part of the Department of Endocrinology M, Odense University Hospital and the Department of Clinical Research, Faculty of Health Sciences, SDU.
- The unit works with the Faculty of Science.

#### **FACTS:**

##### **BIOMARKERS**

- Biomarkers can detect diseases in their earliest stages.
- Biomarkers can be used for clinical diagnosis, prediction of the development of a disease, response to medication, etc.
- A pregnancy test from the supermarket, for example, gives the result on the basis of a biomarker.

# THE GREY-HAIRED REVOLUTION





## Most children born today will celebrate their 100th birthday. But what impact will this have on our family life and careers? And our hospitals? These are some of the questions that the Max-Planck Odense Center will attempt to answer.

Today, people turning 100 are sent a personal letter of congratulations from the queen. It is a greeting and a recognition of having lived to a ripe old age. But if this tradition is to be maintained in the future, an awful lot of letters will have to be sent out.

“More than half of those born today can expect to live to 100,” says Professor James W. Vaupel, PhD, head of the newly established Max-Planck Odense Center on the Biodemography on Aging at SDU. Researchers in the fields of demography, epidemiology, medicine, biology, mathematics and statistics are conducting research into the riddle of old age in an international interdisciplinary collaboration. It deals with why some of us live to a very old age, and the consequences of ageing – both for individuals and for society as a whole.

The elite research centre collaborates with the Max Planck Society, a world-renowned German research organisation. SDU is the

first university in the Nordic Region to have been given the prestigious Max Planck label in recognition of its biodemography research.

### DECISION ON RETIREMENT AGE

One of the areas of research at the Max-Planck Odense Center is called Forecasting and Policy. According to James W. Vaupel, it is an important area because forecasts can have a direct impact on our economy and lives.

“We develop models and methods to predict how long we will live in the future, and how long we will remain fit and healthy. Politicians follow the area closely and, on the basis of our research, can make more informed decisions about our retirement age and the entire pension system,” he explains.

### GREATER IMPACT THAN CLIMATE CHANGE

Life expectancy has increased by 2.5 years

#### FACTS: THE HOSPITALS OF THE FUTURE

- Ageing changes the organisation of the treatment system and hospitals.
- Today, there are numerous physicians who specialise in the heart, lungs, intestines, etc. In the future, there will be a great need for physicians with an overview of the patient's overall health picture.

#### FACTS: GERMAN THOROUGHNESS – DANISH PERSPECTIVE

- Max Planck is Germany's most successful research unit.
- Since its establishment in 1948, the unit has fostered 17 Nobel Prize winners.
- Max Planck publishes more than 15,000 scientific articles a year.
- There are 82 Max Planck institutes in Europe – including the new one at SDU.
- Max Planck Odense Center on the Biodemography on Aging is composed of researchers from both the Faculty of Health Sciences and the Faculty of Science at SDU.
- The centre has around 25 employees from all over the world.

**FACTS:  
RESEARCH GROUPS AT THE  
MAX-PLANCK ODENSE CENTER  
ON THE BIODEMOGRAPHY ON  
AGING**

- **Unit on Human Longevity:** Focuses on how new survival patterns improve human health.
- **Unit on Medical Demography:** Focuses on the relationship between health and mortality throughout the life cycle.
- **Unit on Forecasting and Policy:** Will develop methods to predict and evaluate trends in health and life expectancy during the 21st century.
- **Unit on Evolutionary Biode-mography:** Focuses on principles that govern the patterns within health and (higher) life expectancy – not only for humans, but for a wide variety of species.

per decade since 1840. That is three months a year or six hours a day.

“It’s an age revolution. It has an enormous impact on people’s lives and on society at large. It is comparable to climate change, but here we are seeing the consequences faster. If children can expect to live to 100, would it be reasonable for them to work until they are 80? Should they have one long career or two different ones? This raises a number of questions and challenges the present-day organisation of the labour market,” notes Vaupel.

