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National Public Health Institute, Department of Health Promotion and Chronic Disease Prevention

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NATIONAL PUBLIC HEALTH INSTITUTE

DEPARTMENT OF HEALTH PROMOTION AND CHRONIC DISEASE PREVENTION

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Abstract

This review includes the material for the evaluation of the work of the National Public Health Institute (KTL), the Department of Health Promotion and Chronic Disease Prevention (ETEO) in 1996-2006. The main purpose of the evaluation is to guide the Ministry of Social Affairs and Health for the strategic management of KTL.

A panel has been nominated to implement the evaluation. The evaluation panel will examine the functions, strategic importance, scientific merits and value for money of the scientific and expert work undertaken, and make proposals for future. A special emphasis is on the relevance and effectiveness of the work and of its impact on the health of Finnish people.

Department aims to prevent chronic disease and improve citizens health by high quality scientific work, attaining and providing expertise in the field of prevention and by surveillance and monitoring of health, diseases risk factors, nutrition and life styles.

In 2006, department had personnel of 130 employees, out of which 23 with KTL governmental funding (permanent positions) and 107 with external project funding. The permanent operating costs from the KTL government budget was in 2006 1.6 million euros, KTL project funding 0.9 million euros and external funding 3.1 million euros. Department produced since 1996 over 2000 articles of which 1500 have been published in international peer reviewed journals. Altogether 50 doctoral dissertations have been finished during that time.

Department has served the society by giving its expertise on chromic disease prevention and health promotion to ministry of health, health professionals and to public.

Department has eight units: Diabetes Unit, International Cardiovascular Disease Epidemiology Unit, Health Promotion Unit, Chronic Disease Epidemiology Unit, Nutrition Unit, Cancer Prevention Unit, Chronic Disease Prevention Unit and Injury Prevention Unit. (Key words: chronic diseases, health, evaluation, risk factors, health behaviour, nutrition)

CONTENT

1 EARLIER EVALUATION

In the early 1990s the Science and Technology Policy Council in Finland encouraged the Ministries to evaluate research institutions in their jurisdiction. In accordance to this policy, the Medical Research Council of the Academy of Finland carried out an evaluation of the research activities of KTL in 1994-1995, in response to a proposal put forward by the Finnish National Public Health Institute (KTL) and the Ministry of Social Affairs and Health (STM). The objective of this evaluation was to provide information on the public health functions, strategic importance, scientific merit and value for money of the scientific work undertaken and to make proposals for future work.

The international Evaluation Panel, chaired by Dr David Evered of the UK Medical Research Council, prepared an evaluation Report to the Academy in October 1995. For the evaluation, KTL prepared a report describing the work in the Institute. The Evaluation Panel worked via internal meetings, discussions with important stakeholders of KTL, and through site visits to the three divisions of KTL. On the basis of their evaluation, the Panel made 35 major recommendations for further development of the organization, management and work of the Institute.

Over the past 10 years, most of the recommendations made by the Panel have been implemented: the organization of KTL has been changed, several areas of research and public health work have been directed towards new priorities, and more emphasis has been put on the public health impact of the work of KTL. In addition, a renewed strategy was prepared for the Institute in 2001 during a thorough process involving the whole organization. At the end of 2003, a new Director General was appointed to KTL.

Based on these developments, and on changes in the environment, the time is ripe for a new evaluation of KTL. The purpose of such an evaluation would be to evaluate the effectiveness of the work and assess the scientific and public health impact of the Institute.

2 KTL IN BRIEF

2.1 Strategy and functions

The mission of KTL is to protect and promote the health of the Finnish people. As a research and expert institute belonging to the Ministry of Social Affairs and Health, KTL is responsible for providing decision-makers, professionals and citizens with the best possible health-related information for their choices. A general strategy for the Institute was prepared in 2001, while detailed objectives for the work are agreed upon annually with the Ministry.

The three main areas of work in KTL have traditionally been: 1) infectious diseases and immunizations, 2) chronic diseases and health promotion, and 3) environmental health. In all these areas, both research and public health functions are carried out. Activities of the Institute include basic research, ranging from the detailed analysis of the molecular mechanisms of pathogenesis to large-scale epidemiological and preventive studies and research into factors influencing health.

KTL monitors public health, diseases and their determinants through surveys and registers. Research and expert information is transferred into action by developing health-promoting and preventive measures and by advising and collaborating with various stakeholders. National vaccine service, many centralized laboratory functions and forensic medicine investigations are some of KTL's service functions.

Several of KTL's functions are based on laws, such as surveillance of infectious diseases and protection from communicable diseases by vaccinations. In the prevention of chronic diseases KTL works in close collaboration with various Non-Governmental Organizations. In promoting healthy environment and preventing diseases KTL collaborates with environmental authorities and municipalities. A strong presence in the media is a way to reach the people. The ultimate goal is to reduce the human suffering and economic cost caused by illness and to help people enhance their quality of life.

2.2 Organization, personnel and budget

KTL's main facilities are located in Helsinki and three other facilities in Kuopio, Oulu and Turku. The Institute has 11 departments, each of which is built of various laboratories and units.

Ultimate responsibility for leading and managing the whole Institute rests on the Director General of KTL. He is assisted by the Deputy Director General, the Adminis-

trative Director and the Steering Group, consisting of the Directors of Departments. The Director General is also advised by a Scientific Council of KTL, where representatives of the most important stakeholders are present.

At the end of 2006, KTL had a staff of 980 persons, of whom 450 were scientists or experts. Women make up 73% of the staff. In addition to the permanent or temporary staff, KTL is also a working place for non-paid students or scientists who pursue their studies and research together with the staff of KTL.

The total expenditure of KTL was 66 million euros in 2006, and the operating expenses were 56 million euros when the acquisition of vaccines is excluded. Most part (62%) of the operational funding comes from the national budget, 30% from external sources like the Academy of Finland, the European Union, US National Institutes of Health, or various Foundations supporting scientific research. The rest 8% of KTL's budget is covered through income from chargeable services and from miscellaneous other funding.

3 EVALUATION PROCESS

3.1 Scope and purpose of evaluation

The objective of the review is to provide an evaluation of the work of KTL for the Ministry of Social Affairs and Health. The evaluation should examine the functions, strategic importance, scientific merits and value for money of the scientific and expert work undertaken, and to make proposals for future work. A special emphasis will be placed on the evaluation of the relevance and effectiveness of the work and of its impact on the health of the Finnish people.

The evaluation and the Evaluation Report should address the following main issues:

a. National relevance and effectiveness of the activities

b. Appropriateness and adequacy of the research, expert functions and services

c. Output and quality of research activities

d. National and international co-operation

e. Resource allocation

f. Research fundraising

g. Development needs, especially regarding processes and organization

The main purpose of the evaluation is to guide the Ministry of Social Affairs and Health so that they can use it for the strategic management of KTL. The practical implementation of the results, based on the decisions made at the Ministry, is the responsibility of the Director General of KTL.

3.2 Entities to be evaluated

The first round of detailed evaluations consists of four separate, partly parallel evaluations covering the main functional areas of KTL:

1. Environmental health
2. Chronic disease prevention and health promotion
3. Infectious diseases
4. Molecular medicine - the evaluation of this area will depend on whether the results of the planned evaluation conducted by the Ministry of Education will provide sufficient information for the purposes of the Ministry of Social Affairs and Health.

After the first round has been completed, the entire Institute will be evaluated. This evaluation will focus merely on the general strategy, function and management of the Institute, with less emphasis on the evaluation of individual research and expert functions.

3.3 Information sources for the evaluation

KTL will provide the Panels the following information:

Published documents concerning the whole Institute

1. Annual Report 2006
2. Evaluation of the National Public Health Institute of Finland. Report of the Evaluation Panel 1995

A document prepared by the Director of each relevant Department involved in the evaluation will be provided for the evaluation. These documents describe 1) a report on progress in research over the 1996-2007 period and research plans for the 2007-2011 period, 2) the arrangement for governance and management, and 3) allocation of staff and resources, and 4) his/her plans for the future development of the Department.

3.4 Evaluation of the Department of Health Promotion and Chronic Disease Prevention

Each Department involved in the evaluation will also provide the Panel a self-evaluation of 1) the appropriateness of its work to the national public health needs, 2) its role in the dissemination of research results and knowledge and technology transfer, 3) a description of the interfaces between the Department and the key players in Finland and abroad.

4 DEPARTMENT OF HEALTH PROMOTION AND CHRONIC DISEASE PREVENTION

4.1 Objectives and organization

Motto: To put science into public health in chronic disease prevention and health promotion

The goal of the Department is to prevent and control chronic non-communicable disease and improve people's health. These goals are pursued through 1) high-quality scientific work, 2) surveillance and monitoring of health, diseases, risk factors, nutrition and health behaviour, 3) attaining expertise and providing it to decision makers, health professionals and the public.

There are eight substance units in the Department. The Administrative Unit has a director of department, an IT-director, an IT-assistant and 4 secretaries. Most of the large surveillance and research projects are done in collaboration between the units and in collaboration with other departments.

The Diabetes Unit provides new information on the prevalence, incidence, risk factors and prevention of diabetes. The research focuses on the genetics and environmental risk factors of diabetes. The Unit participates in the Development Programme for the Prevention and Care of Diabetes (DEHKO). Research on the impact of pregnancy and early growth on disease in adulthood is carried out.

The International Cardiovascular Disease Epidemiology Unit specializes in the planning, coordination, quality assurance, data management, data analysis and reporting of large international projects. The Unit started as the Data Centre of the WHO MONICA Project. The objective of the multinational MORGAM Project is to assess the impact of smoking, blood pressure, cholesterol, obesity and genes in the risk of disease in different countries and population groups. Within the Public Health Programme of the European Union, the unit is developing standardized health examination surveys in European countries.

The Chronic Disease Epidemiology Unit does research on the aetiology, risk factors, occurrence and prevention possibilities of cardiovascular diseases using extensive follow-up studies. Risk factors are monitored with the National FINRISK Study, which is carried out every five years. The occurrence of myocardial infarction and stroke is followed-up with continuous registration.

The Injury Prevention Unit aims to provide and disseminate information on the occurrence, causes and prevention of injuries in Finland. Among the short-term objectives is to create a monitoring system of injuries, to begin a falls prevention programme among elderly people, to collaborate in the prevention of sports accidents and to make an action plan for prevention of alcohol-related injuries.

The Cancer Prevention Unit investigates the association of risk factors, diet, genes and their interaction with the risk of cancer, cardiovascular disease, diabetes and dementia. The research is based on extensive inquiry data and biological samples collected in the ATBC Study, a controlled trial to study the effect of supplemental alpha-tocopherol and beta-carotene on chronic diseases, especially cancer.

The Health Promotion Unit monitors health behaviour among working and pension-age people nationally. The Unit also provides health behaviour information relevant for local health promotion needs. One of the main focuses of the Unit is the identification of the health differences and their determinants, and the development of instruments to control them. The Good Old Age in the Lahti Region (or GOAL) project aims at developing novel and more efficient ways of action for the municipalities and health care professionals to prevent diseases. In all, the Unit studies choices - and ways to affect them - of people that have an impact on their own health and the health of their social environment.

The Nutrition Unit examines the relationships between diet, nutrition and health, monitors the diet and nutritional status of Finns, develops dietary assessment methods and works to improve nutrition in Finland. The major research projects are the national Findiet surveys, dietary glycemic load, and associations between diet and diabetes, allergies and obesity. The Unit maintains the National Food Composition Database (www.fineli.fi).

Chronic Disease Prevention carries out research, monitoring and expert activities related to chronic diseases, their risk factors and prevention. Equity in health over the life course and international comparisons are common themes in the research projects. By actively participating in international cooperation, the unit transfers the Finnish expertise in chronic disease prevention and monitoring to other countries and brings new ideas and views from abroad to Finnish prevention activities. Unit also acts as the focal point of tobacco control in KTL. Main areas of activities are: health, lifestyles and inequalities, tobacco control and research, healthy ageing and international health promotion

4.2 Staff and resources

The Department was established in 1977 in Kuopio and moved to Helsinki 1980. In the beginning the core function of the Department was the evaluation of the North Karelia Project, which aims at cardiovascular disease prevention. The work has expanded to other chronic diseases and health promotion. Total staff in 2006 was 130 persons. Staff with permanent service contract (funded permanently with the state budget) has been about 23 since 1996. Out of permanent staff 6 had professor positions, 5 were adjunct professors (docents), 8 had some other academic degree, and 4 were technical staff. In 2006 107 persons were employed by external funding or by KTL project funding, 24 of them were post docs and 45 had university degree.

About 30% of the budget is on permanent funding by KTL, about 15% is on temporary project funding by KTL and 55% on external funding from outside the institute (Table 1). The most important sources of funding were the European Union, the Academy of Finland, tobacco tax money from the Ministry of Health and the US National Institutes of Health.

Table 4.1. Funding of the Department from 2002 to 2006

	2002	2003	2004	2005	2006
KTL Government funding (permanent)	1 785 513	1 280 043	1 403 809	1 396 822	1 578 304
KTL Government Funding (projects)	320 685	470 773	807 441	1 084 755	864 021
Academy of Finland	720 849	957 844	971 902	497 443	421 075
EU	461 973	405 507	496 767	537 308	386 375
NIH	304 815	588 456	827 392	786 724	800 261
STM	301 172	391 495	476 179	937 179	670 252
BHF	168 880	99 407	69 072	45 630	0
Kela	33 638	6 362	84 141	101 477	125 349
Other	1 376 251	886 534	736 727	755 026	774 918
Total	**5 473 776**	**5 086 421**	**5 873 429**	**6 142 364**	**5 620 555**

EU= European Union

NIH= National Institutes of Health (USA)

BHF= British Heart Foundation

Kela=Social Insurance Institution of Finland

4.3 Scientific impact of research

Altogether the Department produced 2188 publications from 1997 to 2007: 1482 articles were published in refereed international journals, 112 were published in refereed international editions and conference proceedings, 163 articles in refereed Finnish scientific journals, 29 articles in refereed Finnish edited volumes and conference proceedings, 35 in scientific monographs published abroad, and 148 in scientific monographs published in Finland and. 217 were published in Finnish in journals popularizing science. Our researchers are actively supervising doctoral students working at the Department, and also in other institutes mainly in hospitals. Number of papers reported by Department of Epidemiology and Health Promotion units can not be calculated together, because several units have contributed to the same papers. The publications in English and Finnish are shown by year in Table 4.2

Table 4.2 International peer review articles and domestic articles published from 1997 to 2007.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Articles in refereed international journals	97	123	118	146	140	148	144	163	151	169	80	1482
Articles in refereed international edited volumes and conference proceedings	13	8	22	13	9	7	21	8	9	2	0	112
Articles in refereed Finnish scientific journals	13	8	10	11	13	20	18	26	17	23	4	163
Articles in refereed Finnish edited volumes and conference proceedings	3	4	0	2	1	1	6	1	8	2	1	29
Scientific monographs published abroad	2	2	2	1	2	7	7	1	5	3	1	35
Scientific monographs published in Finland	11	11	21	10	15	11	12	14	20	20	3	148
Journals popularising science	31	24	16	11	24	6	26	18	20	28	13	217
Total	170	180	169	194	204	179	234	231	230	247	217	2188

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4.4 Public health impact of the Department

4.4.1 National policy development

In Finnish society the ministry is relatively small and institutes under the ministry are relatively large. The expertise of the institutes is widely used in the ministry in planning programmes and strategies and in law-drafting. This requires that the Department cover expertise quite broadly in different areas of chronic disease prevention. Experts of the Department have participated in a number of committees and expert groups, working as chairpersons, secretaries or members in developing national policies, programmes and guidelines. The following are the most important: the ministerial advisory board on public health, the state consultative committee on public health nutrition, the drafting group on the school health services statute, the ministerial expert group on cancer and other screening, the health surveillance of children and adolescents, the drafting group on the tobacco law, the expert group on cardiovascular disease and diabetes, the expert group on asthma and allergy control.

4.4.2 Co-operation with local authorities

Municipalities are very independent in Finland, they collect local taxes and have the responsibility to organize health services. The Department has a long history of community programmes starting from the North Karelia Project. At the moment there are three other community programmes going on: the first aims to prevent diabetes in a population of 900,000, the second aims to prevent falling accidents among old people, and the third is a health promotion programme in one health district. At the moment the Department is developing a programme to build a more coherent infrastructure of health promotion on the district level. We have participated in the minister's visits to 18 districts to promote health and prepared background documents on the health of the people in these areas.

4.4.3 Reviews and guidelines

The Department has published biannual reviews on nutrition in Finland and tobacco reports that summarize the latest scientific literature and nutritional and smoking development in the country. We have been writing several other reviews like the Economic Impact of Health Promotion Programmes for the prime minister's office and Health in Finland every fourth year to the Finnish Parliament. Several provide guidelines for clinical practice like treatment of nicotine dependence.

4.4.4 Professional education

Our scientists give lectures and courses in universities, colleges, seminars and conferences. A great number of medical doctors and other public health workers who have got their doctoral-level training at KTL are now in key positions in other institutions. The Department has contributed to KTL Bulletin, which is directed to health personnel. Writing articles on new findings for non-scientific professional journals is an ongoing process in the Department.

4.4.5 Mass media

The senior staff is frequently on TV, on the radio or in printed media. This is mainly done in four different ways: journalists contact us and want make an interview on some specific topic, the media want to get KTL's opinion on a new scientific finding, we organize our own press conference or have a press release, actively send letters to the editor or other broader articles to newspapers. Based on surveys among journalists, KTL is regarded as a very reliable source of information.

4.4.6 Internet

Internet pages have been vigorously developed in the past few years. Pages include separate files for the public and for professionals. The main content areas are smoking, nutrition and injury prevention. Pages include information and recommendations on how people can improve their own health, information on how different health indicators have developed in the country, and new scientific findings which are of public interest.

4.4.7 International

In addition to scientific collaboration with numerous research teams abroad, the Department has had extensive international co-operation in public health. The Department is a WHO Collaborating Centre on Health Promotion, Disease Prevention and Monitoring. We have organized the North Karelia Project International Visitor's Week twice a year and the WHO CINDI programme training seminar once a year. Finland has been a CINDI country since 1987. The Department has had the responsibility of developing the WHO Non-Communicable Disease Prevention Strategy. In the area of smoking, the International Quit and Win competition was organized by the Department.

The Department ran the European Network on Young People and Tobacco for 10 years funded by the EU Public Health Programme. We have developed recommendations for cardiovascular risk factor monitoring for EU countries and now we are developing health examination survey protocol and pilot testing.

Senior staff members have participated in numerous consultations on public health funded by the World Bank, the WHO and the EU TACIS programme in various countries, e.g. China, Iran, Russia, Slovenia.

4.5 Proposal for future work and expected benefits

Our vision in the future as well will be to put science into public health in chronic disease prevention and health promotion. The main strategies are: 1) to do high-level research in selected areas where we should be among the world leaders, 2) to have a broader expertise in chronic disease prevention and health promotion which can be used to improve citizens' health, 3) health monitoring, 4) to participate as experts on different levels of society to improve public health.

At the moment, there is no intention to take new public health substance areas or diseases into the Department. In terms of diseases we are working in coronary heart disease, stroke, diabetes, cancer, dementia, and in injury prevention. We also cover the main biological risk factors: blood cholesterol and other lipids, blood pressure, obesity, haemostasis and clotting factors and genetics. We have strong teams working in behavioural risk factors (smoking, nutrition, physical activity) and their behavioural, social psychological and societal background. The development and evaluation of community and other public health interventions remains one of the key working areas. There is a political pressure to take more responsibility to co-operate more with the municipalities and other local authorities. The new public health law also requires this of KTL.

The Department will continue health behaviour (AVTK), risk factor (FINRISK) and cardiovascular disease monitoring. A system for monitoring the health of children and adolescents will be developed. We are also forming a strong database for research work. Survey data are linked to mortality and morbidity data. This makes it possible to have a new cohort study on new risk factors every five years. DNA samples will be used widely in various research programmes. Diabetes and birth cohort databases will be used for future analyses.

5 DIABETES UNIT

5.1 Research and public health significance of the area

In the year 2005, more than 170,000 Finns were using medication for diabetes, based on the National Drug Register data, with an increase from the previous year of over 5%. Approximately 80% of all diabetic cases are estimated to be type 2 diabetes. In addition to individuals who are on medication for type 2 diabetes, a large number of clinically undiagnosed type 2 diabetes cases will be found in population surveys. The increase in the prevalence of type 2 diabetes can mainly be attributed to changing lifestyles leading to physical inactivity, overweight, and obesity. Finland has the highest incidence of childhood-onset type 1 diabetes in the world. The incidence of type 1 diabetes appears to be increasing in nearly all populations worldwide, but reasons for this increase are not clear.

Diabetes is associated with micro- and macrovascular complications such as renal failure, retinopathy, cardiovascular diseases, and lower limb amputations. Type 2 diabetes without

any prior evidence of coronary heart disease indicates a comparable or higher myocardial infarction and mortality risk than prior coronary heart disease in non-diabetic subjects. The late complications of type 2 diabetes are related to the duration of the disease and the degree of metabolic control. Therefore it is important to postpone the clinical onset of the disease and to keep the metabolic profile as normal as possible.

The Diabetes Unit of KTL provides information on the incidence, prevalence, risk factors and genetics of type 1 and 2 diabetes. The ultimate goal of these activities is to improve primary and secondary prevention of the disease. The Unit co-ordinated the Finnish Diabetes Prevention Study, which showed for the first time in a controlled randomised setting that type 2 diabetes is preventable by lifestyle modification. This study, together with the Unit's development of screening methods to identify high-risk individuals, have formed the foundation for several local and national diabetes prevention programmes. Through several population-based incidence studies the Unit has provided understanding about the geographic variation, secular trend, host factors, familial aggregation, complications and mortality of type 1 diabetes. In addition, the Unit has an extensive research programme on the effect of fetal and childhood growth on diseases in adult life.

5.2 The main scientific achievements

PRIMARY PREVENTION OF TYPE 2 DIABETES

The results of the Finnish Diabetes Prevention Study DPS provided the first convincing evidence that type 2 diabetes (T2D) can be prevented by lifestyle modification. The DPS was a multicentre study with five participating centres in Helsinki (KTL, study co-ordination and data collection), Kuopio, Turku, Tampere, and Oulu. A total of 522 persons with impaired glucose tolerance (IGT) and thus at high risk of developing T2D were randomized to either an intensive lifestyle or a control intervention. The study participants were advised to lose weight, increase physical activity and consume a moderate-fat, high-fibre diet in accordance to the official dietary recommendations. For the participants in the control group, the lifestyle advice was given once as 'standard care counselling'. For the intensive intervention participants, study nutritionists gave individualized, detailed dietary counselling, with seven face-to-face sessions during the first year and every three months thereafter. They were also offered free-of-charge supervised resistance training based physical activity sessions.