He estimates that in the future we will, for example, work for far more years, but fewer hours per week.

“Today, we slog for 30-40 years to get everything to run smoothly: our career, our family and our leisure time. This is known as ‘The rush hour of life’. But then, you have plenty of time, when you retire. Demographic developments make it possible – and perhaps even necessary – to organise work in a different way, so you might work 25 hours per week, but spread the work over 50-60 years.”

**FACTS:  
THE HOSPITALS OF THE FUTURE**

- Several diseases or disorders are often present in elderly patients at once – comorbidity
- Odense University Hospital specialises among other things in geriatric medicine, which, according to James W. Vaupel of the Max-Planck Odense Center on the Biodemography on Aging, will be a key area at the hospitals of the future.



Cooperation:  
SDU – Department of Public Health – Max Planck Institute for  
Demographic Research – Faculty of Science, SDU

James W. Vaupel

# FOCUS ON THE HEART AND MIND IN THE TREATMENT OF PATIENTS WITH HEART DISEASE

One in four cardiac patients suffer from anxiety and depression and die earlier than patients in emotional balance. Despite increasing recognition of the fact that the psychological profile of patients may have an impact on the prognosis and quality of life of cardiac patients, it is not common to have a psychologist on board the multi-disciplinary team in cardiology departments. At Odense University Hospital (OUH) and the University of Southern Denmark (SDU), things are different. A psychology professor from the Department of Psychology, Faculty of Health Sciences, SDU, is working at the Department of Cardiology, OUH, two days a week, as a research collaboration agreement has been entered into between the two institutions. It is her task to bridge the gap between basic research and clinical practice.

Around a quarter of the many thousands of patients admitted to cardiac units suffer from anxiety and depression. Even if they are given the very best, state-of-the-art treatment, the result is not encouraging: They have a poorer quality of life and apparently die earlier than comparable patients unburdened by such symptoms.

This is just one of the many psychological challenges associated with the treatment of cardiovascular disease, but until now there has been little focus on the psychological aspect at the cardiology depart-

ments. This has unfortunate consequences for patients and society alike. As the first in Denmark, the Faculty of Health Sciences at SDU has therefore allocated funding for research in this interdisciplinary field, among other things with the appointment of Susanne S. Pedersen, Professor of Cardiac Psychology.

## **BOTH BEHAVIOUR AND THE IMMUNE SYSTEM**

With the aim of bridging the gap between research and clinical practice, she is based at the Department of Cardiology, OUH, two days a week.

"I look at how patients' treatment can be optimised beyond everything that doctors can do. I focus on the many cardiac patients who suffer from depression or anxiety, and the consequences of this. In order to improve the treatment, it is important to look at both the behavioural factors, such as patients not taking their medication, and at basic research on the immune system, etc., because the mind and body interact," says Professor Susanne S. Pedersen.

She is part of everyday life at the Department of Cardiology, but her work does not involve therapy sessions with patients or individual counselling. Her focus is on the overall perspective with emphasis on the patient's perspective: How does heart disease affect the mind? What are the implications of having technology implanted into the body? How does the disease affect relatives? And what can we offer those patients who have difficulty adapting and moving on? Do patients receive sufficient information and are they satisfied with their treatment, or can we improve what we offer patients?

#### **PATIENT INVOLVEMENT GIVES QUALITY OF LIFE**

Although the research is still in its infancy, Professor Pedersen has identified a clear need for psychological expertise on a cardiology ward.

"Cardiologists do not always feel equipped to talk to a family which has lost a relative

suddenly to a genetic heart defect, with the implication that the rest of the family needs to establish if they have the same genetic defect," she explains.

"Cardiology has a range of state-of-the-art treatments. For example, patients can be fitted with an ICD (implantable cardioverter defibrillator), which intervenes and saves the patient's life in the event of a potentially life-threatening heart rhythm. But all technology comes at a price, and we need to get better at asking patients what they want. In a study from the Erasmus Medical Center, the Netherlands, we have shown that patients prefer to have their ICD switched off in the final stages of their life, and die a dignified death without multiple painful shocks. Patient involvement and shared decision-making is the future, and this is something of a paradigm shift in terms of what doctors have been used to. It may even lead to improved compliance among patients, as they become more involved in their own treatment and thus likely feel more responsible. This is known as 'patient empowerment'," explains Pedersen.

#### **THE MIND MUST BE INCLUDED IN INFORMATION MATERIAL**

The goal of the research is to become better at targeting treatment to the individual patient, so it is as effective and considerate as possible. The goal is also to develop better information for patients,

which takes into account both the clinical and the psychological aspects of disease and, for example, provides guidance on how to deal with depression and anxiety.

"It is important to have psychological expertise on board both in clinical research and practice, and my wish for the future is that resources will be made available to appoint psychologists with knowledge of somatic disease on cardiology wards. The benefit of having a psychologist present is that the psychologist has knowledge of the challenges and problems of cardiac patients, and is on hand to advise and supervise staff. Naturally, this involves an investment, but the question is whether we can afford not to for the sake of patients' well-being and prognosis," says Pedersen.

She points out that doctors are busy, so one of the prerequisites of a good research collaboration is not only that psychologists are present in clinical practice, but also that they speak the doctors' language. Susanne S. Pedersen reaps both goodwill and effective input from working at the Department of Cardiology at OUH two days a week. She is delighted that the opportunities for research collaboration and knowledge sharing will be even better in a few years time when the new interconnected SDU and OUH are completed.

Cooperation:  
Department of Cardiology, Odense University Hospital –  
Department of Psychology, SDU



#### FACTS:

- Around 420,000 people in Denmark live with cardiovascular disease.
- In a municipality with 50,000 inhabitants, around 3,800 people suffer from cardiovascular disease.
- More than a quarter of Danes die from cardiovascular disease.
- Cardiovascular disease is the second most common cause of death in Denmark.
- More than 54,000 people in Denmark are hospitalised each year as a result of cardiovascular disease. Over the course of a year, this adds up to 120,000 admissions. Some 43,000 people a year in Denmark attend one or more outpatient consultations for cardiovascular disease at the hospital.
- Patients hospitalised with cardiovascular disease cost the State DKK 4.6 billion a year – plus costs for prescription heart medication.

Source: The Danish Heart Foundation

# KIDNEYS AND BLOOD PRESSURE – HOW THEY ARE CONNECTED



## **FACTS:**

The Department of Molecular Medicine has three main areas of research. Besides Cardiovascular and Renal Research, there is Cancer and Inflammation Research as well as Neurobiology Research. Boye L. Jensen's research group collaborates on research projects on hypertension with Odense University Hospital and hospitals in the Region of Southern Denmark:

Projects focus on patients with pre-eclampsia, type1 and type2 diabetes and nephrotic syndrome. This autumn a project on hypertension in kidney transplant patients begins. Despite a "new" kidney, a significant proportion of transplanted patients display protein in the urine and high blood pressure.



## New insight into the causes of hypertension provides better opportunities for individual treatment for the 800,000 people in Denmark with high blood pressure, putting them at a higher risk of a stroke, heart attack and kidney damage.

Protein in the urine is a "danger" signal that causes doctors to look for signs of pre-eclampsia in pregnant women and renal dysfunction in diabetic patients. Protein in the urine is an indication that the kidneys' filters, where the blood is purified, are "leaky", as protein from the blood is leaked into the urine. Kidney filtration barrier damage is often seen concurrently with increased blood pressure. Blood pressure raised over a long period of time damages the kidneys.

"It's a vicious cycle that starts when a kidney is "leaky". Once the kidneys are affected, it predicts a negative outcome," explains Boye L. Jensen, Head of Research and Professor of Cardiovascular and Renal Research the Department of Molecular Medicine.