The main results of the DPS showed that after an average of 3.2 years of follow-up, T2D incidence was reduced by 58% in the lifestyle group compared to the control group. During the first year of the study body weight decreased statistically significantly more in the intervention group (4.5 kg) compared with the control group (1.0 kg). Also, indicators of physical activity and diet, central adiposity, fasting and post-challenge glucose and insulin, and HbA1c improved more in the intervention group compared with the control group at 1-year follow-up. The active intervention ended after a median of 4 years and the participants who were still free of diabetes were further followed for three years, with median total follow-up of seven years. The post-intervention follow-up results showed that the effect of intervention

on diabetes risk was sustained at least for a median of 3 years after the discontinuation of the intervention.

The DPS is an outstanding clinical trial in the sense that the results were published in parallel with increasing public discussion about the emerging worldwide T2D epidemic; therefore the findings were immediately recognised as highly important in Finland and abroad. The main results, published in the New England Journal of Medicine, is the most cited Finnish publication in the medical field during the past 10 years and has thus far been cited over 1600 times. The DPS has led the way for diabetes prevention implementation programmes in Finland, most importantly the DEHKO (The Development Programme for the Prevention and Care of Type 2 Diabetes in Finland 2003 - 2010) and its implementation project, the FIN-D2D. It also forms the background for the EU-funded European diabetes prevention programme DE-PLAN (Diabetes in Europe - Prevention using Lifestyle, Physical Activity and Nutritional Intervention).

The DREAM trial (Diabetes REduction Assessment with ramipril and rosiglitazone Medication) was a large, international, multicentre trial that tested whether rosiglitazone and/or ramipril prevents or reduces the incidence of the primary outcome of type 2 diabetes or death. 5269 people with impaired fasting glucose and/or impaired glucose tolerance were recruited in 191 clinical centres located in 21 countries. They were randomly allocated to rosiglitazone, ramipril or placebo treatment and followed for a median of 3 years. The rosiglitazone arm showed a greater than 60% decrease in progression to diabetes (from 25% with placebo to 10.6% with rosiglitazone) over a 3-year period, with 70% returning to normal glucose tolerance. The main results were published in 2006 in the New England Journal of Medicine and The Lancet. The centre at KTL was among the biggest centres in Europe, and the institute was awarded twice during the study as the best centre in Europe (for participant follow-up and medication adherence in Europe). Currently, the DREAM trial has an open off-drug follow-up study with duration of 2 years that will end in 2008.

TYPE 2 DIABETES EPIDEMIOLOGY

The aim of the DECODE and DECODA (Diabetes Epidemiology - Collaborative analysis of diagnostic criteria in Europe/Asia) studies was to collect data from a large number of cohorts with detailed information on disturbances in glucose metabolism and follow-up data for diabetes-related complications and mortality, and to use these to review the current diagnostic criteria for T2D. Currently, there are data from more than 60 cohorts in 24 countries, most of which are population-based. The main results unequivocally showed that non-diabetic glucose levels, such as the category of impaired glucose tolerance, are an independent risk for CVD morbidity and mortality, and the increased risk cannot be explained by the development of diabetes during the follow-up. The DECODE study made the WHO Consultation Group revise their recommendations on the diagnostic criteria and resulted in a call for a new ADA Expert Committee on Classification and Diagnostic Criteria for Diabetes in 2001 with the updated report in 2003. The importance of post-load hyperglycaemia pointed out by the DECODE study was addressed by the recent ADA Expert Committee. In

addition, these studies have provided new information on the prevalence of type 2 diabetes and other forms of disturbances in glucose regulation in different countries.

Since the beginning of the DECODE study in 1997 and of the DECODA study in 1998, more than 30 articles have been published in international peer-reviewed journals. These two studies have already had a major impact on the current understanding of the importance of fasting vs post-challenge glucose in public health and clinical research and practice. Since the databases are large, there is sufficient statistical power to address issues that cannot usually be investigated in individual studies. Further, new cohorts have been recruited and the existing database is updated continuously. After the successful initial phase, the basis for the further research on diabetes, non-diabetic hyperglycemia and other related conditions has been established, in terms of the databases, research personnel and the connections with other research institutes around the world.

Nationally, the Unit performs population-based health surveys on abnormalities in glucose metabolism every fifth year. These surveys are conducted in conjunction with the national FINRISK health surveys and provide means to monitor changes in diabetes and its risk factors in the Finnish population.

DIABETES IN CHILDREN AND YOUNG ADULTS

Finland has the highest incidence of childhood-onset type 1 diabetes (T1D) in the world. However, T1D can develop at any age, and it is not understood why T1D starts in adulthood in many people. Globally, the number of patients with type 2 diabetes (T2D) among adolescents and young adults is increasing, but solid epidemiological data on T2D in Finnish children or young adults has been missing. Although the epidemiological research will have its own importance, it will also provide a solid basis for research on causes of T1D and T2D in this age group.

Through the Unit's work on several population-based studies on the incidence of diabetes in children and young adults, better understanding about the geographic variation, secular trend, host factors, familial aggregation, complications and mortality of the disease has been acquired. In addition to the burden conferred by the high incidence of T1D in Finland, T2D among the young adult population seems set to become an important public health problem in the near future.

There is considerable global variation in the incidence of T1D among children. This variation appears to reflect the global distribution of major ethnic populations, which demonstrates a different degree of genetic susceptibility to diabetes among populations. Although genetic susceptibility is necessary for the development of T1D, the aetiology of this disease is a multifactorial one. The wide global variation in incidence between and within major ethnic groups suggests that environmental factors are significant in the aetiology of T1D. Still, most of the information regarding T1D incidence thus far has come from regions with a high or intermediate incidence, mostly in Europe and North America where several registries

have been established since the mid-1980s. The data from Asia, South America, and Africa are still sparse. Because of the dearth of information available and limited research on the public health implications of T1D, the World Health Organization began the multinational project for childhood diabetes, DIAMOND, in the year 1990. The primary goal was the surveillance of the incidence of T1D among children worldwide using population-based registries. This large worldwide project was co-ordinated by the Unit. The total population of children aged 14 years or under (740 million) from countries for which the incidence of T1D was estimated covers 41% of the world's population in that age group. The rising incidence of T1D is a global phenomenon. Incidence has increased by 2.8% per year during the years 1990-1999 worldwide. The global variation in incidence (> 350-fold) appears to be stable. The global increase in the incidence of T1D may be partly explained by an improvement in case ascertainment. An underestimation is certainly inherent in all registration systems, but the problem was avoided in this study by measuring the degree of ascertainment on the basis of two or more data sources.

The Unit has published more than 30 articles on diabetes in children and young adults in peer-reviewed international scientific journals during the evaluation period.

DEVELOPMENTAL ORIGINS OF HEALTH AND DISEASE

The Helsinki Birth Cohort Study (HBCS) is focusing upon the development of health and disease from a life course perspective, taking into account early and childhood growth, socioeconomic factors and adult lifestyle. We have been focusing upon major non-communicable disorders of major public health impact like coronary heart disease, hypertension, type 2 diabetes, stroke and depression. The cohort being followed up consists of over 20,000 individuals, a further 2500 individuals have been studied clinically in great detail, including genetic sampling. This birth cohort born 1924-44 with excellent childhood growth data is unique worldwide.

This study has produced over 50 original publications, published in peer-reviewed international journals including the New England Journal of Medicine, Annals of Medicine, BMJ, Hypertension, Stroke and Diabetes. We have been able to show that non-optimal growth during fetal life and infancy is associated with an increased risk of coronary heart disease and type 2 diabetes later in life. Slow growth during fetal life and infancy is often followed by accelerated weight gain in childhood. These patterns of growth seem to precede the development of CHD and type 2 diabetes in adult life. We are beginning to understand that adult degenerative diseases are associated with different patterns of early growth and these diseases can best be focused upon from a life cycle perspective.

From a public health point of view the studies have shown the importance of early health and nutrition both during pregnancy and during infancy. This knowledge is of utmost importance for early preventive measures of many non-communicable diseases.

The Helsinki Study of Very Low Birth Weight Adults assesses the effects of very low birth weight (VLBW; <1500 g) on health in adult life. After birth, most VLBW infants experience a period of neonatal intensive care characterised by often severe immaturity-related complica-

tions, insufficient nutrition and slow growth. They would thus be expected to be particularly susceptible for the long-term consequences of such adverse early life conditions.

Since 2004, we have performed a detailed clinical examination in 170 young adults with VLBW, together with 170 comparison subjects born at term. We focus on 1) risk factors of common later-life disorders such as cardiovascular disease, type 2 diabetes, osteoporosis and depression; and 2) factors that affect how a young adult finds her/his position in society (such as temperament, personality, education and career, raising a family etc.) which may have major indirect effects on health. This cohort is the only European cohort which includes both VLBW adults and a comparison group born at term.

The first publication from this project, showing impaired glucose regulation and higher blood pressure in VLBW as compared with term-born adults, was published in the New England Journal of Medicine in 2007. Ten other manuscripts are currently at different stages of processing. The results have obvious direct relevance for those 6-12% of people who are born preterm and those 1% who are born with very low birth weight. Also, outside the prematurity context, they are important in assessing the mechanisms that link early life conditions with adult disease.

GEOGRAPHICAL HEALTH STUDY - SMALL AREA ANALYSIS

Specific problems are associated with the analysis and interpretation of the regional distribution of health-related data in administratively defined areas. The size of the population deviates greatly between small areas (for example municipalities), and therefore regional variation in areas with a small population tends to present random variation of the rates, resulting in extreme incidence rates that dominate the map. There are also complex dependencies between many of the measured variables and response variables which can be either spatial or temporal or both.

This project was designed to develop and apply new analytical techniques for exploring the regional variation of chronic diseases employing the Bayesian approach and georeferenced data. Thus far the developed models have been applied to research of the spatial variation of non-communicable diseases and analysis of the geographical variation of T1D, acute myocardial infarction (AMI) and Parkinson's disease and their spatial association with the possible environmental risk factors, such as geochemical elements of drinking water.

The interest in spatial epidemiology is growing worldwide. In Finland, clear advantages for further studies are the exceptionally large records of health-related data, expert knowledge of spatial statistics and medical geography, and the training and experience achieved during this project thus far. The Unit's work in this area continues further within the framework of the GEO-BENE (Global Earth Observation - Benefit estimation: Now, Next and Emerging) project which is funded by the EU. The objective is to develop methodologies and analytical tools to assess the societal benefits of GEO in the domains of Disasters, Health, Energy, Climate, Water, Weather, Ecosystems, Agriculture and Biodiversity. The project aims at drawing up policy conclusions from the modelling exercise for supporting the implementation of international agreements.

GENETIC STUDIES OF DIABETES

The Finland-United States investigation of non-insulin-dependent diabetes mellitus (FUSION) study is a long-term effort to identify susceptibility genes for type 2 diabetes and associated quantitative traits, such as decreased insulin secretion and decreased insulin sensitivity. This has involved the phenotyping and DNA analysis of thousands of individuals living in Finland, utilizing a study design that was originally based on affected sib pairs. The majority of these samples have already been subjected to a genome scan using microsatellite markers. More recently, with the opportunity provided by HapMap and dramatically lowered genotyping costs, the original FUSION samples and thousands of other cases and controls were being subjected to genome-wide association (GWA) analysis. These results, finding novel candidate genes for type 2 diabetes and insulin secretion, have been recently published in Science.

The FUSION study is a collaborative effort with an international research team. Since the study began in 1993, the original aim was to identify and collect Finnish nuclear families with at least two siblings affected with T2D, at least one of whom (the index case) was diagnosed between 35 and 60 years of age. From these families, the sample included all affected siblings, any living parents, and a spouse and multiple offspring of the index case or an affected sibling. Also, we studied a sample of elderly normoglycemic Finnish controls and, when possible, obtained DNA samples from a spouse and up to two of their offspring. For FUSION 1 (recruited in 1996) and 2 (recruited in 1998) diabetes family members and elderly controls, we carried out clinical examinations and determined diabetes disease status, diabetes-related quantitative traits and clinical information, grandparental birthplace, and information on general health status, diet, and physical activity. In a subset of the spouses and offspring, we carried out over 500 frequently-sampled intravenous glucose tolerance tests to better assess diabetes-related metabolic parameters. In addition, we've obtained additional sets of unrelated Finnish cases and controls (i.e. the Finrisk-2002 and Health-2000 studies) to permit more powerful studies of phenotype-genotype association and replication of FUSION results. This was done in 2001-2003. With these main sample sets we've carried out careful genotyping and statistical analyses to produce over 20 peer-reviewed publications in top journals, such as Science, PNAS, Journal of Clinical Investigation, American Journal of Human Genetics, Diabetes, Diabetologia and Diabetes Care.

Table 5.1. Summary of main scientific achievements during 1997-2006.

Scientific output	N	Comments
Original articles and reviews in international peer-review journals	>630	
Original articles and reviews in domestic peer-review journals	17	
Textbooks and chapters in textbooks, reports and proceedings	38	
Theses	PhD: 10	Harjutsalo V (2007), Lindström J (2006), Jakovljevic D (2006), Moltchanova E (2005), Wang J (2005), Rytkönen M (2004), Kajantie E (2003), Onkamo P (2002), Lakka HM (2001), Forsen T (2000).
Organization of scientific meetings and conferences	9	e.g. World Congress on Prevention of Diabetes and Its Complications (1999, 2002, 2005); International Diabetes Epidemiology Group Meeting (1997, 2000, 2006), Genetics of type 2 diabetes in the Nordic countries (2002).
Presidencies and memberships in scientific committees of international meetings	44	e.g. European Society of Cardiology congress (annually); 4th World Conference on Preventive Cardiology; 16th Int. Diabetes Federation Conference; 5th Int. Conference of Coronary Heart Disease; FutureForum congress (annually); 3rd Nordic Conference in Epidemiology; 6th International Conference on Preventive Cardiology; 1st and 2nd Int. Congress on "Prediabetes" and the Metabolic Syndrome.
Presidencies and memberships in other scientific committees	30	e.g. International Diabetes Epidemiology Group; ESC/EASD Task Force on Diabetes and Cardiovascular Disease; American Diabetes Association; IDF Consensus Groups on the Metabolic Syndrome and Prevention of Type 2 Diabetes; Developmental Origin of Adult Health and Disease Society; European Society of Cardiology; European Association of Cardiovascular Prevention and Rehabilitation; International Council of Fetal Origin of Adult Diseases.
Invited lectures and chairmanships in international meetings	>450	
Lectures in domestic scientific meetings	>200	
Editorial tasks in international peer-review journals	15	e.g. J Human Hypertens, International Diabetes Monitor, Diabetologia, J of Hypertens, Eur J Cardiov Prev R, Diabetes Vasc Dis Res, Evidence-Based Prev Med, Diabetes-Metab Res, Eur J Clin Nutr.
Opponent of dissertation	13	
Supervision of dissertations	18	Ongoing doctoral theses work.
Review of PhD thesis, evaluation of docentship or professorship	17	
Review of scientific papers	>200	e.g. for N Engl J Med, Lancet, JAMA, BMJ, Circulation, Diabetes, Diabetes Care, Diabetologia, Am J Epidemiol, Int J Epidemiol, Statist. Med.
Research visits to/from international research institutes or universities	>100	Numerous research institutes around the world.

5.3 The main public health activities and achievements

IMPLEMENTATION OF DIABETES PREVENTION

The Development Programme for the Prevention and Care of Diabetes (DEHKO 2000-2010) is Finland's national diabetes programme. It aims to prevent type 2 diabetes and diabetes-related complications and to improve the quality of diabetes care and to support the self-care of people with diabetes. DEHKO constructs new action models for health care which are implemented throughout Finland. The programme is coordinated by the Finnish Diabetes Association, and KTL is one of the associated partners. DEHKO is the first national programme in the world to also include and implement the prevention of type 2 diabetes. The implementation of the prevention programme, FIN-D2D, is carried out in five hospital districts in Finland during the period 2003-2007. It comprises three concurrent strategies: 1) the population strategy covering the general population, 2) the high-risk strategy that is based on individual-oriented measures targeted at those at a particularly high risk of developing T2D, and 3) the strategy of early diagnosis and management of T2D directed at persons with newly diagnosed T2D.

The Unit has been actively involved in the planning and implementation of both DEHKO and FIN-D2D. Furthermore, the main body of the prevention programme is built around the experiences from the Unit's research work on primary prevention of type 2 diabetes by lifestyle intervention (DPS), and screening for high risk of type 2 diabetes by the diabetes risk score (FINDRISC).

In addition to Finland's national diabetes prevention programme, the Unit is working closely with several local projects which are implementing methods of lifestyle interventions to prevent type 2 diabetes. These include a collaboration with the occupational health-care provider of the main Finnish airline to screen all employees of the corporation for high diabetes risk and disturbances in glucose metabolism, and to provide lifestyle intervention for those at highest risk. The role of KTL in the project is to provide expertise on the intervention methods, and to evaluate the effectiveness of these activities. Similarly, the city of Turku has a development project in association with several private and public occupational health-care providers aiming at the development of new methods for diabetes prevention implementation in occupational health care.

There is a clear consensus at the EU level that action is needed now to develop targeted prevention programmes for type 2 diabetes. Currently, numerous prevention management concepts exist in various European countries, and an evaluation of these is necessary in order to learn how the prevention of T2D works in reality and to find out the extent to which the prevention of T2D will reduce direct and indirect medical care and non-medical costs due to the disease. DE-PLAN (Diabetes in Europe - Prevention using Lifestyle, Physical Activity and Nutritional Intervention) project aims at addressing the development of national community-based T2D prevention programmes systematically throughout European countries. IMAGE (Development and Implementation of a European Guideline and Training Standards for Diabetes Prevention) project will develop EU-wide intervention standards and strategies for diabetes prevention. The Unit is a collaborating partner in both of these EU-

funded projects, and has the responsibility of creating the standards for evaluation and quality control of primary prevention of diabetes.

SCREENING FOR HIGH DIABETES RISK

The DPS and several other intervention studies have shown that T2D can be efficiently prevented by relatively simple and feasible lifestyle intervention. In most prevention trials participants with increased T2D risk were recruited based on elevated plasma glucose values especially after glucose load (impaired glucose tolerance). However, in health care setting, oral glucose tolerance testing to identify persons with high diabetes risk is not a feasible option. Therefore, a prediction model for future diabetes was developed using existing data sets from the FINRISK 1987 and FINRISK 1992 surveys. The end-point of the follow-up was the development of drug-treated diabetes. Baseline age, body mass index, waist circumference, history of antihypertensive drug treatment and high blood glucose, physical activity and daily consumption of fruits, berries or vegetables were selected into the risk score model. The optimal cut-off point of the risk score identified 78% of those who got diabetes during the follow-up (= sensitivity of the test) and 77% of those who remained free of diabetes (= specificity of the test). The final Finnish Diabetes Risk Score (FINDRISC) form includes, in addition to the predictors of the model, a question about family history of diabetes and the age category of over 64 years.

The use of FINDRISC to identify high-risk people, followed by lifestyle intervention, has been selected as the first line procedure in the Finnish national diabetes prevention programme, and is also used in several other diabetes-related projects in Finland, for example the GOAL (Good Ageing in Lahti Region; Ikihyvä Päijät-Häme). The FINDRISC has also been scientifically validated in Germany, Poland, and Italy, and serves as the risk screening tool in the European diabetes prevention project DE-PLAN. In addition, the FINDRISC is validated for screening of undiagnosed T2D, and it is being used for this purpose in several countries around the world.

Table 5.2. Summary table of committee memberships, coordination and proceedings with public health impact during 1997-2006.

Public health output	N	Comments
Articles and reviews in non-peer-review journals	41	
TV, radio, newspaper interviews	150	
Membership in international committees with public health impact	15	e.g. WHO workshop group on Screening for Type 2 Diabetes; IDF Metabolic Syndrome Consensus Workshop; SNEHA - India working group for the improvement in health of women and young children; WHO/IDF Consultation: Definition and diagnosis of diabetes mellitus.
Membership in domestic committees with public health impact	15	e.g. National CVD and diabetes committee; Nutrition Guidelines for Diabetes working group; several committees in association with the Finnish national diabetes prevention programme.
Organization of international training with public health impact	16	e.g. 2nd Mediterranean Training Course on Epidemiology and Public Health Aspects of Diabetes; 2nd and 3rd Asian Pacific Diabetes Epidemiology Course; 3rd Advanced International Diabetes Epidemiology Course; 3rd Diabetes and Cardiovascular Risk Factors - East Meets West Symposium; 1st and 2nd International Reporting Days of the National Type 2 Diabetes Prevention Programme; European Stroke Master Course.
Organization of domestic training with public health impact	5	

5.4 Funding for research and public health programmes

Currently one senior researcher gets funding from the KTL budget (Peltonen), and the other employees (~30) are funded with external research grants. Three senior researchers have fellowships from the Academy of Finland (Karvonen, Kajantie, Lakka). During the evaluation period, the Unit has been successful in obtaining external funds for research, and we are optimistic that this will continue, at least on the short term (1-3 years). However, external research funding is usually received for novel research ideas, whereas it is clearly more challenging to get appropriate funding for implementation projects with direct public health impact. The main sources of external financial support have been the Academy of Finland, the US National Institutes of Health, the European Union, the British Heart Foundation and the Social Insurance Institution of Finland.

5.5 Personnel

During the 10-year period of evaluation, the number of employees in the Diabetes Unit has varied between 20 and 40. Currently, there is 1 professor, 9 senior researchers, and 10 researchers conducting doctoral studies. In addition, about 10 nutritionists, statisticians, data managers and research assistants are employed.

The current key senior researchers:
Markku Peltonen, PhD, adjunct professor, Head of the Unit: Chronic disease epidemiology.
Johan Eriksson, MD, professor: Life course epidemiology, prevention of T2D.
Marjatta Karvonen, PhD, adjunct professor: Spatial epidemiology.
Eero Kajantie, MD, adjunct professor: Life course epidemiology.
Jaana Lindström, PhD, senior researcher: Primary prevention of T2D, nutrition, screening methods.
Timo Valle, MD: Prevention of T2D, diabetes care.

During the evaluation period, professor, MD, PhD Jaakko Tuomilehto, adjunct professor, MD Qing Qiao, adjunct professor, MD Hu Gang (all currently at the University of Helsinki) and PhD Tom Forsen have been employed by the Diabetes Unit.

5.6 National and international collaboration

University of Helsinki, Department of Public Health: Prof. Jaakko Tuomilehto, doc. Qing Qiao, doc. Hu Gang. Projects on primary prevention of type 2 diabetes (DPS), implementation of prevention of diabetes in Europe (DE-PLAN), epidemiology of diabetes and cardiovascular disease (DECODE/DECODA).

University of Kuopio: rector, prof. Matti Uusitupa. Primary prevention of type 2 diabetes (DPS).