### ENZYME PROVOKES RETENTION OF SALT

Boye L. Jensen and his research team work closely with physicians at Odense University Hospital. As two researchers from the Department of Molecular Medicine and the Department of Nephrology discovered five years ago, enzymes in the urine now appear to be a possible cause of the kidneys retaining salt and water and

"forcing" blood pressure up when protein is leaked from the blood to urine.

"We have found it in rats and we have found it in various groups of patients (pre-eclampsia, diabetes, paediatric nephrotic syndrome). Together with the Department of Endocrinology, Odense University Hospital, we have discovered that the enzyme may be affected by blood pressure medication," says Jensen.

### HYPERTENSION IS AN OVERLOOKED EPIDEMIC

Up to one in five adults in Denmark have high blood pressure. Only half of them know it, and only half of those who know it get treatment. Of those, many do not attain treatment goals, which are to lower blood pressure sufficiently, preferably to under 140 mmHg. So there is a large group of people who are unaware that they are at increased risk. Hypertension, which in itself often has no symptoms, is discovered by accident and sometimes, unfortunately, following a "stroke".

"In more than 90% of patients with high blood pressure, we do not know the

cause. But we believe we have discovered a mechanism that can contribute to hypertension in patients with protein in the urine," says Jensen.

### COOPERATION IS THE KEY TO PROGRESS

All departments at Odense University Hospital dealing with kidney, blood pressure and urinary tract diseases contribute to and benefit from the translational research conducted at the Department of Molecular Medicine's Department of Cardiovascular and Renal Research.

"We have an excellent working relationship with the departments. Without them we would not be able to test our theories, and their contact with so many patients gives us extensive biological material to work with – urine, tissue and blood samples and the possibility of intervention with medicines. It makes our basic research and our work with animal models far more realistic, we can quickly test ideas out on patients and see that there is a need for our research," believes Jensen.

Cooperation:  
Department of Molecular Medicine – OUH

### FACTS:

Boye L. Jensen's work with kidney disease, hypertension and protein in the urine is relevant to the disciplines of many of the departments at Odense University Hospital. The various groups of the research unit are currently cooperating with:

- Department of Gynaecology and Obstetrics
- Department of Urology
- Department of Nephrology
- Department of Gastroenterology
- Department of Pathology
- Department of Nuclear Medicine
- Department of Cardiac, Thoracic and Vascular Surgery
- Department of Endocrinology
- Department of Clinical Biochemistry
- Department of Neurosurgery
- Department of Cardiology
- Department of Neurology

## NEW GRADUATES DEVELOP THE HEALTHCARE SECTOR

The Faculty of Health Sciences is a beacon within master's programmes mimicking real life. The Faculty recently had its master's programmes in occupational therapy, clinical nursing and midwifery science accredited – and this will have a positive impact on professions, personnel and patients.

Nurses, occupational therapists and midwives can now take a master's degree in their subject at SDU, equipping them to develop the profession through a scientific approach. The new master's programmes make a positive contribution to the healthcare system because the students can act as internal agents of change. They can challenge existing procedures and identify effective new procedures. On a scientific basis, that is.

"The bachelor degree programmes play a key role in health care because they – the nurses, occupational therapists, midwives,

etc. – are very much the people who the patients encounter. The bachelor degree programmes work well and the realistic new master's programmes will, together with the bachelor programmes, help to create an even better health service in the future," says Merete Munk, Head of Education at the Faculty of Health Sciences.

It can be difficult to implement knowledge and new initiatives in a busy working day, so the programmes also focus on how the knowledge is put into play, so that it makes a difference to the day-to-day work, extending all the way out to the departments and the patients. Consequently, these programmes also include subjects such as project management, organisation and change processes.

### DAILY LIFE IS INTERDISCIPLINARY

Interdisciplinarity is a crucial point of the Faculty's master's programmes, as is the case with the three new programmes.

Much of the teaching is a joint effort. The students get to know each other as professional groups while they are studying, and the interdisciplinary competencies match the reality they subsequently have to work with.

### ALTERNATIVE TO BROAD-BASED MASTER'S PROGRAMMES

The thinking behind the new programmes is that there is a demand for more research-based knowledge in the respective fields and an alternative to the more broad-based master's programmes, which have so far existed for bachelors in occupational therapy, nursing and midwifery science. The new programmes have therefore also been developed in collaboration with both professional colleges and employers.

### SUCCESS WITH QUOTA 2 SELECTION

A large percentage of the students at the Faculty of Health Sciences are admitted via special selection ("Quota 2"). Candidates are assessed in relation to the formal requirements, their performance in a multiple-choice test and personal qualities such as motivation and ethics. Interviews ensure a good match between student and programme, reducing the risk of students dropping out.

The special Quota 2 selection is used for Medicine, Clinical Biomechanics, Public Health, Sport & Health and Psychology. Teachers and students alike are happy with the scheme, and studies have shown that the Quota 2 students generally do better on the programmes than students admitted in a traditional way.



	2009	2011	2013
Students in total (no.)	2,982	3,496	4,388

Admission (graduates, undergraduates, options, supplementation and masters)			
Medicine	499	488	633
Chiropractor (clinical biomechanics)	109	87	87
Sport and Health	142	183	229
Master in Health Science	26	31	48
MSc in Pharmacy	-	12	20
Biomedicine	14	14	32
Public Health Sciences	69	71	119
Audiologopaedics	31	25	18
Physiotherapy	-	28	31
Master in Health and Physical Activity	11	-	-
Audiology	25	45	59
Master of Rehabilitation	19	-	18
Master of Public Quality Management	17	20	17
Master of Medical Imaging	11	8	-
Psychology	-	114	206
Supplementary Health Programme	32	31	63
In total	1005	1157	1580

#### FACTS:

The Faculty of Health Sciences offers the following programmes:

- Medicine
- Clinical Biomechanics
- Sport and Health
- Public Health Sciences
- Master in Health Science
- MSc in Pharmacy (in cooperation with the Faculty of Science)
- MSc in Physiotherapy
- Psychology (in cooperation with the Faculty of Business and Social Sciences and the Faculty of Humanities)
- Biomedicine (in cooperation with the Faculty of Science)
- Audiology and Logopaedics (in cooperation with the Faculty of Humanities)
- Occupational Therapy
- Clinical Nursing
- Midwifery Science
- Master of Rehabilitation
- Master of Public Quality Management
- BSc in Engineering (Welfare Technology) (in cooperation with the Faculty of Engineering)

# PUBLIC SECTOR CONSULTANCY AND PROJECTS

## THE AUTHORITIES' RIGHT HAND

The Faculty of Health Sciences assists the public authorities with a number of tasks – from analysis of public health to investigation of causes of death.

The Faculty of Health Sciences highly prioritises close interaction with the surrounding society. We do this a.o. through public authority projects and knowledge sharing, bringing research into people's everyday lives.

The Faculty of Health Sciences provides independent, research-based public-sector consultancy with a fast response, making the faculty an interesting and reliable partner. The Faculty of Health Sciences also holds a leading position within the monitoring of public health with strong research environments within epidemiology and register based research as well as a sizeable biobank.

Below, we provide two specific examples of how our professional knowledge benefits the authorities.

## FIRST EXAMPLE: STATE OF THE NATION IN A SINGLE DATABASE

The National Institute of Public Health, SDU, is a national research institute that supplies research and data to all Danish municipalities and regions, and has a consultancy commitment to the Danish Ministry of Health.

"The Institute assures the University of Southern Denmark close ties with the National Board of Health and the Ministry because we contribute a vast database of figures and knowledge. The health of the Danish population can therefore be followed over time, showing how important it is to make an extra effort," says Director Morten Grønbæk.