Hospital districts of Pirkanmaa, South Ostrobothnia, North Ostrobothnia, Northern Savo and Central Finland: Implementation of the Finnish diabetes prevention programme FIN-D2D.

Finnish Diabetes Association: Planning and implementation of the Development Programme for the Prevention and Care of Diabetes (DEHKO) and the Finnish diabetes prevention programme FIN-D2D.

DECODE/DECODA: Coordination and collaboration with research groups in 24 countries in Europe and Asia.

EU-funded projects DE-PLAN, IMAGE and GEO-BENE: A total of 68 collaborating partners from 25 countries in Europe.

WHO DIAMOND project: Coordination and collaboration with research groups in 53 countries around the world.

Helsinki Birth Cohort Study: Collaborative research with top international groups around the world including David Barker (UK/USA), Peter Gluckman (New Zealand), Leif Groop (Sweden), Thorkild Sorensen (Denmark), Juha Kere (Sweden), Göran Roos (Sweden), David Phillips (UK), Clive Osmond (UK), Cyrus Cooper (UK) and a large number of researchers from Finland including researchers at University of Tampere, Kuopio, Oulu, Turku, Helsinki and the Finnish Genome Center.

Helsinki Study of Very Low Birth Weight Adults has collaboration with Helsinki University Central Hospital (Hospital for Children and Adolescents) University of Helsinki (Department of Psychology), Karolinska Institute (Juha Kere) and University of Southampton (David Phillips).

FUSION: University of Michigan (Michael Boehnke), National Human Genome Research Institute, NIH (Francis Collins), USC School of Medicine (Richard N. Bergman, Thomas A. Buchanan).

5.7 Proposal for future work and expected benefits

The main justification for prevention of T2D is the supposed concurrent prevention or postponement of complications related to T2D. The disease is characterised by the development of micro- and macrovascular complications which give rise to excessive rates of cardiovascular disease. These complications account for the majority of morbidity and mortality associated with diabetes. In the DPS study, the feasibility and effects of a lifestyle intervention on the risk of developing diabetes among high-risk subjects was shown. However, there is little data on the effective prevention of macrovascular complications of T2D. Thus, in a follow-up study of the original DPS, we aim to determine the long-term effects of lifestyle intervention in high-risk subjects on vascular complications of T2D. In addition, work on the cost-effectiveness of the lifestyle intervention used in the DPS is underway.

Finland is among the first countries in the world to develop a nationwide primary prevention programme for T2D. The Diabetes Unit is responsible for the evaluation of the effectiveness, feasibility and cost-effectiveness of the programme. These will be assessed using population surveys focusing on T2D and its risk factors throughout the country at the beginning and at the end of the programme, as well as cohort studies on diabetes risk in high-risk subjects. The main results are expected in 2008. These will provide information on whether screening for high risk subjects and consequent implementation of lifestyle interventions focusing on weight maintenance, healthy nutrition and increased physical activity can effectively be implemented at population level.

Incidence of childhood T1D is still increasing, and continuous monitoring, using updated diagnostic criteria and developed standardized methods, is required. In particular, it is important to differentiate between type 1 and type 2 diabetes, because the latter has become increasingly common in adolescents in some populations. The fact that prevention strategies are in progress justifies the ongoing surveillance of incidence: i.e. when these trials are performed on a population basis, surveillance will allow us to demonstrate their effectiveness.

In the Helsinki Birth Cohort Study, the present research direction focuses upon ageing and cognitive functions - a huge problem worldwide, both clinically and from a public health aspect.

The 5th World Congress on Prevention of Diabetes and its Complications (WCPD 2008) will be organized 1-4 June, 2008 in Helsinki, Finland. KTL and the Finnish Diabetes Organisation co-organize the congress. The scientific programme is the responsibility of KTL, and the chair of the scientific committee (Eriksson) and the scientific secretary of the congress (Lindström) are from the Diabetes Unit.

5.8 Main publications

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6 INTERNATIONAL CARDIOVASCULAR DISEASE EPIDEMIOLOGY UNIT

6.1 Research and public health significance of the area

The Unit was established in 1984 to serve as the international Data Centre of the WHO MONICA (Multinational MONItoring of trends and determinants in Cardiovascular disease) Project. Its specialties are the planning, coordination, quality assurance, data management, data analysis and reporting of large international population studies and health monitoring. Towards the end of the 1990s, when the data collection period of MONICA was ending, the Unit started using its expertise in two directions. One was harmonizing and pooling data from population-based studies in different countries for research purposes. The other was facilitating standardized health examination surveys (HES) in the European countries.

Many major aspects of the population health, such as distributions of obesity, blood pressure, blood lipid profile, prevalence of most major chronic diseases, such as coronary heart disease (CHD) and diabetes, and functional capacity can be measured reliably only through a health examination survey. Although these should have a major impact on public health policies, data on these are available only from a few countries. The last internationally com-

parable population-level data, although not covering the countries as a whole, comes from the MONICA Project. This covered obesity, blood pressure and blood lipid profile, but the data are already over ten years old. There are no internationally comparable survey data on these from the past ten years, and there have never been internationally comparable population data on many other important health aspects. One of the objectives of the Public Health Programme of the European Union is the availability of comparable health data from all member states. The European countries would like their health data to be comparable over time and with data from other countries, and therefore consider international standardization of health surveys important. The Unit is well placed for developing international collaboration in health surveys because of the advanced health survey system in Finland and the experience from the WHO MONICA Project.

In the research area, the Unit's activities focus on harmonizing and pooling data from population-based follow-up studies on cardiovascular disease (CVD). There is a large number of follow-up studies in different countries, and these are being used extensively for research. One obstacle to deepening the research is the limited size of the studies. There is insufficient power or statistical precision to address many relevant research questions. However, one can create a large study by pooling many small studies. One of the relevant study questions is the effect of the classic cardiovascular risk factors. Their impact is fairly well known, but there are still open questions as to whether the impact really is similar in Southern Europe with low incidence and Northern Europe with high incidence, whether the impact is similar in men and women, whether the impact differs between the young and the elderly, etc. Another need for large studies has emerged with the recent developments in genetics and in genotyping technology. Coronary heart disease and stroke are due to the interaction of many genetic and environmental factors. Individually these interactions have small or, at most, moderate effects but may carry considerable public health significance if the genetic variants in question are common in the population. Reliable detection of these effects requires large sample sizes and abundant statistical power, which can only be achieved in a large collaborative study by the use of high throughput genotyping. The same concerns biomarkers, where better knowledge could help focusing public health activities and medical treatment in the future. The Unit is involved in the pooling of follow-up studies on cardiovascular disease for this purpose as the Data Centre of the MORGAM (MONICA Risk, Genetics, Archiving and Monograph) Project.

The main challenge of the data pooling is the harmonization of the data from the different studies. Luckily, in the cardiovascular research, the WHO MONICA Project created data collection standards that have been used widely also outside MONICA, and therefore the harmonization of data from different studies is possible, although tedious. There are two other large European activities for pooling follow-up data from different countries. These are the Prospective Studies collaboration and SCORE. Although MORGAM has much in common with these, MORGAM is complementary in the sense that it has a higher level of standardization, it has both fatal and non-fatal end-points, and it is able to measure genotypes and biomarkers.

6.2 The main scientific achievements

WHO MONICA Project

The MONICA (Multinational MONItoring of trends and determinants in Cardiovascular disease) Project was established in the early 1980s in 32 Collaborating Centres in 21 countries to monitor trends in cardiovascular diseases, and to relate these to risk factor changes in the population over a ten-year period. It was set up to explain the diverse trends in cardiovascular disease mortality which were observed from the 1970s onwards. The total population age 25-64 years monitored was ten million men and women. As such, MONICA was the biggest study on cardiovascular epidemiology ever conducted.

In each Collaborating Centre, the monitoring was conducted in a geographically defined population. All possible myocardial infarctions of the population were registered, detailed information on symptoms and diagnostic tests, necropsy findings and previous history of coronary heart disease were collected and the events were assigned a diagnostic category using standardized criteria. In about a half of the populations, there was also registration of strokes. Major cardiovascular risk factors, including smoking status, blood pressure, cholesterols and obesity were monitored in the same populations using sample surveys. Independent population samples were examined in the beginning, optionally in the middle, and at the end of the ten-year period.

Quality assurance of the data received particular attention in MONICA. This involved

- the MONICA Manual, which described the standardized data collection procedures, and became the standard also widely beyond MONICA;
- training of the personnel to follow the standard procedures;
- quality control during the data collection; and
- retrospective assessment and documentation of the achieved quality and any centre-specific characteristics of the data.

The quality assessment reports, which include necessary background information for anyone analysing the data and summarize the MONICA experience for anyone planning new data collection, were published on the WWW.

Despite uncertainties about the funding during the project period, the data collection was completed successfully by the end of the 1990s, and the main results were published in the years 1999-2003. MONICA provided comparable data from a large number of countries on four continents on the attack rates of hard coronary events and strokes, uptake of the effective cardiac treatments that were introduced in the 1980s (antiplatelets, ACE inhibitors, thrombolytic therapy and coronary artery revascularization), and on the major classic cardiovascular risk factors (smoking, blood pressure, cholesterol). These confirmed major international differences in the incidence of coronary heart disease, which were anticipated from mortality statistics. The trends in the attack rates were declining in most populations. Overall, two thirds of the decline in mortality was attributable to a decline in coronary attack

rates and one third to a decline in case fatality. The trends in coronary event rates were associated with the trends in the classic risk factors, although more than half of the event rate changes remained unexplained. To what extent the unexplained changes are due to time lags in the effect of the risk factors, which could not be assessed in this study of ten years only, and to what extent they are due to changes in other known or unknown risk factors remains an open question. Case fatality, and in particular mortality, were strongly associated with changes in treatment. The association was actually stronger than could be explained by the known effects of the treatments, and the results are likely to be confounded by the major social and political changes that took place during the same period in Central and Eastern Europe.

To date, MONICA has produced 64 collaborative publications in peer-reviewed scientific journals and 32 quality assessment and other reports on the WWW. The exact number of publications from the individual Centres is not known, but it is thousands. The collaborative database has been archived for easy use. All MONICA Centres have a copy of it, and outside investigators can participate in the analysis through collaboration with a MONICA Centre. The MONICA experience has been summarized in the "MONICA Monograph and Multimedia Sourcebook", which was published by WHO in 2003. Attached to it are two CD-ROMs, which include the basic MONICA documentation and a 20% sample of the individual-level data from the database. These are being used for educational purposes in many places.

The MONICA Project was a major collaboration between WHO, MONICA Data Centre (currently the Cardiovascular Disease Epidemiology Unit of KTL), four external Quality Control Centres, six Reference Centres of optional studies and the 32 Collaborating Centres which administered the data collection in the study populations. The MONICA Data Centre was centrally involved in the coordination of the study, quality assurance data analysis and publication, and archiving the study core data. It had (and has) little responsibility in the optional studies that focused on nutrition, antioxidant vitamins and polyunsaturated fatty acids, psychosocial issues, physical activity, drugs and haemostatic risk factors.

The cardiovascular disease and risk factor monitoring of MONICA laid the basis for preventive activities and related health policies in the participating countries, most of which have continued the monitoring activities locally after MONICA. MONICA also had a major impact on the training of epidemiologists in the countries.

MORGAM

When the MONICA data collection period had ended, it was found that many of the Centres had followed up the people examined in the risk factor surveys for death and cardiovascular end-points. It was found that pooling the follow-up data provides a unique possibility to create a data set with:

- representative population cohorts from the high incidence north and low incidence south;

- standardized baseline measurements of the classic cardiovascular risk factors;
- additional baseline measurements, such as socio-economic status, use of alcohol, status of cardiovascular diseases and diabetes, and family history of cardiovascular diseases;
- a large number of fatal and non-fatal events both in men and women in a prospective follow-up;

This would provide the possibility to get precise estimates for the open questions listed in section 6.2 above, as well as for many other relevant public health questions. Furthermore, in most of the surveys conducted in the early 1990s, DNA had been collected also. Human genome mapping was at an advanced stage, genotyping technology was developing rapidly, and it was obvious that there would soon be need for large population cohorts for assessing the impact of genetic markers on the development of cardiovascular diseases.

The MORGAM (MOnica Risk, Genetics, Archiving and Monograph) Project was established for the pooling of the follow-up data and DNA in 1998. (The "Archiving and Monograph" in the Project's name refer to the archiving of the MONICA database and the preparation of the MONICA Monograph, which were described under the MONICA Project above.) The main objective of the risk factor component of MORGAM is to assess the similarity of risk coefficients for the classic cardiovascular risk factors in different parts of Europe, between men and women and between age groups, using large cohorts with standardized baseline measurements and well-validated outcomes. The objective of the genetic component is to determine statistically significant combinations of SNPs from the multitude of genotypic data which, in combination with environmental factors and possible intermediate quantitative phenotypes, are predictors of incident coronary and stroke events, and total mortality.

The genetic component is carried out in a case-cohort design, where the cases as well as random samples of the entire cohorts are genotyped. With this design, there is no need to select separate sets of controls for the different disease end-points, and the design also allows the estimation of the population frequencies of the genotypes.

MORGAM is a collaboration of 19 Participating Centres in 11 countries (Australia, Denmark, Finland, France, Germany, Italy, Lithuania, Poland, Russia, Sweden and UK) which have followed up cohorts, three laboratories in Finland, France and Ireland which do genotyping, and a biomarker laboratory in Germany and a Data Centre at the Cardiovascular Disease Epidemiology Unit at KTL. The MORGAM Data Centre is closely involved in the coordination of the Project together with Queen's University Belfast and has a major responsibility in the data harmonization, data pooling, development of statistical methods, data analysis and reporting of the results.

To date, the follow-up of these data from the last cohorts is being completed and the data assessment reports are being published. The first set of main analyses is being completed for publication using the finalized data both from the general cohort component and the genetic component. The first genetic results from the individual centres have already been published. Analysis methods for the MORGAM case-cohort design have been published in statistical journals.

There are a total of 142,000 subjects in the cohorts, with 17,000 deaths, 9,500 CHD cases and 4,200 stroke cases during follow-up. The cohorts with DNA have 61,000 subjects, with 4,900 deaths, 3,200 CHD cases and 1,300 stroke cases. There are 800,000 genotypes from 343 single nucleotide polymorphisms from 93 genes. The analysis of 20 biomarkers, to assess the predictive value of biomarkers for CVD events and to look for associations with genotypes, is just starting. The biomarkers have been selected as representing discrete patho-physiological pathways i.e., inflammation, endothelial activation, metabolics, lipids, oxidative stress, renal function, and neurohumoral/haemodynamics.

Summary of scientific achievements

A summary of the Unit's main scientific achievements is presented in Table 6.1

Table 6.1 Summary of main scientific achievements since 1997

Scientific output	N	Comments
Original articles and reviews in international peer-review journals	95	
Original articles and reviews in domestic peer-review journals	8	
Textbooks and chapters in textbooks, reports and proceedings	53	This includes 38 WWW-publications: international project manuals, quality assessment reports databooks and methodological appendices to articles published in journals
Theses	PhD:2 MSc:2	Doctoral theses: Molarius A, Tolonen H
Organization of scientific meetings and conferences	10	Most of these are international workshops of the MORGAM and EHRM Project
Presidencies and memberships in scientific committees of international meetings	2	
Presidencies and memberships in other scientific committees	5	Presidency of the Finnish Society of Biostatistics 1995-7, MONICA Steering Committee 1987-, MORGAM Management Group 1998-, GenomEUtwin Steering Group 2002-7, Swiss National Science Foundation Cohort Panel 2005-
Invited lectures and chairmanships in international meetings	11	
Lectures in domestic scientific meetings	occasionally	
Supervision of dissertations	1	
Review of PhD thesis, evaluation of professorship	2	
Review of scientific papers	35	Lancet, Stroke, J Intern Med, Int J Epidemiol, J Clin Epidemiol, BMC Medical Genetics, Prev Med, IBM Systems Journal, Eur J Cardiovasc Prev Rehabil, Tob Control, Ethn Health, IBM System Journal, Digital Signal Processing, J VLSI Signal Processing Systems, Int J Adaptive Control and Signal Processing, IEEE Speech and Audio Processing, Computational Statistics and Data Analysis etc.
Research visits to/from international research institutes or universities	150	Our daily research collaborators are scattered mostly around Europe. Short and longer-term visits are made whenever convenient

6.3 The main public health activities and achievements

MONICA created standards and laid the basis for international collaboration in the monitoring of the risk factors of cardiovascular diseases in the population. However, in most countries MONICA monitoring covered only the population of a relatively small area, and the MONICA data collection ended in the 1990s. After MONICA, the Unit has been actively involved in the development of the survey part of health monitoring in the European Union. It had the leadership in the European Health Risk Monitoring (EHRM) Project, which was conducted in the years 1999-2002 within the EU Programme of Community Action on Health Monitoring. The Project produced a recommendation for indicators, international collaboration, protocol and manual of operations for chronic disease risk factor surveys. The primary purpose of such surveys is to gather information for the planning and evaluation of health promotion and disease prevention in the countries and at European level. The recommendations also updated and complemented the MONICA survey procedures which were already 20 years old. The Project was conducted in collaboration with the European Union, the World Health Organization and national experts in different countries.

The Unit is currently (years 2006-2008) leading the Feasibility of a European Health Examination Survey (FEHES) Project within the EU Programme of Community Action in the Field of Public Health. The purpose of the Project is to assess the feasibility of conducting a health examination survey (HES) in all EU Member States. In addition to the risk factors of the major chronic diseases, such a survey can comprise topics such as the prevalence of many chronic diseases and functional capacity. The Project reviews the scope, contents, methods and cost of the surveys that have already been conducted, and assesses the perceived interest and possible plans of the Members States to such surveys in the future. Based on this and other available information, the Project makes proposals for models of surveys for comparable information from all Member States.

The Unit also participates in the development of international systems for interview surveys through memberships in the Eurostat Task Force on Health Interview Survey Methods and Expert Advisory group for the WHO and CDC for planning Global Adult Tobacco Surveillance in middle and low income countries. The Unit is represented in the Steering Committee of the European Health Survey System, set up jointly by Eurostat and the Directorate General for Health and Consumer Protection (Sanco) of the European Commission.

A summary of the Unit's main public health activities and achievements is presented in Table 6.2

Table 6.2 Summary table of committee memberships, coordination and proceedings with public health impact

Public health output	N	Comments
Articles and reviews in non-peer-review journals	3	
TV, radio, newspaper interviews	few annually	
Health education material, websites, information databases	6	MONICA, EHRM and FEHES websites. WWW-publication series of MONICA, EHRM and MORGAM.
Membership in international committees with public health impact	7	SC of the European Health Survey System; EU/Sanco Working Parties: Mortality and Morbidity, Indicators, Task Force Major and Chronic Diseases, Eurostat Task Force on HIS Methods, WHO/Global Adult Tobacco Use Surveillance expert group, EHRM Steering Committee
Coordination and/or implementation of development projects	2	Coordination of EHRM and FEHES Projects
Public health output	N	
Articles and reviews in non-peer-review journals	3	
TV, radio, newspaper interviews	few annually	
Health education material, websites, information databases	6	MONICA, EHRM and FEHES websites. WWW-publication series of MONICA, EHRM and MORGAM.
Membership in international committees with public health impact	7	SC of the European Health Survey System; EU/Sanco Working Parties: Mortality and Morbidity, Indicators, Task Force Major and Chronic Diseases, Eurostat Task Force on HIS Methods, WHO/Global Adult Tobacco Use Surveillance expert group, EHRM Steering Committee
Coordination and/or implementation of development projects	2	Coordination of EHRM and FEHES Projects

6.4 Funding for research and public health programmes

Two persons' salaries in the Unit come from the KTL regular budget. The last years of MONICA and the first years of MORGAM were funded by Biomed2 grants from EU/Research, and the past 4 years of MORGAM by a fifth Framework Programme grant from EU/Research. The EU funding concerned the collaborative activities of the research projects, such as international coordination, data pooling (including most of the Data Centre activities), and genotyping, whereas the data collection and local research in the Participating Centres were funded locally. The EHRM and FEHES Projects for developing European health surveys were funded mostly by grants from the Health Monitoring Programme and the Public Health Programme of the EU (DG Sanco).

6.5 Personnel

The number of personnel in the Unit has increased slightly from about 6 when MONICA was the only big activity to the current about 9. The current staff includes

- Head of the Unit (Kari Kuulasmaa, PhD);
- 2 persons (led by Zygmantas Cepaitis, Eng) for systems analysis and data management;
- 2 statisticians (earlier led by Sangita Kulathinal, PhD, now by Juha Karvanen, DSc) for statistical methods;
- 3 epidemiologists (including Hanna Tolonen, PhD, and Matti Niemelä, MD) for developing European health surveys and harmonizing data from MORGAM Centres; and
- an administrative secretary.

The Unit benefits substantially from, and is dependent on, work done by collaborators in other parts of KTL and abroad.

6.6 National and international collaboration

All the Unit's main activities are part of wide international collaboration. The MONICA network involves 32 centres in 21 countries. The MORGAM network, including the Collaborating Centres, the Laboratories, the Data Centre and Associated Centres not contributing data but receiving information and invited to meetings involves 36 research groups in 17 countries. The MORGAM Coordinator is Professor A. Evans, Queens University Belfast, and the MORGAM laboratories are at

- Department of Molecular Medicine, KTL, Helsinki (MORGAM Central laboratory, Prof. L. Peltonen);
- INSERM U525, Paris (Dr F. Cambien);
- Royal College of Surgeons in Ireland (Prof. D. Shields); and
- Johannes Gutenberg-University, Mainz (Prof. S. Blankenberg).

Since the year 2002, MORGAM has been part of GenomEUtwin, a Network of Expertise for Genomics in Europe, which also involves the twin registries of 8 countries. Within ETEO, the Unit collaborates closely with the Chronic Disease Epidemiology Unit and the Cancer Prevention Unit, which participate in MORGAM. For the development of statistical methods, there is a close collaboration with the Department of Mathematics of the University of Helsinki.

The FEHES Project on European HES is done together with a core group of investigators in

- Department of Health and Functional Capacity, KTL, Finland
- Istituto Superiore di Sanità (ISS), Italy;
- Rijksinstituut voor Volksgezondheid en Milie (RIVM), the Netherlands;
- Norwegian Institute of Public Health (FHI), Norway; and
- University College London (UCL), UK,

and there is a network of contact persons in 32 European countries. There are also close contacts with WHO, the European Commission, and other relevant projects of the Public Health Programme of the EU. More recently, contacts have been created with the organizers of the national HES's in the USA (NHANES) and Canada.

6.7 Proposal for future work and expected benefits

The Unit will continue with the two current lines: large international pooling of data for research purposes and the development of international collaboration in health monitoring. After the long data harmonization process, MORGAM is now ready to start harvesting. Therefore, the focus in the next years will be on data analysis and publication. Where there is benefit from synergy, MORGAM will collaborate with other international projects such as Cardiogenics and EuroClot which are producing promising candidate genes that can be assessed in the MORGAM cohorts. There are great expectations for the MORGAM Biomarker Substudy, which has just received funding from the British Medical Research Council. MORGAM is open for new cohorts to join, and the preparation of data for MORGAM has already started from large population cohorts in Norway, England and Germany.

KTL has recently submitted a proposal to the EU for preparing a full-size national HES in 11 countries. This would form a part of the piloting of the European HES. The objective is to proceed steadily to a standardized sustainable HES system in the European countries. The Unit is prepared to be involved in the international coordination and standardization, until more permanent structures are in place for this in the EU.

A standardized national health interview survey is being carried out in over ten EU countries in 2007-8. Eurostat will pool the data for basic processing, but does not have the authority to release these for research purposes. There is a proposal by the Unit to pool these data on a voluntary basis, to assess their quality and comparability to see that they meet research standards, and to share the data with European researcher groups of top expertise in related areas.

The Unit will continue with its responsibilities in the administration of MONICA and maintenance of its archived data set, but this will have a small role in the Unit's activities.

6.8 Main publications

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7 CHRONIC DISEASE EPIDEMIOLOGY UNIT

7.1 Research and public health significance of the area

The Unit has existed approximately in its present form since the year 2000. The task of the Unit is to carry out research on the epidemiology, risk factors and aetiology of chronic diseases that are of major public health significance. Research proceeds in parallel with the monitoring of the risk factor levels and the occurrence of major disease events such as myocardial infarction (MI) and stroke in the Finnish population. The aim is to produce new data, which could contribute to reducing the risk factor levels and improving the treatment of chronic diseases, thus reducing morbidity and mortality.

The Unit has the main coordinating responsibility of the FINRISK surveys, which is one of the most important projects of the whole Department. This is a series of cardiovascular and other chronic disease risk factor surveys that have been carried out every five years since

1972 on random population samples of certain geographical areas of Finland. The roots of the FINRISK surveys are in the North Karelia Project, which then continued as part of the Finnish contribution to the WHO MONICA Project and has since then extended to cover even wider geographical areas. The number of participants in different years has varied from about 6,000 to about 11,000.

The main purpose of the FINRISK surveys has been to monitor the levels of cardiovascular risk factors, such as smoking, blood pressure and cholesterol, in the population. However, each of the surveys also forms a cohort, which is being followed-up with annual record linkage of the study data on the basis of personal identification number with the national Causes-of-Death Register, the Hospital Discharge Register and the Drug Reimbursement Register. Serum and plasma samples have been taken and stored in freezers, and DNA samples have been collected since the 1992 survey. This setting has enabled a wide research activity and there are numerous subprojects ongoing in the FINRISK framework in which the research is carried out by investigators of the Chronic Disease Epidemiology Unit as well as other investigators of KTL, or investigators elsewhere in Finland and even abroad.

Traditionally, the focus of FINRISK research has been on cardiovascular diseases, which are still the number one killer in Finland. The biological, behavioural and socioeconomic risk factors of cardiovascular diseases are covered by different projects. Other important public health problems covered are diabetes, cancer, asthma and allergies, effects of ageing, health effects of alcohol and to some extent also kidney and liver diseases. In particular it should be noted that there are currently DNA samples from about 32,000 FINRISK participants. Together with the follow-up information and stored serum and plasma samples this provides a unique setting for genetic epidemiological studies of important public health problems.

The other main activity of the Unit is cardiovascular disease registers, which serve both research and monitoring of the occurrence of cardiovascular disease events. FINAMI follows the tradition of the FINMONICA MI register as a population-based myocardial infarction register. The idea is to record all coronary heart disease (CHD) events that occur in the populations of four geographically defined areas. It should be mentioned that the same areas are also covered by the risk factor monitoring of the FINRISK surveys. The registration of CHD events takes place in collaboration with clinical researchers working in the main hospitals of the study areas. The local registration teams collect data on every suspected CHD event, including out-of-hospital deaths, according to a standardized protocol. The data are then sent to KTL for checking, quality control, and analysis. The FINAMI data are annually linked to the National Hospital Discharge Register and the National Causes-of-Death Register to check the completeness of registration and to provide data on prognosis of MI patients in relation to reinfarctions, revascularizations and survival. The data are also linked to socioeconomic indicators, such as education level, family income and profession, to obtain information on the socioeconomic position before the MI event. Since the FINAMI diagnoses are carefully scrutinized, they can be used for validation of CHD diagnoses in Finnish administrative registers. In this way, the FINAMI register also serves the follow-up of

FINRISK cohorts as well as the country-wide monitoring of CHD events, which is done with administrative registers.

Similarly to the FINAMI-register, stroke registration was continued after the end of the FINMONICA-Project under the name FINSTROKE. However, due to the resource limitations data collection in the FINSTROKE-register ended at the end of 1998. Since then the collected data have been used for analysing factors related to survival and functional capacity after stroke.

An application of administrative registers is the Finnish Cardiovascular Disease Register (CVDR)-project, where we have on the basis of personal ID code linked together data on cardiovascular events from the National Causes-of-Death Register, the National Hospital Discharge Register and from the Drug Reimbursement Register. This database includes all fatal and hospitalized non-fatal cardiovascular events in Finland from 1991 currently until 2005. Together with the population counts the event data have been used for calculating annual age-standardized rates of cardiovascular events for the whole country as well as for each hospital district. To avoid the effects of random fluctuations, the hospital district-specific rates are expressed using three-year moving averages. These summary figures have been placed on the Internet, were they are freely available for anybody at http://www.ktl.fi/cvdr/ . The background information is provided in both Finnish and English. It should be noted in particular that the use of personal ID code has enabled us to check the Hospital Discharge Register backwards in time for earlier cardiovascular events. In this way, the register can produce data on the incidence of first CHD and stroke events. The CVDR data have been linked to the coordinates of the Geographical Information System (GIS) to investigate the geographical distribution of CHD and stroke events in Finland. It has also been linked to the drug reimbursement records to provide data on the use of secondary preventive drugs after a CHD event or a revascularization procedure. The database is relatively easily updated annually as new versions of the Causes-of-Death Register and the Hospital Discharge Register become available.

7.2 The main scientific achievements

FINRISK

During the past ten years, 210 original articles have been published from the FINRISK data in English in scientific journals following the peer-review practice. In domestic medical journals, 18 scientific articles have been published in Finnish language. Furthermore, 4 doctoral and 9 master's theses have been prepared. FINRISK data have played a key role in many well-known international collaborative projects, which have published important results, such as the WHO MONICA Project and its successor, the MORGAM Project, the SCORE collaboration and the Fibrinogen Studies Collaboration. At the end of the 1990s the MDECODE (Molecular Diversity and Epidemiology of Common Disease) collaboration published the DNA sequence diversity and the haplotype structure of the lipoprotein lipase gene, partly based on FINRISK data. These were pioneering papers at that time and are still widely cited. Other pioneering papers from the FINRISK data include those of the DECODE (Diabetes Epidemi-

ology: Collaborative Analysis of Diagnostic Criteria in Europe) Study documenting the superiority of oral glucose tolerance test and 2 h blood glucose value over the fasting glucose as predictors of all-cause mortality and cardiovascular diseases.

FINAMI, FINSTROKE and CVDR

During the last ten years 60 original articles have been published from the MI and stroke-register data in English language in peer-reviewed scientific journals and 20 papers in domestic journals in Finnish language. Furthermore, 4 doctoral theses have been prepared. Finnish MI and stroke register data were important parts of the Collaborative publications of the WHO MONICA project documenting the contributions of risk factors and treatment to the declines in CHD and stroke mortality. The Finnish data have also been reported on their own, and the findings have documented the prominent roles of declining recurrence and incidence rates in the decline of CHD mortality in Finland. Other findings have documented prominent socioeconomic discrepancies in the incidence, prognosis and treatment of coronary events in Finland. More recently, we have used the FINAMI data to report trends in coronary events correcting for the effects of troponins, which are more sensitive and specific markers of myocardial injury than the previously used cardiac enzymes. This was the first time that the effects of widely adopted troponin determinations on CHD event trends could be properly quantitated.

A summary of the Unit's main scientific achievements is presented in Table 7.1

Table 7.1 Summary of main scientific achievements during 1997-2006

Scientific output	N	Comments
Original articles and reviews in international peer-review journals	280	This is the total number of papers published or accepted for publication from the FINRISK, FINAMI, CVDR and other projects between 1996 and 5/2007
Original articles and reviews in domestic peer-review journals	39	
Textbooks and chapters in textbooks, reports and proceedings	10	
Theses	8 doctoral theses, 9 master's theses	Doctoral theses: PerolaM, Kastarinen M, Suviolahti E, Borodulin K, Ketonen M, Kaarisalo M, Koukkunen H, Jakovljevic D
Organization of scientific meetings and conferences	5	Paavo Nurmi Symposium Nordic Congress on Coagulation American Heart Assoc. Congress on Epidemiology and Prevention in 2005 and 2006, Nordic Congress on Cardiac Rehabilitation (upcoming in 2008)
Presidencies and memberships in scientific committees of international meetings	2	Co-chairman of the Scientific and Standardization Committee on Predictive Hemostatic Variables, ISTH, 2005 and 2007
Presidencies and memberships in other scientific committees	4	NHLBI Workshop on CVD events, 2005; MORGAM Management Group; Advisory Board, Prevent-it Study; Expert Workshop on MI Registers in 2007
Invited lectures and chairmanships in international meetings	1-3/year	ESC; EUROPREVENT; AHA Congress on Epidemiology and Prevention etc
Lectures in domestic scientific meetings	Several annually	Meetings of the Finnish Cardiac Society, Finnish Heart Assoc., Finnish Medical Assoc.
Editorial tasks in international peer-review journals	1	Associate Editor of the Eur J Cardiovasc Prev Rehabil
Opponent of dissertation	3	
Supervision of dissertations	2	2 done, 6-8 ongoing
Review of PhD thesis, evaluation of docentship	17	
Review of scientific papers	Several annually	Regular reviewer for journals like Circulation, ATVB, Arch Int Med, EHJ, Am J Epid
Research visits to/from international research institutes or universities	3	School of Public Health, University of North Carolina, USA

7.3 The main public health activities and achievements

The FINRISK surveys have enabled the monitoring of the cardiovascular risk factor levels in the Finnish population for 35 years. At the same time and in the same areas CHD and stroke mortality and morbidity have been monitored using specific MI and stroke registers and administrative registers. This has created a strong knowledge base for health-political decision making and public health programmes aimed at preventing cardiovascular diseases. Good information on the smoking habits of the population has also contributed to the prevention of cancers and COPD. Investigators of the Unit, as well as other investigators of KTL, have presented these results in numerous educational meetings for physicians and other health care personnel. These data have also been used over the years as background material for various governmental committees as well as for the expert groups of the Finnish Heart Association. A recent example of these activities was the consensus conference on obesity organized by the Academy of Finland.

Both FINRISK data and the FINAMI and FINSTROKE data have been widely used for analysing and reporting on socioeconomic disparities in cardiovascular risk factors and in cardiovascular mortality and morbidity. For example, we have reported that patients belonging to the lowest income tertile had 2-3 times higher risk of dying within one year of the onset of symptoms than patients belonging to the highest income tertile. From the FINRISK data we have recently reported that the proportion of socioeconomic differences in CVD mortality and morbidity that can be explained with socioeconomic differences in the levels of classical risk factors (smoking, cholesterol, and blood pressure) is diminishing over time. These kinds of results have been directly used for the evaluation of the 'Health for All by the Year 2000' and now the 'Health 2015' Programme, which give great emphasis to narrowing of the socioeconomic health disparities. Other public health achievements include the CVD register on the web-pages of KTL, which provides the annual numbers and rates of coronary and stroke events from 1991 to 2005 for the whole country as well as for each hospital district, thus helping health care planning and resource allocation. The register data have also been widely used by third sector organizations, such as the Finnish Heart Association, to help direct their activities.

Experts of the Unit have played an important role in putting together the Social and Health Report of the Finnish parliament in 2006. Other functions of considerable public health importance include IARC's expert group on the health effects of smoking cessation. At the European Union level, investigators of the Unit were in a key position in organizing a high-level expert meeting during the Finnish EU presidency under the theme "Health in All Policies" and in documenting the relevant materials of the meeting as a booklet. The Unit has also actively participated in the expert groups of the Health Monitoring Programme of the European Union. Examples of this work include the EUROCISS (European Cardiovascular Indicators Surveillance Set) and IMCA (Indicators for Monitoring COPD and Asthma) projects. At the global level, it should be mentioned that the secretariat of IANPHI (International Association of National Public Health Institutes) started its functions in the Unit. Later on, when the activities grew more extensive, the secretariat was transferred under the direct leadership of the deputy director general.A summary of the Unit's main public health activities and achievements is presented in Table 7.2

Table 7.2 Summary table of committee memberships, coordination and proceedings with public health impact

Public health output	N	Comments
Articles and reviews in non-peer-review journals	13	2 reports of the OECD, several reports of KTL, and in the journal of KTL
TV and radio interviews	7	
Health education material, websites, information databases	2	CVD Register, Tabulated data of FINRISK
Membership in international committees with public health impact	4	EUROCISS, IMCA, SCORE, PRECARD
Membership in domestic committees with public health impact	2	Finnish Academy's Consensus Committee on Obesity; Health Report 2006; Nucleus of the WG on Prevention and Rehabilitations, FSC; HIAP
Coordination and/or implementation of development projects	1	IANPHI
Coordination of public health networks	1	IANPHI
Organization of domestic training with public health impact	1	Annual series of educational events for doctors and nurses by the WG on prevention and Rehabilit, FSC

7.4 Funding for research and public health programmes

The Unit has been successful in attracting external funding from competed sources such as the Academy of Finland, the Sigrid Juselius Foundation and other Finnish foundations. Researchers of the Unit are also co-investigators in major grants from the EU and from the NIH. It should be noted that some of this external funding is not included in the summary report of the Department, because the funds do not go through the KTL administration for example in cases where FINRISK samples are being analysed abroad. The clear majority of the funding for the research of the Unit has come from external sources, except for the field work of the FINRISK surveys (for example in 1997), when the Institute has made a substantial 'extra' input to get the basic data and sample collection funded. At the moment 2.2 persons in the Unit receive their salaries from the budgetary funds of KTL, all others (5-8 persons) are hired on project money from various temporary sources.

7.5 Personnel

The staff of the Unit has varied between 5-10 persons. The current figure is eight, five of whom are working on a part-time basis. The true research group is, however, much larger due to extensive domestic and international collaborations.

The researchers as of May 2007:

Veikko Salomaa, MD, PhD, research professor. Head of the Unit, Cardiovascular epidemiology, risk factors, genetic epidemiology.

Pekka Jousilahti, MD, PhD, research professor. Works 20% for the Unit. Epidemiologist, risk factors for cardiovascular disease and cancer, obesity research, research on respiratory diseases

Satu Männistö, MSc, PhD, senior researcher. Works 80% for the Unit. Nutrition and obesity research and cancer epidemiology.

Kennet Harald,MA (sociology), PhD student. Socioeconomic research, analyses and management of the FINRISK data.

Rauni Pääkkönen, MSc, Works 50% for the Unit. Construction and maintenance of the Cardiovascular Register Database. Statistical analyses.

Aki Havulinna, MSc, PhD student. Works 50% for the Unit. Statistical modelling of the spatial distribution of CHD and stroke events. Other statistical analyses, database management of the FINAMI data.

Jorma Torppa, MSc, Works 40% for the Unit. Statistical analyses of the FINAMI and FINSTROKE data.

One researcher of the Unit, Katja Borodulin, PhD, is currently working as a post-doc at the Universityof North Carolina in the USA (exercise research). In addition, there are currently five PhD students working outside KTL but under the guidance of the Unit's investigators and using the materials of KTL. Besides researchers, the Unit has a secretary/ administrative assistant, who currently works 75% of her time for the Unit.

7.6 Collaboration

International

The Unit is involved in extensive international research collaboration and many of the best results of the Unit have been gained through multinational collaborative projects. Below is a brief list of the most important collaborators and projects as of May 2007:

The Broad Institute of MIT and Harvard, Cambridge, MA, USA (Drs Altschuler, Hirschhorn, Kathiresan and others). MIGEN is a multinational case-control study on the genetics of MI in young patients. A large number of young MI cases and controls have been collected from several sources, including the FINRISK Study. A genome-wide association study of 1 million SNPs and copy number variants is being performed using the Affymetrix 6.0 chip. This is one of the first large-scale studies in the world that uses such a dense genome-wide scan. In the FINRISK -97 cohort we are replicating the findings on obesity and lipids obtained in other GWA studies of the Broad Institute. In addition to replication, in the FINRISK -97 cohort we aim (a) to characterize the findings and biological mechanisms in more detail by fine mapping of the associated loci and (b) to assess the risk at the population level in more detail by using the prospective cohort design. In KTL, the Department of Molecular Medicine is an important collaborator in these projects.

The Queen's University of Belfast, UK, Inserm U252 Paris, France, University of Mainz, Germany etc_._ (Drs Evans, Cambien, Blankenberg and others). The MORGAM-Project is a large multinational research project focused on cardiovascular risk and risk factors. It is based on the follow-up of cohorts which participated in the risk factor surveys of the WHO MONICA Project and other similar cohorts. FINRISK -92 and -97 cohorts are included in MORGAM. The project has the general risk factor arm and the genetic arm. In KTL the most important collaborators in this project are the International CVD Epidemiology Unit, which hosts the Data Centre for MORGAM, and the Department of Molecular Medicine. The MORGAM Biomarker Study is an adjunct to MORGAM that aims at identifying new biomarkers of cardiovascular risk. In this framework an extensive set of biomarkers is being determined at the University of Mainz from the samples of the FINRISK -97 cohort.

University of Dublin, Ireland (Dr Graham and others). The SCORE collaboration aims at calculating the absolute risk of cardiovascular events in European populations. FINRISK cohorts were by far the largest contributors in calculating the SCORE tables on absolute risk of cardiovascular death, which are now widely used all over Europe. Efforts are underway to update these risk equations to also include nonfatal events and FINRISK cohorts play a key role in the efforts.

University of Cambridge, UK (Dr Danesh and others). The Fibrinogen Studies Collaboration is a large meta-analysis project aiming to characterize in more detail the roles of fibrinogen and its correlates in cardiovascular disease risk. The FINRISK -92 Haemostasis Study and the PAIS Project, which are subsamples of the FINRISK -92 and -97 surveys are participating in this project. The Emerging Risk Factor Collaboration is another large meta-analysis project, which aims to assess the roles of CRP, triglyceride concentration and several other 'emerging' risk factors in the cardiovascular risk.

GSF Forschungszentrum fur Umwelt und Gesundheit (Drs Peters, Illich, Koenig, and others). The AIRGENE Study is an EU-funded study on the effects of various air pollutants on inflammatory reaction in MI survivors. In KTL, the study is led by the Department of Environmental Epidemiology in Kuopio, but our Unit has contributed substantially, because the MI patients were recruited and investigated in Helsinki. We have also added a substudy on Interleukin 1 in the project and a PhD-student is working on these data.

Socialstyrelsen's Epidemiologisk Centrum, Sweden, the National Public Health Institute of Denmark, Denmark, University of Glasgow, Scotland (Drs Köster, Hammar, Madsen, Leyland and others). The NORDAMI Project is a collaboration between the Nordic countries and Scotland, all of which have built a cardiovascular disease register based on record linkage of the national administrative registers, such as the causes of death register and the hospital discharge register. The Project aims at standardizing the cardiovascular event definitions and making the data as comparable as possible. Data from all countries will be placed publicly available on the Internet using the web-site of the Swedish Socialstyrelsens Epidemiologisk Centrum. Common data are also being used for scientific publications. The Finnish CVD Register data have already been sent to Sweden for this purpose.

Instituto Superiore di Sanita, Rome, Italy (Dr Giampaoli and others). The EUROCISS Project, coordinated by the National Public Health Institute of Italy, is a part of the Health Monitoring Programme of the European Union. Phase II of the Project has just assembled is final report, presenting the recommendations for monitoring CVD events in the European Union. IMCA is a similar project for respiratory diseases coordinated by Fundacio IMIM, Barcelona, Spain (Dr Duran).

Domestic

Kuopio University Hospital, North Karelia Central Hospital, Oulu University Hospital, and Turku University Hospital (Drs Pyörälä, Lehto, Mustonen, Ketonen, Kesäniemi, Airaksinen, Immonen-Räihä and others). The main domestic collaboration for the past ten years has been the FINAMI myocardial infarction *register* which is still ongoing. Clinical investigators and research nurses in three university hospitals and one central hospital have worked together with KTL investigators for many years to collect and analyse data on myocardial infarction events in four geographical areas of Finland. These data have been used for numerous scientific reports and public health functions in the study areas and in the whole country. Currently, there are two PhD-students actively working on these data.

Another very long-standing and productive collaboration has taken place in the framework of the Helsinki Businessmen Study, a cohort that has been followed-up since the late 1960s. Participants in this collaboration have been the University Hospital of Helsinki and University Hospital of Oulu (Drs Strandberg, Miettinen, Tilvis and others).

Of domestic collaborations it should be noted that investigators of our Unit have actively participated in the work of the Health 2000 Project, playing important roles in the research group on respiratory diseases and in the research group on cardiovascular diseases and diabetes. There are several other smaller-scale collaborative projects with different investigators at the University Hospital of Helsinki and elsewhere. Particularly important have been good relations with the Finnish Heart Association and the Finnish Cardiac Society.

7.7 Proposal for future work and expected benefits

FINRISK

The prospects for the next few years are excellent. The projects and collaborations explained above give good possibilities for producing results that are of substantial scientific and public health significance. The first priority is to take care of the timely analysis and reporting of the main results of the FINRISK 2007 survey. The updated information on the main risk factor levels (smoking, cholesterol, blood pressure, BMI) in the Finnish population will be an achievement both from the public health and the scientific point of view. Besides the scientific audience, these results need to be communicated widely to the Finnish health care professionals and health policy makers. The FINRISK 2007 survey also included a specific subproject on obesity, DILCOM (the role of Diet, Lifestyles and Genetic factors in the development of Obesity and Metabolic syndrome), sponsored by the Academy of Finland. The purpose of the DILCOM project is to investigate in a multidisciplinary manner social, behavioural and biological determinants of weight gain in young and middle-aged individuals. If everything goes as planned, the DILCOM participants will be re-examined in the FINRISK 2012 survey. We expect, however, that the cross-sectional analyses of the 2007 data and samples will already produce new information on this increasing public health problem.