Since 1987, the National Institute of Public Health has been making random checks on our health behaviour. Most recently, in 2010 and 2013, more than 150,000 Danes were asked to complete a questionnaire on health for the National Health Profile. In many municipalities, the results form the basis of the work of many political committees.

"The municipalities want to know how people are. We ask them about everything from smoking and diet to sex and gambling addiction," explains Grønbæk.

## YOUNG PEOPLE DRINK LESS THAN BEFORE

One result of the survey – which has received a great deal of attention – is that young people aged between 16 and 24 drank less alcohol in 2013 than in 2010.

"We can see a fairly sharp decline in alcohol consumption. It is still higher than in many other countries, but it is falling," says Grønbæk.

When the responses in the questionnaires show something as clear and sensational, many people question whether it can be true. Morten Grønbæk explains that the results are validated in a variety of ways.

"We allow for drop-out, so that is not a factor, at least not when we look at changes. And from time to time, we supplement the results with other population studies that have looked at physical examinations. For example, data analysis on

## FACTS:

The National Health Profile 2013 is open to the public, so anyone can search for data on the health, well-being and morbidity of Danes at local, regional and national level. In future, the health profile will be compiled every four years, ensuring that the newly elected local councillors have fresh figures to work with. [www.danskernessundhed.dk](http://www.danskernessundhed.dk)



people who say they drink a lot shows them to be far more likely to develop cirrhosis than those who say they do not drink. It is an indirect validation that the answers given are more or less true – even when talking about one's drinking habits," says Grønbæk.

#### **SECOND EXAMPLE: CT SCANS PROVIDE BETTER FORENSIC MEDICINE**

Every year, the Department of Forensic Medicine at the Faculty of Health Sciences carries out a multitude of tasks for the authorities – in fact, it is the very DNA of the institution: Forensic medicine is defined as "science and medicine used for the purposes of the law".

Since 2006, the Department has used CT scans in its work as a supplement to standard autopsies. CT is an advanced X-ray imaging technique that allows inner structures to be seen in three dimensions as well as in cross-sections without opening the body.

#### **ACCURATE DIAGNOSIS**

"CT images show the inner structures undisturbed by dissection. Once we open

the body, we change the anatomy. If, for example, a man has sustained a blow to the head with a crowbar, the skull fragments tends fall apart when we open the head at the autopsy. With CT we can view the cranial fractures in situ, and thereby evaluate far easier if a given blunt instrument has been used to produce this lesion or not. The CT images are also more suited to courtroom presentation than grisly autopsy photos, especially in jury trials," says Peter Mygind Leth, Deputy Chief Forensic Pathologist, Specialist in Forensic Medicine at the Department of Forensic Medicine.

Another advantage of CT scans in forensic medicine is that it is easy to store and send the images, thereby facilitating second opinion reviews and quality control.

"In short, CT scans ensure that we get a better and more accurate diagnosis. CT is so effective that I believe some autopsies can be avoided in the future, for the benefit of the relatives and the authorities alike," says Peter Mygind Leth.

The Department of Forensic Medicine performs around 200 CT scans a year.

#### **FACTS:**

- CT scanning is an advanced form of X-ray that provides 3D images instead of the traditional 2D X-ray image.
- X-rays have been used in forensic medicine for more than a century, but CT scans have only been introduced as standard over the past few years.
- It takes about 10 minutes to complete a CT scan in Forensic Medicine.
- The Department of Forensic Medicine has used CT scans to help with an almost 1,000-year-old murder case – the murder of Canute the Holy.

## NEW OUH/SDU

# UNIQUE NEW BUILDING PROJECT PROVIDES EXCEPTIONAL RESEARCH AND EDUCATIONAL OPPORTUNITIES

The University of Southern Denmark and Odense University Hospital are being built together at Campus Odense. The New OUH/SDU will be a unique design that will attract international attention. The New OUH/SDU will contribute to a strong and close collaboration between a five-faculty university and a university hospital.

The extraordinary opportunities offered by the New OUH/SDU to optimise cross-disciplinary research will provide SDU with a national and international position of strength in translational research that will enhance the quality of research and strengthen implementation of new research in society as well as contribute to educational and business innovation.

The linking of SDU and OUH is completely central to this. Ideally, employees from SDU and OUH will not think about where they are, whether in one organisation or the other. They will be able to find workstations and meeting places where they need them.

And an easily accessible and forward-looking research communication will strengthen the employees' identity and knowledge about each other's fields of research.

### STIMULATING RESEARCH AND STUDY ENVIRONMENT

New HEALTH, i.e. the new building for the Faculty of Health Sciences at SDU, represents the physical link between SDU and the New OUH. New HEALTH will provide a framework for both research and education, where interaction and cooperation are keywords that will ensure quality and a high international level of New HEALTH's core tasks.

New HEALTH will be a pleasant and inspiring place to work and study, and a place that is welcoming to visitors and business partners. The research areas are flexible and support a dynamic research development. The education facilities with classrooms and study zones form an excellent learning environment and provide a sense of belonging to the university.

Two concepts – Active Living and research communication – contribute to the dynamic development of the collaborative culture, working environment and knowledge sharing. At the same time, the surrounding nature will help make the work and study environment feel welcoming and stimulating.

### NEW JOB

#### ACTIVE AND HEALTHY LIVING

In 2013, the Department of Sports and Clinical Biomechanics moved into its new building and training stadium, which with its cutting-edge interior will contribute to the development of research, education, entrepreneurship and innovation – nationally and globally.

### FACTS:

The New HEALTH covers 50,000 m<sup>2</sup> and the building connects the existing campus with the new university hospital.

Together, SDU and the New OUH will cover an area of approximately 500,000 m<sup>2</sup> under one roof when the new buildings are completed. The New OUH/SDU should also be viewed in connection with Cortex Park, located just north of SDU, where residence halls have already been established, and where buildings for organisations and companies are set to shoot up in the coming years. The experience of the entire campus area will be a dynamic, vibrant city of knowledge, which is marked by the work of the university and the university hospital.

Completion of the New OUH/SDU planned for 2022.

## COLOPHON

Health for all, 2014

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	2009	2011	2013
<b>Personnel</b>			
Academic staff (FTEs)	325	373	438
Academic staff (no.)	1,258	1,322	1,313
Technical and administrative staff (FTEs)	281	292	271
Technical and administrative staff (no.)	516	476	361
PhD students (no. as at 31.12)	315	437	540

<b>Economy (mDKK):</b>			
External activities (excl. forensic medicine services)	200	233	257
Ordinary activities (consumption)	297	361	415
Forensic medicine services	17	18	20

Institute 2013	Academic staff – VIP (FTEs)	Academic Staff (no.)	Technical and administrative staff – TAP (FTEs)	Technical and administrative staff (no.)	PhD students enrolled (no. as at 31.12)	Turnover, external activities (DKK million)	Turnover, total (DKK million)
Department of Molecular Medicine	60.1	158	68.4	84	55	44.2	109.3
Department of Sports Science and Clinical Biomechanics	82.5	184	21.6	41	50	31.4	87.9
Department of Public Health	79.7	180	59.5	82	82	60.4	122.0
National Institute of Public Health	65.9	104	14.8	25	31	36.9	59.2
Department of Psychology	19.1	48	6.4	16	9	3.3	17.2
Department of Clinical Research	71.8	478	9.1	23	241	43.9	151.2
Department of Regional Health Research	23.4	149	4.9	5	69	15.8	45.5
Department of Forensic Medicine	5.9	12	27.0	38	3	21.3	26.6
The Faculty Secretariat	30.0		59.2	47		22.1	76.2



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