Another point of emphasis in the near future is genetic epidemiology. A challenge is to make good use of the DNAs of 32,000 FINRISK participants together with the phenotypic information collected at baseline and during follow-up. This process is well underway in our collaborative projects with the Broad Institute of Harvard and MIT. Several genetic variants have shown strong associations with lipids in the FINRISK -97 data and the analyses on their associations with CVD events are in progress. It can be realistically expected that this will produce substantial new information on the genetic background of unfavourable lipid profiles and cardiovascular risk in the Finnish population. This should lead to better identification and treatment of individuals at high risk. Equally promising preliminary findings have been obtained with regard to anthropometric characteristics, such as height, weight, BMI and waist circumference. These will be pursued further to better understand the biological mechanisms and population-attributable risks. Another promising project is MIGEN, which includes young cases of MI and controls from the FINRISK -92, -97 and 2002 surveys. This is probably the first genome-wide association study in the world to use the chip containing 1 million SNPs and copy number variants (Affymetrix 6.0). We will aim at replicating the most promising findings in the prospective, population-based setting of the FINRISK-cohorts.

We aim to do as much relevant genotyping as possible in the whole FINRISK -97 of >8000 participants, rather than using various subsamples. At the same time, about 15-20 potential new biomarkers of cardiovascular risk are being determined from the whole FINRISK -97 cohort in the framework of the MORGAM Biomarker Study. Our idea is to establish a cohort which is exceptionally rich in genotypic and phenotypic data and can be used for versatile analyses and examination of new hypotheses in a prospective setting. The value of such a cohort will only increase as the follow-up years and event numbers increase. It should be

mentioned that many of the biomarkers that are being determined and genes that are being genotyped are related to obesity (for example, adiponectin, leptin, chrelin and resistin, and the FTO gene) thus serving our obesity research and helping to tackle this increasing public health problem.

In addition to the Biomarker study, we will continue our active participation in the genetic component and in the general risk component of MORGAM as well as in the work of the MORGAM Management Group. The project is reaching the stage when the large database and careful quality control can be utilized in scientific publications.

FINRISK will continue participating in the SCORE PLUS collaboration aiming at updating of the current SCORE tables of cardiovascular risk with new versions that also include nonfatal CVD events. If successful, this can be a major step forward in the cardiovascular risk prediction and gain wide use in Finland as well as elsewhere in Europe.

To summarize: In our future work in FINRISK we propose to focus on three targets: (1) Analysis and reporting of the main results of the FINRISK 2007 survey; (2) Genetic epidemiology of cardiovascular disease and its risk factors; (3) Obesity research using a multidisciplinary approach.

FINAMI and CVDR

Monitoring the occurrence, treatment and prognosis of myocardial infarction events will remain as an important part of our research and public health work also in the future. The NORDAMI collaboration has been an example for rest of the EU in the monitoring of the trends in CVD events. One specific topic that we will address is myocardial infarction in women. This topic has attracted a lot of attention lately both in Europe and in the USA. It has been suggested that women's MI is a problem which has been underestimated. There are, however, few studies extensive enough to produce reliable information on the clinical characteristics, prognosis and treatment of MI events in women. With the large datasets of the FINAMI and CVDR projects we are in the position to contribute new data on this topic. Another topic that we will address using the FINAMI data is the socioeconomic differences in coronary heart disease mortality and morbidity. We have previously reported surprisingly large socioeconomic disparities using the FINMONICA MI data for the period 1983-1992. Now we are in the process of analysing, whether these differences have changed or remained the same during the FINAMI period 1993-2002. The background is that the coronary heart disease mortality and morbidity have declined remarkably in Finland, but it is not well-known whether all population segments have benefited equally from this favourable development or whether there are population groups that would require special attention.

Stroke monitoring will be continued using CVDR, which is currently the only data source for stroke epidemiology in Finland. Data collection in the FINSTROKE-register has already ended in 1998. This situation is not ideal, since stroke is a common and very costly disease in an ageing population and it would be very useful to have more detailed and validated

information on a subsample of stroke events. There are, however, no resources in sight which would allow the re-establishment of the FINSTROKE register.

To summarize: We propose to focus on following points: (1) To continue monitoring the trends in MI and stroke events in the Finnish population using FINAMI and CVDR registers, and to continue participating in international collaboration in this field with the Nordic countries (NORDAMI) and at the EU level; (2) To analyse and report in more detail about the epidemiology of myocardial infarction in women; (3) To analyse and report whether all population groups and socioeconomic groups have benefited equally from the decline in coronary heart disease mortality and morbidity or whether there are population groups that would benefit from additional attention to prevention and treatment.

7.8 15 most important publications with impact factors

Nickerson DA, Taylor SL, Weiss KM, Clark AG, Hutchinson RG, Stengard J, Salomaa V, Vartiainen E, Boerwinkle E, Sing CF. DNA sequence diversity in a 9.7-kb region of the human lipoprotein lipase gene. Nat Genet 1998;19(3):233-40. Impact factor 25.797

Clark AG, Weiss KM, Nickerson DA, Taylor SL, Buchanan A, Stengard J, Salomaa V, Vartiainen E, Perola M, Boerwinkle E, Sing CF. Haplotype structure and population genetic inferences from nucleotide-sequence variation in human lipoprotein lipase. Am J Hum Genet 1998; 63(2):595-612. Impact factor 12.649

Miettinen H, Lehto S, Salomaa V, Mahonen M, Niemela M, Haffner SM, Pyorala K, Tuomilehto J. Impact of diabetes on mortality after the first myocardial infarction. The FINMONICA Myocardial Infarction Register Study Group. Diabetes Care 1998;21(1):69-75. Impact factor 7.844

Glucose tolerance and mortality: comparison of WHO and American Diabetes Association diagnostic criteria. The DECODE study group (Jousilahti P). European Diabetes Epidemiology Group. Diabetes Epidemiology: Collaborative analysis Of Diagnostic criteria in Europe. Lancet 1999;354(9179):617-21. Impact factor 23.878

Conroy RM, Pyorala K, Fitzgerald AP, Sans S, Menotti A, De Backer G, De Bacquer D, Ducimetiere P, Jousilahti P, Keil U, Njolstad I, Oganov RG, Thomsen T, Tunstall-Pedoe H, Tverdal A, Wedel H, Whincup P, Wilhelmsen L, Graham IM; SCORE project group. Estimation of ten-year risk of fatal cardiovascular disease in Europe: the SCORE project. Eur Heart J 2003;24(11):987-1003. Impact factor 7.341

Jousilahti P, Vartiainen E, Tuomilehto J, Puska P. Symptoms of chronic bronchitis and the risk of coronary disease. Lancet 1996;348(9027):567-72. Impact factor 23.878

Jousilahti P, Vartiainen E, Tuomilehto J, Puska P. Sex, age, cardiovascular risk factors, and coronary heart disease: a prospective follow-up study of 14 786 middle-aged men and women in Finland. Circulation 1999;99(9):1165-72. Impact factor 11.632

Tuomilehto J, Hu G, Bidel S, Lindstrom J, Jousilahti P. Coffee consumption and risk of type 2 diabetes mellitus among middle-aged Finnish men and women. JAMA 2004;291(10):1213-9. Impact factor 23.494

Pastinen T, Perola M, Niini P, Terwilliger J, Salomaa V, Vartiainen E, Peltonen L, Syvanen A. Array-based multiplex analysis of candidate genes reveals two independent and additive genetic risk factors for myocardial infarction in the Finnish population. Hum Mol Genet 1998;7(9):1453-62. Impact factor 7.764

Salomaa V, Miettinen H, Kuulasmaa K, Niemela M, Ketonen M, Vuorenmaa T, Lehto S, Palomaki P, Mahonen M, Immonen-Raiha P, Arstila M, Kaarsalo E, Mustaniemi H, Torppa J, Tuomilehto J, Puska P, Pyorala K. Decline of coronary heart disease mortality in Finland during 1983 to 1992: roles of incidence, recurrence, and case-fatality. The FINMONICA MI Register Study. Circulation 1996;94(12):3130-7. Impact factor 11.632

Salomaa V, Niemela M, Miettinen H, Ketonen M, Immonen-Raiha P, Koskinen S, Mahonen M, Lehto S, Vuorenmaa T, Palomaki P, Mustaniemi H, Kaarsalo E, Arstila M, Torppa J, Kuulasmaa K, Puska P, Pyorala K, Tuomilehto J. Relationship of socioeconomic status to the incidence and prehospital, 28-day, and 1-year mortality rates of acute coronary events in the FINMONICA myocardial infarction register study. Circulation 2000;101(16):1913-8. Impact factor 11.632

Kastarinen MJ, Salomaa VV, Vartiainen EA, Jousilahti PJ, Tuomilehto JO, Puska PM, Nissinen AM. Trends in blood pressure levels and control of hypertension in Finland from 1982 to 1997. J Hypertens 1998;16(9):1379-87. Impact factor 5.218

Jousilahti P, Rastenyte D, Tuomilehto J. Serum gamma-glutamyl transferase, self-reported alcohol drinking, and the risk of stroke. Stroke 2000;31(8):1851-5. Impact factor 5.855

Salomaa V, Koukkunen H, Ketonen M, Immonen-Raiha P, Karja-Koskenkari P, Mustonen J, Lehto S, Torppa J, Lehtonen A, Tuomilehto J, Kesaniemi YA, Pyorala K. A new definition for myocardial infarction: what difference does it make? Eur Heart J 2005;26(17):1719-25. Impact factor 7.341

Salomaa V, Ketonen M, Koukkunen H, Immonen-Raiha P, Lehtonen A, Torppa J, Kuulasmaa K, Kesaniemi YA, Pyorala K; FINAMI Study Group. The effect of correcting for troponins on trends in coronary heart disease events in Finland during 1993-2002: the FINAMI study. Eur Heart J 2006;27(20):2394-9. Impact factor 7.341

8 HEALTH PROMOTION UNIT

8.1 Research and public health significance of the area

Based on the main reason for its emergence in 1994, the Unit has been responding to important national and international information needs concerning lifestyle or health behavior and functional ability among citizens aged 15 to 84 years. Regularly gathering comparable data on lifestyle, health and functional ability, and reporting the time trends and population group differences is essential for the national health policy evaluation and planning. The monitoring results of the Unit can be used for planning and evaluating nationwide health promotion campaigns as well as for assessing impact of lifestyle related laws and their amendments and they serve as models for other countries to follow. The data gathered offers basis for studies on determinants of lifestyle and its development in the population and groups specified by gender, birth cohort/age, socioeconomic position, - and region. Some related local data gathering and reporting for municipal purposes has also been done - useful as a model as the the Public Health Law of 2006 requires municipalities to monitor the health of their citizens.

As a significant input following the proposal from the international evaluation of the institute in 1994-95, just after the Unit had been established as as an health behavior monitoring entity, a group of health psychologist from the Mental Health Department joined the Unit in 1997. This import of behavioral science knowledge proved to be an important ingredient for broadening orientation of the Unit, when it was joined to the body of social science knowledge already present. From early 2000's the Unit has enlarged its domain to community and organizational health promotion. Adopting the North Karelia project's tradition to challenges resulting from economic, administrative and cultural changes contributing and implementing advanced behavioral and social science theories to health promotion practice the Unit has found its niché at KTL and elsewhere. The Unit aims at continuing the lifestyle monitoring and at developing and implementing behavioral and social sciences based instruments for lifestyle and functional ability enhancement finding the goals to pursue from results of RCT's.

8.2 The main scientific achievements

The research of the Unit, albeit partly close to strategic research, is directly useful for health promotion. The lifestyle monitoring activity of the Unit has been adopted to many CINDI countries, and it has also influenced creation of modules for the EU Health Interview Surveys. Its results have also been widely published internationally. Creation of the GOAL lifestyle intervention instruments started in 2003. Their design precludes significant latency time before results can be expected. The main result paper is currently in press and others are being processed. The GOAL Lifestyle instruments are tried (James Dunbar) in the state of Victoria, Australia, too. Next, the the two study strains, and third involving genetic testing and mammography screening (now discontinued), will be described more in detail, main publications included. The Unit is been involved with research also, such as that pertaining

to psychosocial determinants of disease with University of Helsinki, Oulu, Turku, and Institute of Occupational Hygiene, not to be described here, however.

8.2.1 Monitoring of health and lifestyle in working age

Health related lifestyle or health behavior, and health monitoring national surveys have been carried out annually at KTL since 1978. When the Unit was established in 1994, taking possession of this monitoring and publishing results based on it became its main and almost sole activity. The primary purpose of the monitoring is to obtain annual information on the lifestyles - smoking, dietary habits, consumption of alcohol and physical activity - among citizens 15-64 years of age. Items on health status, health services use, exposure to health campaigns, psychosocial process factors and health policy opinions are also included. What has been found in these annual surveys mailed to a representative sample of 5000 persons, is that in the long term male smoking has decreased, whereas female smoking after initial increased has stabilized on the level reached in the mid 1980's. The differences in daily smoking between educational groups have increased, though. Food choices (less often saturated fat, more often vegetables, fruits and berries) show healthy development in indicators of fat and fiber, and regional and socioeconomic differences in healthy food habits have diminished. Alcohol consumption has continued to increase, there are less non-users and weekly consumption has been elevating - partly also because of the tax lowering on 2004. Frequency of leisure-time physical activity has increased, but proportion of overweight and obese men and women has increased. Overweight is most common in the lowest educational group. Results published deal with secular trends of lifestyle and their determinants, socioeconomic position included.

8.2.2 Monitoring of health/functional ability and lifestyle among elderly

Health behavior and health among Finnish pensioners has been monitored since 1985 using biennial postal surveys to stratified (by age and gender) random samples of 2400 Finnish citizens aged 65 to 79/84 years. These mailed surveys gather information on living conditions, health status, lifestyle and coping with daily activities among the seniors. Results published deal with secular trends of lifestyle and functional ability from the viewpoint sociodemographic and socioeconomic factors. As new cohorts get to pension age they "bring along" the lifestyle they have adopted while being in the working age. Selective mortality "takes care" of those with the most detrimental lifestyle so that smoking gets decreased as is decreasing when to the situation two decades ago. There are less tea-totaling pensioners and weekly consumption is increasing. At the population level the pensioners' alcohol consumption does not cause such a health concern as that of the working age population. The food choices have become more healthy and Finnish pensioners have retained their traditional physically active lifestyle. Among pensioners the socioeconomic cleavage prevails, too. Although functional capacity and ability have increased among both men and women, it is on much higher level among the better education. The latter also have healthier food choices than the lower educated.

8.2.3 Regional and local lifestyle studies

In the province of North Karelia an extra sample has been approached annually in 1978-1996, and thereafter sporadically. These samples of 1200 persons each have contributed to the North Karelia Project process evaluation as the questionnaires are comparable to the national ones. The data has been used, e.g., for one of the few CINDI process evaluation studies where factors contributing to the success of smoking cessation were identified. Results also indicate lifestyle reasons for the faster than national average health development in the region: diminishing of smoking and healthier diet are two of the contributing factors. More sporadically, other regions or municipalities have also been served. Results from these studies have been used in planning of local welfare services and health promotion actions. In 1997-2007 these studies have been done in the provinces of Kanta-Häme (1998) and Kainuu (1999) and in the cities of Jyväskylä (2001) Mikkeli (2002) and Kaarina (2002). The ongoing study in the city of Kauniainen will be finished in 2007.

Examples of scientific use of national lifestyle monitoring data

Impact evaluation of national tobacco control policy: Birth cohort analyzes have been done to examine smoking initiation and cessation. Furthermore, exposure to environmental cigarette smoke at worksite and homes has been studied. Results speak for the success of the Tobacco Control Act of 1976 and its Amendment in 1995. Smoking initiation among those, who reached the typical initiation age when the 1976 Tobacco Control Act (TCA) was operational, was clearly lower than expected based on the prediction from trends in the birth cohorts born before. The impact seemed socioeconomically neutral among women; among men the well-educated benefited most. Among non-smokers exposure to environmental tobacco smoke at work decreased to one-third between 1985 and 2000 as a result of the worksite smoking ban of 1995, and the Amendment also encouraged employed smokers to quit.

Impact of unemployment on lifestyle and health. Finland harbored in grave economic problems with massive unemployment in early 1990's that caused serious turbulence in private and public sector and national economy. In 1997 the Unit devised a follow-up of working age persons who had responded to the the health behavior surveys in 1989 and 1990. Of the the over 5000 persons responding close to a half indicated that the recession unemployment had touched their family. Results revealed that subjective health and well-being of those who had been inflicted by unemployment themselves had worsened. Smokers among unemployed found it harder to quit than those who had remained employed. No significant impact of unemployment on alcohol use was revealed. Impact of unemployment on food choices and physical activity were dependent on the socioeconomic position. Those who were better educated often indicated diet improvement and increased leisure time physical activity.

Impact of national drug campaign on opinions. During the late 1990s the use of illicit drugs was increasing in Finland. The cabinet responded with a policy statement resulting into the establishment of a board including all relevant sectors in public administration. The board was to coordinate, and monitor, e.g., a national mass media and internet campaign on illicit

drugs starting in 2002. The visibility of the campaign was evaluated using several data sources: special items in the Adult Health Behavior survey, focus group interviews among high school students, survey done among journalists writing about about drugs and professionals working in prevention and treatment, and an analysis of the visibility of the campaign in the media. The Adult Health Behavior Monitoring surveys showed that contacts to illicit drugs among Finns were relatively high 2001 but diminished onwards. Accordingly, and also because of the fact that media was not so interested in drugs any more, worries about problems caused by illicit drugs were alleviated. Majority of Finns, however, still consider that illicit drugs are a serious problem in Finland. Most of them also find that in addition to prevention, diminishing harm caused by the drugs, is an acceptable health policy goal.

Future directions of lifestyle and health monitoring

The system of health behavior, health and functional ability monitoring has been found valuable which speaks for the need of its continuing maintenance. Challenges for development arise from continuously developing local, national, EU, and international needs. Can Finland afford to meet these partly conflicting needs? Does it have the resources needed for the full scientific exploitation of the system and the extra resources needed for the system development in the challenging context? Perhaps the best way of summarizing future expectations is to say: the system will be maintained and used for scientific purposes, but it will also be adapted to changing contextual requirements.

8.2.4 GOAL Program for Good Aging in Lahti Region, 2002-2012

In 2001, the Health Promotion Unit began its active participation in the Good Aging in Lahti Region or GOAL research and development program (Ikihyvä Päijät-Häme in Finnish) in the Päijät-Häme province in Finland. In the province, chronic disease related morbidity and mortality exceed the national average, and aging is also proceeding at above average rate. An increase in chronic diseases such as type 2 diabetes and functional capacity restrictions among the aging are acute challenges that gave birth for the initiation of the GOAL Program. A 10-year longitudinal GOAL cohort study (original sample N=4,272) among the cohorts born in 1946-50, 1936-40, and 1926-30 was initiated in 2002, to be repeated every 3 years, and forms a backbone for the monitoring. It includes measures of main chronic disease risk factors (e.g., blood pressure, blood lipids, fasting glucose and insulin, weight and BMI, waist circumference), state of health including functional capacity, lifestyle, and use of social and medical services. The questionnaire gathers also information on, e.g., wellbeing, and perceptions and opinions about aging and health. These data together with other available information have been and are used for community diagnoses that form the basis of needs' assessment for the interventions. The data will also be used for evaluation of the development of health within the region during the research period, as well as for for evaluation of the three interventions studies embedded into the program.

Social capital, urban-rural dimension and health

Self-rated health is a widely used indicator of an individual's health status in general and its socioeconomic gradient is well known. Self-rated health also associates with main components of social capital, trust and social participation. For the GOAL program health promotion purposes and in order to acquire information on how the urban-rural dimension may influence the relation of social capital and health, GOAL cohort study data from from 2002 was used. Positive associations between indicators of SES and self-rated health were observed in urban, and densely and sparsely populated rural communities. Adequacy of income showed the strongest positive association with self-rated health in urban areas. Participation in social activities was significantly associated with good health, too. Therefore, promotion of social participation - leisure time activities included - and facilitating access to help from others should arguably be employed as instruments of community health promotion, too.

The GOAL lifestyle implementation trial

Randomized controlled trials have shown that type 2 diabetes can be prevented by lifestyle modification when a sets of goals is achieved. How to do this in "real life settings" poses a real challenge for the health care. The GOAL Lifestyle Implementation Trial is a theory- and evidence-based lifestyle counseling program aiming to test whether lifestyle modification objectives with established efficacy in earlier type 2 diabetes trials can be effectively implemented in the primary health care settings. Main research focus is on process evaluation, especially on changes in the psychosocial determinants of behavior and on changes in behavior by gender and socioeconomic position. Feasibility of the program for primary health care use is another factor under evaluation. The program was tested in year 2003 with 352 patients in 36 groups (aged 50-65 years) with identified at lest moderate risk for type 2 diabetes. The subjects were followed at 3, 12, and 36 months. Trained public health nurses employed in the health care centers delivered the program as facilitators of group counseling aiming at workable lifestyle change plans for individuals. Anthropometric, clinical data and questionnaire data were collected before the intervention and at follow-ups. In addition to the quantitative data, qualitative data was collected at 18 months post-intervention from participants who were either successful or unsuccessful in weight loss. Results were compared to those received in Finnish Diabetes Prevention Study using intensive individual counseling. 12 months follow-up showed modest positive clinical risk factor changes, with better results in the mixed-gender groups achieved by men than women. Of the psychosocial factors, planning and general self-efficacy were enhanced in the intervention process and this increase was predictive of the hoped-for behavioral outcomes. Success in in change was also related to motivation of the group facilitator. Almost all participants and facilitators expressed high acceptance of the program. Data collection has now been completed and an active reporting phase is in the process. Several publications are in press, many manuscripts either submitted or processed.

The GOAL trial to implement Current care guidelines for prevention of chronic diseases

The aim of this implementation trial was to develop and implement a regional application of national current care guidelines involved with prevention of major chronic diseases including treatment of hypertension, dyslipidemia, adult obesity, and smoking cessation or nicotine dependency. The guidelines were implemented locally via workshops and lectures provided by the GOAL team for physicians and nurses working with metabolic syndrome disorders in primary and secondary care. For the evaluation of the impact of the trial questionnaires were distributed to physicians and nurses at the premises. The results of the evaluation are currently being processed. Initial results suggests that there has been positive development in respect of attitudes towards and use of clinical guidelines.

The GOAL Functional Capacity Intervention

With the rapidly aging population, healthy aging has become a major public health goal. Promotion of healthy aging requires identification of those at risk and a comprehensive approach addressing multiple risk factors: physical inactivity, poor diet, and social isolation. This intervention study seeks to promote healthy aging among over clients of the municipal homecare aged 70 and over. The specific objectives of the study, initialized in 2005 with interventions running in 2006, and 12 month follow-up data to be gathered in 2007, was to develop a clinical kit to measure functional capacity and to find practical methods to be used by social sector homecare teams for its promotion. Clients were first randomly assigned to one of the three study arms. These were standard care, group-based strength and balance exercise, or home-based strength and balance exercise. The last two being based on the same goal-oriented theory as the lifestyle change program. In the second phase, clients were randomized into one of the latter two conditions both of which now included detailed action planning for daily physical activity, healthy diet and active social networks. In the first phase, each trial arm included 40 participants, tn the second, the number of participants per study arm was 24.

Future directions of the GOAL Program

The GOAL lifestyle intervention, albeit it has been found attractive by professionals and administrators of the region, has also brought results giving impetus to further study and development. Questions such as how to awaken the interest of men for lifestyle change, how to improve social support for change among low-educated women, and how to enhance physical activity promotion are examples of challenges that should be tackled. The functional capacity intervention needs to be tested also among subjects with better functional capacity to learn its full potential. In addition, the GOAL program process has us aware about the poor health of the aging health and social care personnel which together with the non-modern and short professional training among the social sector workers especially prevents them from working efficiently. An intervention study to alleviate the problem is currently in planning phase.

8.2.5 DefenceNutri: Intervening food choices of conscripts in the Finnish Defence Forces, 2007-2011

The epidemic of male overweight and obesity is a special concern for the Finnish Defence Forces, and clearly a public health problem. As the service is compulsory to the males, over 80% of the male generation participates it, typically in the age 18-20 years. For women service is an option, taken only by few. The context offers offers an excellent chance to influence eating patterns of the most of the Finnish males. The DefenceNutri intervention study combines nutrition science knowledge with cultural, sociological and socialpsychological perspectives for food-related consumer decision-making among young males and strives to intervene the food choices by affecting both both the food supply and demand in the garrison context.

The study aims to examine eating patterns and their changes among young Finnish men during the military service. The field work takes place in selected companies of the Kainuu Brigade and the Armoured Brigade (Parola). Social representations and prototypes bearing on young men's food choices involved in the decision-making process are being studied in a design involving first the control phase in the two garrisons in 2007, and continuing with supply intervention in 2008, and supply and demand intervention in 2009. The subjects will receive mailed questionnaires 12 months after the service, too, so the field phase will last until 2010. The two main loci of food supply and consumption in the garrisons are the soldier's homes and garrison canteens. Therefore the ideological and practiced nutrition related objectives and their rationale of garrison canteens and soldier's homes are analyzed. The intervention will include two phases: One targeting the garrison canteen and Soldier's Home personnel to increase the supply of healthy food choices and enhance their attractiveness, the other while maintaining the supply element, targeting the conscripts to increase their demand for healthy foods. The supply phase intervention used processes based on theories of expansive and problem based learning in educating the personnel to impact the food supply. The demand phase relies on both central and peripheral routes of influence on conscripts' cognitions and emotions. Experimental design, using conscripts entering service before intervention as controls, moving over to the supply intervention, and implementing the demand intervention while maintaining the supply intervention, allowing impact and process evaluation using quantitative methodology. Data on consumption and sales of foods are used to validate self-reported consumption rates. Measures of participating males involve anthropometry, clinical risk factors of CVD and T2D, physical fitness, health behaviors, taste preferences, and cognitive-evaluative processes related to food choices and the intervention.

Future directions of the DefenceNutri program

If found successful we plan to help to implement the intervention in all garrisons of the Defence Forces.

8.2.6 GEP: Getting evidence into practice in health promotion, 2003-2005

There is an obvious need to develop shared methods to collect, analyze and judge information for evidence in the area of health promotion. The aim was to develop a European review protocol to collect this information, and to develop a quality assurance tool to plan and evaluate health promotion interventions. Literature studies and Delphi rounds among experts were used to get the data. Draft review protocol and quality assurance tools were developed and results published, e.g. at the EU website. Several workshops (in Europe, Thailand and Canada) have been organized related to the evidence base of health promotion, and journal manuscripts are being processed. Due to the lack of funding the GEP project was cult into half: the products were created, but they remained unvalidated in many countries with Germany and Denmark as marked exceptions.

Future directions of the GEP program

At present not to be continued at the Unit.

8.2.7 Psychological studies of testing and screening, 1992-2002

Finnish mass screening for breast cancer, 1992-2002. Biennial mass screening for breast cancer among women 50-59 years by mammography was started in Finland in 1987. Even though the false positive rate is low, over 4,000 are annually being sent for further examinations resulting presumably to cancer worries although the final verdict is mostly false positive. The aims of this study were to assess the psychological impact of the screening, and to examine reasons non-participation. Data was collected 1992-1994, participants were women aged 50 (target N=16,886), community referents outside screening area were N=1,718. A baseline measurement was conducted one month before invitation to screening. A random sample of 10% from the target area as well as all women re-called for further examinations were followed up three months and 12 months post screening. Screening non-participants were followed up three months post screening. Mailed questionnaires were used to gather the data. Non-participation (10%) was predicted by expected pain. Women in the middle socioeconomic positions were most eager to participate. For most women screening was not a distressing, but those false positives reported increased screening specific distress. Preexisting experience of breast cancer in ones family and high perceived breast cancer risk on screening induced higher and longer-lasting distress.

Genetic testing and screening: attitudes among lay people, 1996-1999. Practices of genetic testing and screening were taking place in Finland as well elsewhere in Europe during the 1990s. There were public debates on how testing and screening should organized. Prenatal genetic screening especially aroused public interest. In order to explore lay opinions on and knowledge of genetic testing and screening, a survey was conducted at the National Public Health Institute in 1996-1997 (N=1216). In general, lay people indicated high acceptance of genetic testing. Some had clearly contradictory attitudes though. Those with the highest level of knowledge of genetics there was both more skepticism and more enthusiasm than among people with low level of knowledge of genetics.

Future directions of psychological studies on testing and screening

At present not to be continued at the Unit.

8.3 The main public health activities and achievements

Research of the Unit translates straightforward to public health practice. Health behavior, health and physical ability monitoring results are widely used in health policy and campaign evaluation and planning. Evaluation results concerning the 1977 Tobacco Control Act and its Amendment in 1995 are good examples. Furthermore, impact of changes made in 2004 to increase availability of alcohol could be assessed and as the main group where alcohol consumption strikingly rose we identified the low educated middle-aged males. Similarly the screening studies yielded results directly relevant for evaluation of important medical screening practices. The data offers information for many working in the field of health promotion, be that in NGO's, companies or public officials. Ministry of Social Affairs and Health employs the results in their lifestyle relevant program planning and evaluation. The Cabinet's report to the Parliament every four years involves the monitoring information, too. Also the Province based round of health promotion seminars, the first of which was held in 2006, benefited from the monitoring information. Moreover, the Unit's monitoring system results has been used to regional (STAKES SotkaNet), national (Statics Finland) and international (EUROSTAT, OECD) statistical purposes. Finally, the fact that several CINDI countries use the monitoring instrument widens the influence of the Unit's activity to an international domain.

All intervention studies the unit performs are designed to be realistic in the sense that they involve controlled costs and challenges to human resources and organizations. Extra costs occur because of the the research and evaluation involved. The GOAL program is a paradigm case where the Unit has participated in education of the health care personnel of the region to make it possible to implement the instruments into normal use in the local health centers. Group counseling has now gained ground over individual counseling, or is sometimes used in addition to it. The municipalities in the region have now jointly hired a dietitian, which is rather unique in Finland, to coordinate and support the counseling, and in the Spring 2007 a total of 29 groups were functioning in the area. A recent news is that the Victorian version of the GOAL Lifestyle Intervention will be implemented into a statewide use.

The Unit entails a significant body of health promotion knowledge that has been used for local, national and international purposes. Currently, many of the researches are engaged in local health promotion on a daily basis in the GOAL and DefenceNutri programs and in local health behavior monitoring tasks. In addition to the aforementioned grass roots work, the Unit's expertise is being shared by several NGO's (e.g., Finnish Center for Health Promotion, Finnish Heart Association, Finnish Diabetes Association, Finnish Society for Research in Sport and Physical Education, Finnish Foundation for Public Health and Physical Activity Promotion), and public administration (Ministry of Social Affairs and Health: e.g., Local activities section of the Public Health Board, HIV expert group, Coordination group for illegal drug use prevention, Steering group for health screening of long-term unemployed, and several ad hoc working groups; Ministry of Education: e.g., Health enhancing physical

activity board). Current international activities include Working Party on Information on Lifestyle and Specific Subpopulations of DG SANCO, Technical Group for Health Interview Surveys of EUROSTAT, and Steering Group for EU Action Plan for Drugs.

8.4 Funding for research and public health programmes

Salaries of two (until 2004 three) researchers, as well as daily expenses, are covered from the state budget to KTL. As the Unit is performing essential national surveillance of health behavior the basic costs for these functions are also covered by state funding half of which, however, has to be won trough applications on an annual basis. By far most significant funding sources are research programs of Academy of Finland. During the last decade, the Unit has found found funding trough the following programs: Health and Other Welfare Differences between Populations Groups 1998-2000, Research Program for Aging 2000-2002, Health Promotion Research Program 2001-2004, Research Program on Health Services Research 2004-2007, and Research Program on Nutrition, Food and Health 2006-2010. Social Insurance Institution has given a substantial funding for the the GOAL Lifestyle Intervention Study and its implementation in the period 2004-2008. EU funds have been raised for 4 research projects, dealing with genetic testing, nutrition related health inequalities, guidelines for public health promotion and SARS related concerns in the period 1998 to 2005. The Unit also participated the Good Aging Program of KTL in 2004-2006. Other funding has been received from doctoral programs (Doctoral program for public health and Population, health and living conditions) as well as from several private foundations.

8.5 Personnel

The unit has currently 14 employees; two of these (unit head and senior researcher) are having salaries from state budget, others working on project money. Most of the academic have behavioral or social science education. During the evaluation decade over 40 different persons have worked in the Unit. Many of those who had stayed a short period have finished dissertations and moved elsewhere for employment. Some redefining of boundaries within the Department have also resulted into personnel changes. Four of the current researchers (including the Unit head) are PhD's, giving tuition to the juniors, who number seven and are preparing dissertations. In addition there are three technical persons. The unit has a flexible and efficient structure with the unit head, three further seniors, and seven juniors. The names, education and primary interests and functions of four current and one past key person in the Unit are listed below:

Antti Uutela, PhD (social psychology), chief of laboratory, docent/adjunct professor (University of Helsinki), head of the Unit. Expert in behavioral medicine and health promotion. Leader, e.g., of the DefenceNutri Consortium, and KTL GOAL Program.

Pilvikki Absetz, PhD (health psychology), senior researcher. Expert in health behavior change theories and methods, principal investigator in the GOAL Lifestyle Implementation Trial, the GOAL Functional Capacity Intervention, and the DefenceNutri Intervention study.

Piia Jallinoja, PhD (sociology), senior researcher. Expert in social and cultural aspects of health behavior, behavior change and health interventions. She is co-principal investigator on DefenceNutri intervention study and in the evaluation of a national mass media campaign against illicit drugs and a senior researcher in GOAL lifestyle implementation trial and and GOAL Current Care Guideline Implementation trial.

Satu Helakorpi, MSocSc (sociology), RN, researcher. Expert in lifestyle monitoring and principals investigator of liesttyle and health/functional ability monitoring.

Dr. Arja R. Aro (Ph.D., Dr. Health Care Research), was senior researcher of the Unit till 2005, responsible for the programs 8.2.4. and 8.2.5. She is now professor of public health at the University of Southern Denmark.

8.6 National and international collaboration

Researchers of the Unit work with several colleagues from, e.g., KTL (Chronic Disease Prevention Unit, Injury Prevention Unit, Nutrition Unit, Department of Health and Functional Capacity), University of Helsinki (Department of Social Psychology, Department of Social Policy, Department of Public Health Science, Department of of Food Technology, and Palmenia Center for Continuing Education), Lahti Polytechnic, and the UKK Institute for Health Promotion. The field work and implementation of the programs requires collaboration with the Päijät-Häme Hospital District and all municipalities involved, as well the Defence Forces General Staff, the Department of Military Medicine of the Defence Forces, the garrisons of Kainuu and Parola, their canteens and soldier's homes etc.

Because of the nature of the work of the Unit both national and international collaboration are extensive. Out of international colleagues we collaborate most actively with Monash University, Melbourne, Australia (Olddenburg), Uppsala University, Sweden (Burell), University of Southern Denmark, Esbjerg (Aro), Jacobs University, Bremen, Germany(Renner), University of North Carolina at Chapel Hill, USA (Fisher), and Glascow University, UK (Leyland).

In addition to research collaboration, another platform of cooperation involves that of international scientific organizations. Most important ones of these to us are International Society of Behavioral Medicine (ISBM), and the European Society of Health Psychology (EHPS). In ISBM postions include Board and Executive Committee memberships 1996-2008, President elect 2002-2004, President 2004-2006, Past president (2006-2008). In EHPS there was Executive committee membership 2003-2005, including founding of the training section of EHPS, SYNERGY. The Unit members organized the International Congress of Behavioral Medicine in Helsinki in 2002 (chair of local organization, program co-chair). The first GOAL Teaching Seminar in behavioral medicine in Lahti was organized by the 2005. In addition, the Unit's seniors are being continuously involved in program committees of international congresses of ISBM, EHPS, EUPHA, and IUPHE since early 1990's.

The Unit has cooperated with several international health promoting organizations, including WHO (Enhancement of medical treatment compliance, World Health Assembly 2002,

Global Conference in Health Promotion 2005), WHO/EURO (Coordination of the 1st European Move for Health Day, Helsinki, 2007), and European Union (several evaluator tasks of Public Health Resarch Programs from 1995 onwards, participation in the Tackling Health Inequalities Program 2000-2002, memberships in Working Party Lifestyle on Information on Lifestyle and Specific Subpopulations 2004-, echnical Group for Health Interview Studies 2007-, Steering Group for Health Interview Studies 2006, and Steering group for EU Action Plan for Drugs 2006-2010.

8.7 Proposal for future work and expected benefits

The present seems to determine largely what the Unit will be doing for the next five years. This being written, and having a look to the decade past, one must conclude though, that this signifies the Unit's current cognitive and motivational state - so significant unforeseen changes have taken place in the immediate past. They have, contributed to the integration of the Unit's research program though. Assuming that the Unit maintains the current resource level, lifestyle monitoring will definitely be continued and adapted to the information needs from local, national and international sources. Scientific publishing of results from both the surveys will increase, proportionally more regarding the elderly.

Intervention studies will continue wit set and novel field phases, and a lot of publishing of results will take place, too.
Creating intervention modules focusing on the possible barriers of the disadvantaged socioeconomic groups to make the change happen will be one of the foci of our work. This means a new look at psychosocial factors involved, including intervention on social support and depression.

The Unit will continue to collaborate with institutions and colleagues mentioned above but also will open new routes. We will strengthen collaboration the Department of Social Psychology (with expertise in social cognition and prototypes, psychosocial factors, including social support), and the Department of Food Technology (with expertise sensory food science) of Helsinki University. The same goes for research collaboration with the University of Uppsala Department of Public Health and Caring Sciences (behavioral medicine, psychosocial factors and clinical interventions) and the Umeå University Department of Public Health and Clinical Medicine (behavioral medicine, interventions to prevent diabetes) in Sweden.

It is to be expected that the Unit's strong local, national and international public health activity will even increase and gain in significance as the younger seniors of the Unit gain more experience.

In the longer run, the Unit will pursue to find solutions to the same kind of challenges that keep us occupied during the next five years. Also active public health participation will be continued. It can be predicted that lifestyle monitoring will continue in somewhat new form, and starts at least partially to use new technology (such as electronic questionnaires) in data gathering. One can be sure that we will continue interventions and implementing their

results into practice. It can be presumed that they will also include novel technology, such as internet and mobile telephones.

The research of the Unit - as it focuses on behavioral and social science aspects of lifestyle and interventions meant to modify it, will serve serve the public health needs of the future, too. It is to be expected, that when the two intervention study strains that have been initiated in the last five years, mature, as our research collaboration with both academic and clinical science advances, and finally, as our intervention program implementation activities increase, we will gain even more public health significance.

8.8 Main publications

Lifestyle monitoring:

Helakorpi S, Martelin T, Torppa J, Patja K, Vartiainen E, Uutela A. Did Finland's Tobacco Control Act of 1976 have an impact on ever smoking? An examination based on male and female cohort trends. Journal of Epidemiology and Community Health. 2004 Aug;58(8):649-54.

Jousilahti P, Helakorpi S. Prevalence of exposure to environmental tobacco smoke at work and at home--15-year trends in Finland. Scandian Journal of Work Environmental Health 2002;28(Suppl 2):16-20.

Laaksonen M, Luoto R, Helakorpi S, Uutela A. Associations between Health-Related Behaviors: A 7-Year Follow-up of Adults. Prev Med 2002;34, 162-170.

Anttolainen M., Luoto R., Uutela, A., Boice, J.D., Blot, W.J., McLaughlin, J.K. et al.: Characteristics of users and non-users of plan stanol ester margarine in Finland: An approach to study functional foods. Journal of American Dietetic Association 2001; 101(11): 1365-1368

Nyman, J. Does unemployment contribute to ill-being: Results from a panel study among Adult Finns, 1989/90 and 1997. (Dissertation) Publications of the National Public Health Institute A4/2000, Helsinki.

Korhonen, T.: Population-based smoking cessation: Process evaluation of selected strategies used in the CINDI program. Publications of the National Public Health Institute A1/1999, Helsinki.

Sulander, T.T., Uutela, A.K., Obesity and education: Recent trends and disparities among 65- to 84-year-old men and women in Finland, Preventive Medicine 2007 (Epub ahead of print, doi:10.1016/j.ypmed.2007.02.008)

Sulander T, Martelin T, Sainio P, Rahkonen O, Nissinen A, Uutela A: Trends and educational disparities in BADL difficulties among people aged 65-84 years. International Journal of Epidemiology 2006;35:1255-1261.

Sulander T., Rahkonen, O., Nissinen, A., Uutela, A.: Associations of smoking status with obesity and diabetes among older people. Archives of Gerontology and Geriatrics 2006, Dec 1 (Epub ahead of print)

GOAL program:

Absetz, P., Valve, R., Oldenburg, B., Heinonen, H., Nissinen, A., Fogelholm, M., Ilvesmäki, V. Talja, M., Uutela, A.: Type 2 diabetes prevention in "real world": One year results of the GOAL implementation trial. Diabetes Care, in press 2007.

Nummela OP, Sulander TT, Heinonen HS, Uutela AK. Self-rated health and indicators of SES among the ageing in three types of communities. Scandian Journal of Public Health. 2007;35(1):39-47

Pajari, P.M., Jallinoja, P., Absetz, P.: Negotiations over self-control and activity: An analysis of balancing in the repertoires of Finnish healthy lifstyles. Social Science and Medicine 2006; 62(10): 2601-2611

Uutela, A., Absetz, P., Nissinen, A., Valve, R., Talja, M., Fogelholm, M.: Health psychological theory in promoting population health in Paijat-Hame, Finland: First steps toward a type 2 diabetes prevention study. Journal of Health Psychology 2004; 9(1), 73-84

Genetic testing and mammography screening:

Jallinoja, P.: Ethics of clinical genetics. The spirit of profession and trials of suitability from 1970 to 2000. Critical ublic Health 2002; 12(2): 103-118.

Aro, A.R., Absetz, P., vand Elderen, T.M., Van der Ploeg, E., Van der Kamp, L.J.T.: False-positive findings in mammography screening induces short-term distress - breast cancer specific concern prevails longer. European Journal of Cancer 2000; 36(9): 1089-1097

ARO, A.R., de Koning, H.J., Absetz, P., Schreck, M.: Psychosocial predictors of first attendance for organised mammography screening. Journal of Medical Screening 1999; 6(2): 82-88.

Table 8.1 Summary of main scientific achievements during 1997-2006

Scientific output	N	Comments
Original articles and reviews in international peer-review journals	178	Original research papers; does not include reviews or congress abstracts.
Original articles and reviews in domestic peer-review journals	45	Original research papers; does not include reviews or congress abstracts.
Textbooks and chapters in textbooks, reports and proceedings	65	Many are reports on ongoing lifestyle monitoring. Does not include proceedings.
Theses	8	Done while working in the Unit: Absetz, Berg, Haukkala, Heinonen, Jallinoja, Nyman, Laaksonen, Sulander,
Organization of scientific meetings and conferences	4	International Congress of Behavioral Medicine, Helsinki 2002; EHPS and EHPS CREATE Meeting 2004, WCPD 2008
Presidencies and memberships in scientific committees of international meetings	18	President ICBM 2006, Scientific committees: ICBM 1998-2008; EUPHA 2000-2005, EHPS 2004-2006
Presidencies and memberships in other scientific committees	13	President elect, President, Past President ISBM 2002-2008; Board memberships ISBM 1996-2008; Chair, Society of Social Medicine 2001, Chair, Behavioral Medicine Section of Society of Social Medicine 2007
Invited lectures and chairmanships in international meetings	35	Congresses of ISBM, EUPHA, EHPS, IUPHE and various and other national and international congresses
Lectures in domestic scientific meetings	88	In health promotion congresses and congresses involving behavioral, social, nutrition, and sport sciences
Editorial tasks in international peer-review journals	10	Psychology of Health, co-editor 2002-2005 Editorial Board memberships: Internal Journal of Behavioral Medicine 1994- Scandinavian Journal of Social Medicine 1994-1999 Health Education Research 1997-2003 Patient Education Counseling 1998-2005
Opponent of dissertation	10	Nygrén, Pohjanheimo, Poskiparta, Tarmi-Mattson, Läärä, Gerlander, Stengård, Kuusinen, Grönroos, Lagerlund
Supervision of dissertations	22	Completed: Kallio, Rahkio, Topo, Pötsönen, Korhonen, Aalto, Berg, Suominen-Taipale, Välimaa, Järvinen, Aktan-Collan, Nyman, Laaksonen, Haukkala, Absetz, Jallinoja, Palosuo, Heinonen, Sulander, Hakanen, Kallio, Savolainen.
Review of PhD thesis, evaluation of docentship	13	Reviews of PhD theses: Appelberg, Seppälä, Tynjälä, Huurre, Sinervo, Gerlander, Jaari, Väänänen, Grönroos, Lagerlund. Review of docentships: Vehkalahti, Salminen, Väänänen
Review of scientific papers	253	Journals mentioned under editorials tasks and more
Research visits to/from international research institutes or universities	25	Queensland University of Technology, Australia, University of Texas, Houston, University of Leiden, University of Amsterdam, RIVM; etc.

Table 8.2 Summary table of committee memberships, coordination and proceedings with public health impact

Public health output	N	Comments
Articles and reviews in non peer-review journals	70	Includes, e.g., Kansanterveyslehti, PROMO, national and local press
TV and radio interviews	39	About half nationally covering, half local
Health education material, websites, information databases	3	Material for the GOAL functional capacity intervention: goal setting video, playing cards, and introduction video to GOAL
Membership in international committees with public health impact	10	EU: Tackling inequalities in health program 2000-2002; Working party on information on lifestyle and specific subpopulations 2004-;Steering group for health interview studies 2006; Steering group for EU action plan for drugs 2006-2010; Technical Group for health interview surveys 2007-; etc.
Membership in domestic committees with public health impact	26	Committees of Ministry of Social Affairs and Health and Ministry of Education, several committees of NGO's including Finnis Centre of Health Promotion, Finnish Heart Association and others
Coordination and/or implementation of development projects	8	GOAL Regional Program for Primary Prevention; GOAL Functional Capacity Program; Lifestyle related programs to NGO's
Coordination of public health networks		
Organization of international training with public health impact	3	The Goal Teaching Seminars
Organization of domestic training with public health impact	11	Relevant university courses, Training for professional development in GOAL program

9 NUTRITION UNIT

9.1 Research and public health significance of the area

Nutrition plays an important role in the aetiology of chronic diseases. In the past, nutrition research in KTL was focused on lipids, blood pressure and cardiovascular diseases, then it was expanded to cancers and during the last ten years the focus has shifted to obesity, diabetes, allergies, carbohydrate metabolism, and children. Nutrition plays an important role in many large epidemiological studies in KTL and only a fraction of nutrition-related research is carried out in the Nutrition Unit. The Nutrition Unit was formed in 2001 when the

three units within the Department of Nutrition, the Nutrition Epidemiology Unit, The ATBC Study and the Biomarker laboratory were separated. The close cooperation with the Cancer Prevention Unit (The ATBC Study) has continued, and the Biomarker Laboratory is still responsible for the analyses of the main nutritional biomarkers.

The Nutrition Unit has the following main functions: It maintains the National Food Composition database Fineli and its on-line website, monitors the diet and nutrition among adults, maintains and updates dietary assessment methods for all studies carried out in KTL, conducts research on nutrition and health together with other Units and Departments, and functions as a pool of nutrition experts for the ministries, NGOs and the public health sector. Thus the Unit is the centre of expertise in the field of nutrition in KTL. However, all its research is carried out in close cooperation with epidemiologists, chemists, behavioural scientists etc. from other units.

9.2 The main scientific achievements

9.2.1 National Food Composition database, FINELI

The aim of this project is to maintain and develop the National Food Composition database and methodological tools for dietary assessment. During the last ten years, the structures of databases and methodological tools have been developed remarkably. The Windows-based software for dietary intake calculation and for the management of food composition databases have been developed and tools for estimating the portion sizes have been modified during these years. The dietary intake calculation software has been applied in over 20 nutritional studies at KTL, but also in collaboration studies at the University of Helsinki and the University of Tampere. The basis of dietary intake calculations is the regularly updated food composition database Fineli, which is constantly developed in order to meet international standards for a high quality database. The whole content of the Fineli database covers 3000 food items, 500 dietary supplements and 300 nutrients or dietary components. Bioactive substances, like plant sterols and phenolic compounds, are the latest inputs into the database. Scientific articles on the food composition database have been published about the usability of food composition data on the internet and the accuracy of portion size estimation.

9.2.2 FINDIET Surveys

The Unit monitors the diet and nutrition in the adult population in Finland mainly by carrying out FINDIET studies every five years among 25-64-year old men and women in connection with the FINRISK Surveys. The latest Findiet 2002 and 2007 studies involved about 2000 subjects and covered five different areas in Finland. The diet was assessed by the computerized 48-hour recall method and several biomarkers of diet were assessed from blood (e.g. folate) and urine (e.g. sodium). These surveys serve as the main tool to monitor the Finnish diet and the nutritional status of adults, for nutrition policy, for risk assessment and many other purposes. The analyses of FINDIET 2002 included e.g. identification of snacking pat-

tern among adults, the intake and sources of fats, salt and sugar, the use of dietary supplements and the use of functional foods. The series of surveys carried out at five-year intervals have also shown the trends in the Finnish diet.

9.2.3 Monitoring nutritional status

During the years 1997-2002 in connection with the FINRISK/FINDIET 1997 and FINRISK/FINDIET 2002 Surveys, blood and 24h-urine samples were collected in subpopulations mainly in the capital area, but also in south-western, eastern and northern Finland. The nutrients in focus have been: Vitamin D, Vitamin C, folates (and homocysteine), B12, iron, sodium and iodine. Analyses of the main dietary sources of the nutrients were obtained from the dietary surveys. The biomarker analyses were carried out mainly at KTL (Biochemical and Biomarker Laboratories) and partly in collaboration with the University of Helsinki and other national and foreign laboratories. The low vitamin D status measured in winter in Finland has been followed by increases in vitamin D fortification levels and the variety of fortified foods. The prevalence of anaemia as well as inadequate folate, iron and iodine status have all been found to be low.

9.2.4 Nutritional Risk Assessment

The aim of the Nutritional Risk Assessment Project is to investigate the impact of food fortification and dietary supplement use on the risk of too low or too high vitamin and mineral intake. The other aim is to study how well the food fortification is targeted - i.e. is it possible to diminish the proportion of those with low vitamin and mineral intakes by optimal food fortification without increasing the proportion of those with too high intakes. The Nutritional Risk Assessment Project produces information for the risk management of dietary supplements and food fortification in the Finnish Food Safety Authority Evira. The project was launched in 2003. Since then the project has developed probabilistic and other methods for nutrient and contaminant intake and a model for optimal food fortification. FINDIET 2002 and an Internet-based survey on the use of fortified foods have been used as the databases. We have modelled vitamin D, calcium, and group B vitamin intake from natural sources, dietary supplements and fortified foods in the adult population. Similar risk assessment has been started among children. We are also a partner in an EU project (Beneris) that develops a benefit-risk analysis for food based on iterative value-of-information approach (www.beneris.eu). The tasks of the Nutrition Unit in Beneris include to provide data on the food consumption and nutrient intake among Finnish adults and children and to develop a simulation method for contaminant intake estimation.

9.2.5 Health Indicator Maps

Effective visual tools for illustrating population and geographical differences are useful for monitoring purposes. The Health Indicator Maps project produces maps on consumption of foods considered as dietary indicators of health (e.g. fruit and vegetables) and other nutritional indicators of health (e.g. saturated fat and sodium intake, BMI). The maps illustrate

the status and geographical differences of these health indicators very effectively. Data were collected in the Health 2000 Study and the FINRISK 1997 and 2002 Studies. Food and nutrient intake and risk factor levels were estimated using a Bayesian conditional autoregressive model. The quality of the diet was evaluated with five dietary indicators of health: consumption of vegetables and fruit, whole grain bread (rye) and fish as well as intake of saturated fatty acids and salt. The diet was evaluated to be best in the capital area and in Eastern Finland. Energy intake and BMI were smaller in cities compared with other areas. The proportion of the population with abdominal obesity was highest in Western and Eastern Finland. The report (summary and names of the maps in Swedish and English) and maps are available on the Internet (www.ktl.fi). The usefulness of the maps was confirmed by an evaluation carried out by an Internet questionnaire sent to decision makers and other professionals in the health sector.

9.2.6 Dietary assessment in epidemiological studies

A self-administrative semi-quantitative food frequency questionnaire (FFQ) was developed for the Kuopio Breast Cancer Study from the longer questionnaire of the ATBC Study. The FFQ was designed to assess the participant's entire diet during the year before diagnosis. It included about 120 food items, mixed dishes and alcoholic beverages. Since the Kuopio Breast Cancer Study, the FFQ has been our key research method in epidemiological studies. The FFQ has been updated for the Health 2000 Survey, the Helsinki Birth Study and the Fishermen Study (called FFQ2000) and again for the SOKRAS/DILGOM Study (FFQ2007). When developing the food list and portion sizes in the most recent FFQs we have used the information from the National FINDIET Surveys. The innovation of the FFQ2007 is to have the portion sizes separately for both genders. The FFQ2007 will also be used in the National Diabetes Programme Dehko and in the Cardiovascular Risk in Young Finns Study (LASERI-Study).

The FFQ and the FFQ2000 have been validated against diet records. The FFQs were found to be reasonably good methods for epidemiological research. The FFQ2007 will be validated in the future.

To study the diet of pregnant and lactating women in our aetiological studies on type 1 diabetes and allergic diseases and asthma, we have developed and validated a 181-item food frequency questionnaire and a software program connecting it to food and nutrient databases. This FFQ has also been validated.

9.2.7 Kuopio Breast Cancer Study

The Kuopio Breast Cancer Study was a cooperative project conducted by the University of Kuopio, Kuopio University Hospital and the National Public Health Institute. The participants included all women who were referred to Kuopio University Hospital for breast examination between 1990 and 1995. The project started as a case-control study, but all breast cancer cases could be followed up because of their annual visits to the same hospital. The focus was on risk and protective factors for breast cancer, pathogenesis, diagnosis at an early

stage of disease, estimation of prognosis, and improvement in treatment. The diet part concentrated on the associations between dietary factors, body-size indicators, and risk of breast cancer. The results showed that maintenance of normal body size throughout lifetime and avoidance of high abdominal fat and body fat percent decreased the risk of breast cancer. High intake of fatty acids such as n-3 and n-6 polyunsaturated fatty acids that are generally considered healthy, certain vitamins, and the consumption of oil were also related to decreased risk of breast cancer. On the other hand, women do not need to be worried about 1-3 alcohol drinks per week. The results were widely published in the media.

9.2.8 Childhood nutrition, type 1 diabetes and allergic diseases

Allergic diseases and asthma as well as type 1 diabetes are among the most common childhood chronic diseases. The incidence of these diseases is steadily increasing. Type 1 diabetes is in Finland more common than anywhere else in the world and its incidence is increasing especially among very young children. The national and international birth cohort and intervention studies in which we collaborate provide unique possibilities to assess prenatal and early postnatal dietary determinants of these important childhood diseases.

We take part in several national and international multicentre cohort studies and randomized clinical trials. The national Type 1 Diabetes Prediction and Prevention Study (DIPP) is a birth cohort of genetically high-risk individuals who are followed for signs of beta-cell autoimmunity (pre-type 1 diabetes), viral infections, growth and nutrition at 3 to 12 month intervals. Over 7500 children have been invited to the DIPP Nutrition study between 1996 and 2004 and will be followed up to the age of 15 years. The diet of the mothers during pregnancy and lactation is studied by a validated food frequency questionnaire and that of the children with repeated 3-day food records and structured questionnaires. Vitamin E, cholesterol, carotenoids and fatty acids are measured from serum samples. Allergy, asthma and atopy endpoints are measured by a validated international ISAAC questionnaire and by measuring specific IgE antibodies at the age of 5 years. Along the increase in the endpoints, the DIPP Nutrition and Allergy studies are coming to a rapid publication phase, the main results are yet to come.

The hypothesis for the Trial to Reduce IDDM in the Genetically at Risk (TRIGR) is that weaning to an extensively hydrolysed infant formula will decrease the incidence of type 1 diabetes, as it does in all relevant animal models for the disease. TRIGR is the first nutritional primary prevention study of type 1 diabetes in the world, carried out in 78 clinical centres in 15 countries. In TRIGR a highly hydrolysed infant formula is compared to a normal cow's milk based one according to a double-blind randomized protocol. In KTL, we are responsible for the dietary intervention and the follow-up of dietary compliance in the whole TRIGR. A total 2162 children who have increased genetic risk for type 1 diabetes and at least one first degree relative with type 1 diabetes have been recruited to TRIGR between 2002 and 2006. These children will be followed up to the age of 10 years. The study achieved, as planned, an 80% power for the detection of a 40% intervention-induced difference in the development of type 1 diabetes-associated autoantibodies and subsequent diabetes.

As there are large cultural differences in infant feeding and in food habits during childhood, it can be fruitful to study several populations at the same time. We participate in an international consortium on the role of environmental factors in the development of childhood type 1 diabetes (The Environmental Determinants of Diabetes in Young, TEDDY Study), the recruitment of this cohort study started in autumn 2004 in four countries and seven centres and will end in 2008. Our aim is to recruit 7000 children with increased genetic risk for type 1 diabetes altogether. The children are followed at 3 to 6 month intervals up to the age of 15 years. The nutrition of the children is followed by 24 hour recalls and repeated 3-day food records as well as with several biomarkers (serum, blood cells, toenails). The comparison of food databases and food and nutrient intakes across the four countries is challenging.

9.2.9 Glycemic Load, Metabolism and Health (ELSA)

Globally, both obesity and type 2 diabetes are increasing in epidemic proportions. This unsatisfactory development is assumed to be mainly due to excess energy intake compared to energy expenditure. The hypothesis, that this development could partly be related to dietary macronutrient, especially carbohydrate quality and quantity, is insufficiently documented. Certain carbohydrates may have unfavourable effects on glucose and insulin metabolism leading to increased hunger and decreased insulin sensitivity and other altered metabolic states with the development of abdominal obesity, increased risk of metabolic syndrome and ultimately type 2 diabetes, coronary heart disease and possibly also other chronic disease states. The aim of the Glycemic Load, Metabolism and Health (ELSA) project is to assess epidemiologically associations of dietary carbohydrate quality, especially glycemic load (GL), glycemic index (GI) and fibre intake, with the insulin-like growth factor (IGF) system, inflammatory and satiety markers, and with risk of obesity, body composition, type 2 diabetes, and coronary heart disease in several large study cohorts (e.g. ATBC Study, Helsinki Birth Cohort Study). The effects of the glycemic quality of carbohydrates on serum responses of glucose, insulin, lipids and satiety markers as well as the IGF-system are studied among normal and overweight subjects in postprandial settings. In addition, it is studied, whether serum markers of glucose and insulin and related metabolism, and obesity-related genes interact with the association between GL/GI and the risk of chronic diseases. To enable the epidemiologic analyses, GI databases for the dietary intake datasets are compiled. Since 2004 seven postprandial sub-studies of the ELSA project have been carried out. These studies have also provided the GI data of some 40 Finnish foods and food combinations that are important carbohydrate sources in the diet. Additional GI data for the GI databases have been obtained from international published sources. The ELSA GI laboratory participated in the international interlaboratory testing between 28 centres, organized by the University of Toronto, Canada.

9.2.10 School Intervention Project

There is growing concern about nutrition in children and adolescents in Finland. Overweight and obesity in children has increased as well as the consumption of beverages and fast food. The Finnish Innovation Fund started a Food and Nutrition Programme and one of the activities it is funding is a school intervention programme among 13-year olds. The main aim is to study the diet of adolescents and to make a dietary intervention during one school year. Altogether 12 schools in three cities participate in this project. There are over 1400 7th graders in these schools. In the baseline survey in Spring 2007 the students and their parents were asked to fill in a questionnaire on dietary habits and lifestyles. The measurements at school included body anthropometry, a dental checkup and a 48-hour dietary interview on 40% of the students. After the baseline survey the schools were randomized into intervention or control schools, equally many in each city. Intensive intervention during the next school year includes efforts to improve the school meals and snacks, involve the teachers, students and parents in various activities aiming at increasing their awareness and knowledge of good nutrition as well as skills to make changes. The follow-up survey will be carried out in Spring 2008. This project is done in cooperation with the Department of Dental Health in the University of Oulu, the Finnish Heart Association, the Bread Information Center as well as several food companies.

Table 9.1 Summary of main scientific achievements during 1997-2007.

Scientific output	N	Comments
Original articles and reviews in international peer-review journals	210	
Original articles and reviews in domestic peer-review journals	20	
Textbooks and chapters in textbooks, reports and proceedings	40	
Theses doctors	9	Erkkola M, Hyppönen E, Kilkkinen A, Lahti-Koski M, Maleta K, Männistö S, Stumpf K, Roos E, Ylönen K
Theses, masters'	20	Mostly in corporation with the Department of Applied Chemistry and Microbiology/Nutrition, the University of Helsinki
Organization of scientific meetings and conferences	25	Symposium on berries in cancer prevention 2004 Lahti, International Conference on Polyphenols 2006 Canada, Diabetes and Nutrition Study Group of the European Association for the Study of Diabetes 2007 Kuopio, World Diabetes Prevention Congress 2008 Helsinki, two symposia annually of the Finnish Society for Nutrition Research (1997-2007) Helsinki Kuopio and Turku
Presidencies and memberships in other scientific committees	15	Academy of Finland/ Research Council for Health, Scientific Council of IARC, TRIGR International Executive Committee, Chair of TRIGR Nutritional Intervention Committee, Co-chair of TEDDY Diet Committee, Doctoral Programming of Public Health Graduate School, EuroFIR Scientific Management Board, EuroFIR Covering Council, Chair of the Finnish Society for Nutrition Research, ABS Graduate School
Invited lectures and chairmanships in international meetings	5-10 annually	
Lectures in domestic scientific meetings	10–15 annually	
Editorial tasks in international peer-review journals	3	Public Health Nutrition, Nutrition Metabolism and Cardiovascular Diseases, Scandinavian Journal of Nutrition
Opponent of dissertation	2	S Männistö Finland, I Milder Netherlands
Supervision of dissertations	30	
Review of PhD thesis, evaluation of docentship	14	
Review of scientific papers	About 20 annually	Eur J Cancer, Public Health Nutr, Eur J Clin Nutr, J Food Compos Anal, CEBP, Scand J Nutr, NMCD
Research visits to/from international research institutes or universities	9	Fred Hutchinson Cancer Research Center, Harvard School of Public Health,ISTMA/INSERM, London School of Hygiene and Tropical Medicine, WHO Geneva, University of Sydney

9.3 The main public health activities and achievements

The Nutrition Unit has the responsibility of detecting trends and signs of alarming changes in the Finnish diet. The most important tool for this is the FINDIET surveys.

In Finland, systematic work to decrease sodium intake in the population has been going on since the late 1970s. We have monitored the situation in two ways: calculating sodium intake from diet and analysing sodium from 24-hour urines collected on subsamples of the FINRISK Study participants. We have documented and published a 20% decrease and shown from the dietary calculations the main sources and changes in them. The major sources of salt are mainly manufactured foods, particularly bread and meat products. The share of salt used at home has decreased with the increased consumption of processed foods in general.

The diet of Finnish adults is still based on the main meals (breakfast, lunch and dinner) and on average the energy is derived from the main meals. However, the group of people who have a varying meal pattern is increasing. In FINDIET 2002 it was observed that one fifth of men and one fourth of women obtained energy mainly from snacks. The snack-dominating meal pattern was energy-dense and contained more sugar, but less fibre, minerals and vitamins than the average diet.

Because of the low vitamin D status measured repeatedly in winter in Finland, vitamin D fortification levels in milks and fats have been increased and there is a variety of fortified foods available on the market. The effects of the new Vitamin D fortification programme launched in 2003 have been monitored in part by using the FINRISK/FINDIET data. Finland has not started large-scale folate fortification of foods, because a low prevalence of inadequate plasma folate levels has been found in the monitoring areas. However, monitoring is still needed in the future, and the national Nutrition Council is currently discussing potential folate fortification. Iodine monitoring is warranted because of the decrease in salt and milk intake and because food industry uses mostly non-iodized salt in food processing. Old iodine sources have partly been replaced by new ones, e.g. cheese. The iodine question is currently under discussion and a more systematic monitoring system for iodine should be established.

Tools for collecting and processing dietary data, like software, databases and data collection methods, are constantly developed at the Nutrition Unit. The in-house software for entering dietary records and converting food consumption to nutrient intakes has been applied in 20 nutritional studies at KTL, and also in collaboration studies at the University of Helsinki and the University of Tampere. The multi-lingual website of the Fineli food composition database (www.fineli.fi) was launched in 1999 and has currently over 3000 visitors daily from lay to professional users. The usability of the site has been analysed and used for further development of the food composition database. The website also has a simple tool, called 'Food Basket', for nutrient intake calculations. The website has reached its target audience according to the survey among professional users. The feedback from users is evaluated yearly and used in the development of the system.

The Nutritional Risk Assessment Project has produced information on the risks and benefits of food fortification and use of dietary supplements for the risk management. In the project it has been found out that food fortification has no risk of overdose in vitamin D and most of the group B vitamins. However, there is a risk of overdose in some group B vitamins (pyridoxine, folic acid) due to dietary supplement use. Also calcium fortification and dietary supplement use confers a risk of overdose, because calcium intake on average is very high in Finland. On the other hand, food fortification and dietary supplement use were found to decrease significantly the proportion of the population with low vitamin and mineral intake - especially for vitamin D, calcium and folate. With the developed model for optimal food fortification it is possible to find a fortification level for vitamins and minerals where the intake of the whole population is between the recommended intake and the tolerable upper intake level in the whole EU. The EU Commission has already shown its interest in the model. In addition, a product diary (corresponding food records) has been developed to collect brand level consumption data on fortified foods and for other food chemical exposure assessment. Risk communication through articles in non-scientific and scientific journals, and TV and radio interviews has increased the awareness of the nutritional risks and benefits of food fortification and dietary supplement use.

Deeper understanding obtained through the ELSA project of the physiological and metabolic responses of frequently consumed important carbohydrate sources alone, in combination with other foods and as part of dietary patterns in the Finnish diet, is expected to provide important detailed knowledge on dietary carbohydrate sources, which may be associated with the risk of overweight, and especially the metabolic syndrome and related abdominal obesity, and chronic diseases. From a public health point of view, the project is of large importance for preventive measures of type 2 diabetes and its co-morbidities.

Finding dietary means to prevent chronic childhood diseases (type 1 diabetes, asthma, allergic diseases) would be of major impact. These aetiological studies also provide important descriptive information on nutrition of infants, young children and pregnant and lactating mothers. The previous nutritional data of these vulnerable population groups is scarce in Finland. We are currently doing a report on the nutrition of Finnish young children (0-6 years). Our expertise in infant and childhood nutrition is also used in the planning of health monitoring of Finnish children and adolescents.

Table 9.1 Summary table of committee memberships, coordination and proceedings with public health impact.

Public health output	N	Comments
Articles and reviews in non-peer-review journals	10–15 annually	
TV and radio interviews	10–15 annually	
Other media contacts	100 annually	
Websites, information databases	3	Fineli website (www.fineli.fi), Nutrition website of KTL, Fineli Food Composition database
Membership in international committees with public health impact	8	EU Projects: EURODIET, EFCOSUM, VENUS, PHYTOHEALTH; Nordic projects: NORBAGREEN Nordic Council of Ministers: Nordic working group for nutrition and toxicology
Membership in domestic committees with public health impact	20	National Nutrition Council (Ministry of Agriculture and Forestry), Advisory Committee on Foodstuffs (Ministry of Trade and Industry), Novel Food Committee (Ministry of Trade and Industry), Support committee for Breastfeeding, NGOs: Finnish Heart Association, Finnish Diabetes Association, Central Union for the Welfare of the Aged
Coordination and/or implementation of development projects	1	Fineli 2000
Organization of international training with public health impact	5	Centre for International Mobility (CIMO) Winter School on Nutrition and Epidemiology, International Postgraduate Programme in Epidemiology University of Tampere, Board of the European Nutrition Leadership Programme, Eurofir training course, International course on production and use of food composition data in nutrition
Lectures, in universities	About 50 annually	Over a hundred/year currently Universities of Helsinki, Tampere, Kuopio
Lectures, for health care personnel	20–30 annually	

9.4 Funding for research and public health programmes

The Unit`s work is largely funded by external resources. From the Unit's over 30 persons 5.3 persons are funded by KTL´s regular budget. The main sources of funding are the Ministry of Social Affairs and Health and the Ministry of Agriculture and Forestry, the Academy of Finland, The Finnish Innovation Fund, Research Foundations, the EU's Framework Programmes and the graduate schools which provide the salary currently for several doctoral students.

The Nutrition Unit has not been able to get funding for the analyses of food composition. The Unit has built a consortium with five national food laboratories and made several applications without almost any financial result. The new food composition data have been produced for plant sterols and phenolic compounds which are standing for the interest of new components. Updating analyses have been carried out for minerals and trace elements in vegetable products only. Thus no interest for regular repeating of food analyses for basic composition has existed. Resources for analytical work of food composition are definitely needed and this is the fundamental question for Fineli in the future years.

Monitoring nutritional status was started ten years ago by short-term funding from the Ministry of Social Affairs and Health. Resources for this area have been very limited and sporadic all these years and have not enabled long-term strategic planning of this part of monitoring. It is to be hoped that now that both folates and iodine are under discussion in the National Nutrition Council, some type of monitoring system could be established and regular funding for that arranged from the Ministry of Social Affairs and Health.

Our international studies on the aetiology of type 1 diabetes, TRIGR and TEDDY, have been primarily funded by the National Institutes of Health (US). DIPP Nutrition and Allergy studies have been totally dependent on relatively small and varying funding by Finnish private foundations and the Academy of Finland.

9.5 Personnel

During the past 10-year time period, the number of employees in the Nutrition Unit has grown from over 10 persons in the old Unit of Nutritional Epidemiology to more than 30. Currently, there are two professors (one only 30% of her time), senior researchers, and 10 researchers conducting doctoral studies. In addition, we have nutritionists, statisticians, data managers and M.Sc. students as research assistants. Dr Virtanen`s team joined us in 2001 and has then expanded from a few persons to more than ten. The other teams within the Unit are currently the Fineli team, the ELSA team, the School Project team and the Risk Assessment team. The FINDIET project involves periodically the majority of the personnel.

The current key senior researchers are:

Prof. Pirjo Pietinen, Head of Unit: School Project, FINDIET, Nutritional risk assessment, ATBC Prof. Suvi Virtanen (only 30%, 70% in the University of Tampere as the professor of

epidemiology): Studies on childhood nutrition and on the role of nutrition in the development of chronic childhood diseases (type 1 diabetes, allergic diseases and asthma) (TRIGR, DIPP nutrition and Allergy studies, TEDDY)
Adjunct Prof. Liisa Valsta: Quality of macronutrients, metabolism and health (e.g. ELSA; Dilgom), FINDIET, Nutritional status monitoring, Nutritional risk assessment Project
Adjunct Prof. Marja-Leena Ovaskainen: Dietary assessment and food composition data
Dr Tero Hirvonen: Nutritional Risk Assessment Project, FINDIET
M.Sc: Heikki Pakkala: Development of database systems for dietary and composition data
M.Sc. Heli Reinivuo: Fineli food composition database, methodological tools

9.6 Collaboration

The Nutrition Unit works in close collaboration with many of the other units within the Department, particularly with the Chronic Disease Epidemiology Unit (FINRISK and Dilgom Studies), the Cancer Prevention Unit (ATBC Study), the Diabetes Unit (Helsinki Birth Cohort Study), the Health Promotion Unit (the school intervention study), the Chronic Disease Prevention Unit (LATE Children Health Behaviour) and within the Department of Health and Functional Capacity the Biomarker Laboratory (nutritional status monitoring), the Laboratory of Analytical Biochemistry (analytical collaboration). The large cohort studies need updates of their dietary databases concerning new dietary factors such as the GI or bioactive compounds and new analyses of the relationships between these compounds and risk of diseases are done in collaboration.

In 1997-2006, the Nutrition Unit has participated in several European and Nordic projects focusing on method development, the estimation of dietary status and the harmonisation of procedures. This collaboration has strengthened and expanded the networks of the Nutrition Unit as well as made the expertise of the Unit known to other European centres.
Projects related to the quality of the European diet: Intake of Trans Fatty Acids in Western Europe, the TRANSFAIR Study (G. van Poppel); Nutrition & Diet for Healthy Lifestyles in Europe, EURODIET Project (A. Kafatos); Consumption of vegetables, potatoes, fruit, bread, and fish in the Nordic and the Baltic counties, NORBAGREEN (L.Valsta), Benefit and Risk Analysis, BENERIS (JT. Tuomisto).
Projects related to method development, harmonization of dietary assessment tools and procedures: Food Consumption and Food Composition Data, COST Action 99 (C. West), European Food Consumption Survey Method, EFCOSUM (J.H. Brussaard, M. Löwik), Scientific Co-operation on Questions relating to Food, SCOOP (M. Gibney), European Food Information Resource Network, EuroFIR (P. Finglas).
Projects related to bioactive compounds and their health effects: Dietary Exposure to Phytoestrogens and Related Compounds and Their Effects on Skeletal Tissues, VENUS (F.Branca), Improving Health Through Dietary Phytoestrogens: A Pan-European Network on Consumers' Issues and Opportunities for Producers, PHYTOHEALTH (F. Branca).

We have collaboration with the Division of Nutrition and the Division of Food Chemistry in the University of Helsinki, the Department of Clinical Nutrition and Food and Health Research Centre in the University of Kuopio, the School of Public Health in the University of Tampere,

the Department of Dental Health in the University of Oulu, the Finnish Food Safety Authority Evira, the Social Insurance Institute and the MTT Agrifood Research Center.

In the area of childhood nutrition and type 1 diabetes we have large national and international collaborative networks through the DIPP, TEDDY and TRIGR studies. The principle investigators of the DIPP study are professors Jorma Ilonen (University of Kuopio), Mikael Knip (University of Helsinki) and Olli Simell (University of Turku), those of TEDDY professors Jeff Krischer (University of South Florida) and Marian Rewers (University of Colorado Health Sciences Center), and that of TRIGR professor Hans K. Åkerblom (University of Helsinki). In DIPP Nutrition study we collaborate with Professor Michael G. Kenward (London School of Hygiene and Tropical Medicine) in the field of longitudinal data analysis and multiple imputation methods. In addition Dr Virtanen's group collaborates with Prof. Outi Vaarala (National Public Health Institute) in studies related to nutrition and T-cell mediated immune responses, with Prof. Mirja Salkinoja-Salonen and Dr Merja Roivainen in studies on the effects of food-derived toxins on beta-cell growth, with Prof. Juha Pekkanen in studies on the effects of fetal and childhood nutrition on T-cell mediated immune responses and on the development of allergic diseases, and with Prof. Leif Group on the significance of dietary factors in the development of insulin resistance.

9.7 Proposal for future work and expected benefits

The Unit actively promotes the maintaining of the Fineli food composition database, collects updated content data in collaboration and tries to build a consortium covering all the scientific users of the compositional data. The Unit will stay up-to-date on dietary assessment methodologies, expand diet monitoring to children and adolescents, and continue and expand nutritional risk assessment. It will strengthen its role as a focal point of expertise in nutritional epidemiology and public health nutrition and continue to offer graduate students excellent databases for doctoral work.

Our collaborative studies in the field of aetiology of type 1 diabetes are among the hallmark studies in their areas in the world. TRIGR is the first dietary randomized trial in the primary prevention of type 1 diabetes. Within the coming 10 years it will answer whether feeding a highly hydrolysed infant formula as a weaning food instead of a conventional infant formula prevents type 1 diabetes. The DIPP study and its nutrition component represents the largest cohort in the field of aetiologic research of type 1 diabetes in the world both in terms of the numbers of subjects recruited and followed and in terms of nutritional measurements done. The number of endpoints of beta-cell autoimmunity (pre-type 1 diabetes) in the DIPP study is larger than in any of those few other cohorts that include measurements of infant and childhood diet. The TEDDY study will be the largest international natural history study of type 1 diabetes. In these large cohorts, hypotheses related to other important childhood outcomes, e.g., allergic diseases, asthma and obesity, can also be raised

The ELSA Project will continue both the epidemiologic analyses related to weight change and obesity, type 2 diabetes, cardiovascular and other chronic diseases, and metabolic response studies, as well as to some extent GI testing of certain special food groups. In the

coming years the focus is to be broadened to also include interactions of dietary macronutrient (e.g. carbohydrate) quality and human intestinal microbiota and associations with metabolic markers and risk of obesity and chronic diseases. The experimental methodology is planned to be expanded from postprandial studies to also include dietary interventions in this study area. The increased expertise in the area of glycemic and insulinemic responses of Finnish foods will most probably lead to increased collaborative applications with other research groups in the area.

The School Project will hopefully have a successful intervention which can serve as a model for all schools nationwide. In addition, its baseline survey is a pilot for future, regular surveys of FINRISK type among children. Hopefully the monitoring system will eventually be built and provide data on children´s diets systematically.

The Nutritional Risk Assessment Project will probably expand from vitamins and minerals to all food chemical (contaminants, food additives, pesticide residues) exposure assessment. This work will be done in co-operation with the Finnish Food Safety Authority and by their co-ordination.

The EuroFIR network interacts with all activities of Food Composition Databases, like Fineli. Harmonized methods improve data quality and boost international cooperation e.g. with data compilation and production of common tools. Moreover, this gives new opportunities for multinational research and a breeding ground for innovative ways of presenting and connecting nutrition information with daily life.

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10 CANCER PREVENTION UNIT

10.1 Research and public health significance of the area

The Cancer Prevention Unit was established in 1994. It was first located in the Department of Nutrition and since 2001 in the current department, the Department of Health Promotion and Chronic Disease Prevention. The Unit was a continuation to the Alpha-Tocopherol, Beta-Carotene Cancer Prevention (ATBC) Study, a randomized, double-blind, placebo-controlled, primary-prevention trial undertaken to determine whether supplementation with alpha-tocopherol, beta-carotene, or both would reduce the incidence of lung cancer and other cancers in 29,133 male smokers. The trial was carried out in 1985-1993 and its main results were published in the New England Journal of Medicine in April 1994.

The main research of the Unit has focused on provision of interventional and epidemiological data on chronic diseases with major public health significance, particularly on cancer and cardiovascular disease. The Unit has exploited the extensive exposure data collected during the trial such as background characteristics, medical, smoking, physical activity and dietary histories as well as biological samples (serum, whole blood, toenails). In addition, the Unit has regularly updated the endpoint data from the Finnish Cancer Registry (FCR), the Hospital Discharge Register, and the Register of Causes of Death. All cancer cases identified through FCR up to April 1999 have been reviewed for cancer diagnosis and extension by collecting hospital records and review by one or two study physicians. Comparing the reviewed ATBC data with the original FCR data showed that FCR data are a reliable source of information for follow-up of cancer incidence but the delay in case notification should be taken into consideration. Thus, the Unit has used only FCR data for cancer follow-up since May 1999 and reviewed the data from hospital records only for specific subgroups as for cancer cases without any histological or cytological verification.

The ATBC Study is a collaborative project between the National Public Health Institute (KTL) and the U.S. National Cancer Institute (NCI). Accordingly NCI collaborators have focused on cancer-related analyses and reports whereas the KTL researchers have focused more on non-cancer endpoints. However, all NCI ATBC-related activities are based on the checked and updated data provided by the Unit. In recent years the ATBC Study has joined many international research consortia to increase the number of endpoints and thus the power to study risks between exposures and endpoints.

When the trial ended, the main emphasis was to analyse and report the intervention effects of alpha-tocopherol and beta-carotene on specific cancers and cardiovascular diseases. At the same time, cohort studies to examine the association between risk factors and endpoints increased in number. In recent years the whole blood samples have been exploited to study the association between the genetic markers and lifestyle factors and their interactions, and end-

points. The Unit has also analysed and reported the 6-year postintervention effects of alpha-tocopherol and beta-carotene on cancer, coronary heart disease, and stroke.

The Cancer Prevention Unit has collaborated with many Departments and Units of KTL during the last 10 years. The Unit has continued close collaboration with the Nutrition Unit during the whole 10-year evaluation period; the Head of the Nutrition Unit, prof. Pirjo Pietinen, is the Co-Principal Investigator of the ATBC Study, and many researchers of the Nutrition Unit have exploited data and samples from the ATBC Study in their research. Currently, the most extensive collaboration with the Nutrition Unit is through the Glycemic Load and Health (ELSA) project that assesses carbohydrate's glycemic indexes and loads. This project also involves examination of the association between glycemic variables, and the risk of type 2 diabetes and coronary heart disease in the ATBC men.

10.2 The main scientific achievements

Intervention-related findings of the ATBC Study

The ATBC Study was the first prevention trial to show that supplemental beta-carotene increases the risk of lung cancer in smokers. This was against the expectations raised by several epidemiological cohort studies that had found an inverse association between serum beta-carotene concentration and the risk of lung cancer. The increased risk appeared approximately 4 years after starting beta-carotene supplementation and in the 6-year postintervention follow-up it disappeared within a similar timeframe after stopping the supplementation. The effect of supplemental beta-carotene was studied also on other cancers, i.e. head and neck, gastric, colorectal, pancreatic, renal cell, urothelial, and prostate cancer, but no significant effect on these cancers was evident.

Supplementation with alpha-tocopherol reduced the incidence of prostate cancer by 34%, with the preventive effect observed approximately 18 months after the start of intervention. The effect attenuated during the 6-year post-trial follow-up, but a nonsignificant 12% decrease in the risk was still evident during the follow-up. The mechanism through which alpha-tocopherol could influence the prostate carcinogenesis is unclear. We found that alpha-tocopherol supplementation reduced serum androgen concentrations and serum vascular endothelial growth factor (VEGF) levels, which might have contributed to the observed reduction in prostate cancer risk. Supplementation with alpha-tocopherol had no significant effect on the incidence of other cancers.

We have also studied the effect of supplemental alpha-tocopherol and beta-carotene on cardiovascular endpoints. During the intervention period, beta-carotene seemed to increase coronary mortality among those who reported a history of myocardial infarction (MI) at baseline, whereas among those without a history beta-carotene had no effect on the risk of major coronary events (non-fatal MI and coronary death). During the 6-year postintervention follow-up beta-carotene supplementation seemed to increase the risk of first-ever non-fatal MI, whereas it had no effect on the risk of major coronary events in men with a history of MI at

baseline. Thus the effect of beta-carotene on coronary heart disease risk remained unclear. Alpha-tocopherol supplementation had no significant effects on the major coronary endpoints.

Alpha-tocopherol supplementation decreased the risk of cerebral infarction but increased that of fatal haemorrhagic strokes. During the 6-year postintervention follow-up these effects disappeared. Supplemental beta-carotene had no preventive effect on strokes but the risk of intracerebral haemorrhage was increased.

Neither alpha-tocopherol nor beta-carotene supplementation had an effect on the symptoms or incidence of intermittent claudication. Neither did the supplements have an effect on the end-of-trial prevalences of cataracts or age-related maculopathy.

Cohort-related findings in the ATBC Study

Lung cancer: Consumption of vegetables and fruits associated with lower risk of lung cancer. An interesting finding reported repeatedly also by other studies is that dietary beta-carotene did not associate with the risk of lung cancer whereas serum beta-carotene had an inverse association, the multivariate relative risk = 0.81, 95% confidence level 0.69-0.95, highest versus lowest quintile. A new finding was that markers suggesting chronic Chlamydia pneumoniae infection were positively associated with the incidence of lung cancer.

Prostate cancer: New risk factors for prostate cancer were searched for in many analyses but neither serum factors of one-carbon metabolism, serum insulin-like growth factor I, nor serum enterolactone associated with the risk of prostate cancer.

Stomach cancer: H. pylori was a strong risk factor for noncardia gastric cancer (OR = 7.9, 95% CI 3.0-20.9) whereas it was inversely associated with the risk of gastric cardia cancer (OR = 0.31, 95% CI 0.11-0.89). Polymorphisms in inflammation-related genes were not associated with the risk of gastric cancer.

Colorectal cancer: Of the dietary factors, high consumption of milk products and high intake of calcium were inversely associated with risk of colorectal cancer. The cluster of indicators for metabolic syndrome (hypertension and overweight and low HDL cholesterol) associated with the risk of colorectal cancer as well as high levels of serum glucose, insulin, and insulin resistance. Another interesting finding was that chronic low-grade inflammation assessed by C-reactive protein measurement was a marker for increased risk of colorectal cancer.

Pancreas cancer: Dietary and serum folate associated inversely with the risk of pancreas cancer whereas the other factors of one-carbon metabolism had no consistent association. Indicators of abnormal glucose metabolism, i.e. high baseline fasting concentrations of glucose, insulin, and insulin resistance were positively associated with pancreatic cancer. Serum concentrations of insulin-like growth factor I and insulin-like growth factor binding protein 3 were not associated with the risk of pancreatic cancer. A novel finding was that H. pylori infection increased the risk of pancreatic cancer two-fold.

Total mortality: Although alpha-tocopherol supplementation did not influence the total mortality, baseline serum alpha-tocopherol concentration associated inversely with total mortality, RR 0.82, 95% CI 0.78-0.86, highest vs lowest quintile.

Stroke: High serum total cholesterol had a protective association with the risk of intracerebral haemorrhage. Serum total cholesterol was not associated with risk of cerebral infarction whereas HDL cholesterol had an inverse association with the risk. The associations between alcohol consumption and the different strokes were non-uniform, linear in subarachnoid haemorrhage, U-shaped in intracerebral haemorrhage, and J-shaped in cerebral infarction.

A summary of the Unit's scientific output is presented in Table 10.1

Table 10.1 Summary of main scientific outputs of the Cancer Prevention Unit during 1997-2006

Scientific output	**N**	**Comments**
Original articles and reviews in international peer-review journals	170	This is the total number of papers published from the ATBC Study material from 1997 through June 2007.
Original articles and reviews in domestic peer-review journals	10	
Textbooks and chapters in textbooks, reports and proceedings	10	
Theses	8	Rapola J, Haukka J, Leppälä J, Korhonen P, Malila N, Törnwall M, Hirvonen T, Hemilä H
Invited lectures and chairmanships in international meetings	10	
Lectures in domestic scientific meetings	20	
Supervision of dissertations	9	4 ongoing
Review of PhD thesis, evaluation of docentship	3	
Review of scientific papers	Several annually	
Research visits to/from international research institutes or universities	4	

10.3 The main public health activities and achievements

The Unit is not involved in any direct public health activities but it frequently provides expert opinions on major chronic diseases, their risk factors and prevention for various mass media. A summary of the Unit's public health output is presented in Table 10.2

Table 10.2. Summary of output with public health impact of the Cancer Prevention Unit during 1997-2006.

Public health output	N	Comments
Articles and reviews in non-peer-review journals	10	
TV, radio and newspaper interviews	Several annually	
Membership in domestic committees with public health impact	3	

10.4 Funding for research and public health programmes

The ATBC Study has been supported by the U.S. National Cancer Institute; a contract for the period from September 1994 through March 2003 amounting to USD 3 906 593 and from April 2003 through March 2008 amounting to USD 3 612 910. Negotiations with NCI are in progress for a new contract after March 2008.

10.5 Personnel

The number of employees in the Unit has varied from 7 to 12 during the last ten years. Currently, one professor, one senior researcher, one researcher conducting doctoral studies, and four other people (biostatistician, data manager, and research assistants) are employed by the Unit.

The current key senior researchers are:
Jarmo Virtamo, MD, PhD, research professor, Head of the Unit
Satu Männistö, MSc, PhD, senior researcher. Works 20% for the Unit. Nutrition and obesity

10.6 National and international collaboration

National

The ATBC Study has collaborated with many institutions such as Departments of Public Health, Oncology, Medicine, and Surgery, and the Institute of Dentistry in the University of Helsinki, and the Finnish Institute of Occupational Health. The Study also collaborates closely with the Finnish Cancer Registry to retrieve data on new cancer cases. At the moment the study is involved in a project of many partners led by the Department of Bacteriology and Immunology, University of Helsinki, to study the association between H. pylori eradication and subsequent risk of gastric cancer.

International

The MORGAM project, coordinated by the International Cardiovascular Disease Epidemiology Unit of KTL, aims to determine in a prospective setting whether variation in genes, either by itself or in combination with lifestyle, is a significant predictor of incident coronary heart disease, stroke, or total mortality. Since the end-of-trial collection of the whole blood sample, the placebo group of the ATBC Study (n = 5073)has been involved in the MORGAM Project for the follow-up of coronary heart disease and stroke.

A lot of international collaboration takes place with the NCI collaborators. Currently most collaboration is with Demetrius Albanes, M.D.; Philip Taylor M.D., Sc.D.; Stephanie Weinstein, Ph.D.; Rachael Stolzenberg-Solomon, Ph.D.; Farin Kamangar, M.D., Ph.D; and Unhee Lim, Ph.D. Through NCI collaborators there is also much further collaboration with other U.S. scientists outside NCI.

DIETSCAN, coordinated by TNO Nutrition and Food Research, Zeist, Netherlands, was an EU-supported project to develop and apply a common methodologic approach to study dietary patterns and cancer in 4 European cohorts.

The Pooling Project of Prospective Studies of Diet and Cancer, coordinated by Harvard School of Public Health, aims to examine associations between dietary factors and cancer through combining data of up to 27 prospective studies.

The Pooling Project of Cohort Studies on Diet and Coronary Disease, coordinated by the Harvard School of Public Health, aims to examine associations between dietary factors and major coronary heart disease events by pooling the primary data of up to 11 major cohort studies.

Cancer Control using Population-based Registries and Biobanks is a network of European cancer registries and biobanks coordinated by the Department of Medical Microbiology, Lund University, Sweden. The network aims at using the samples of the biobanks in large-scale cancer research searching for genetic and infectious causes to cancer.

The National Cancer Institute Breast and Prostate Cancer Cohort Consortium includes nine large cohort studies. The goal of the consortium is to characterize variations in approximately 50 genes that mediate two pathways that are associated with breast and prostate cancer - the steroid-hormone metabolism pathway and the insulin-like growth factor signalling pathway - and to associate these variations with cancer risk.

The Pancreatic Cancer Cohort Consortium (PanScan), funded by NCI, involves 12 prospective epidemiological cohorts and 1 case-control study to conduct whole genome scans of common genetic variants in order to identify markers of susceptibility to pancreatic cancer.

In addition, the ATBC Study is participating in two large consortia applying for funds to start their research:

The Genetics of Vulnerability to Nicotine Addiction project, coordinated by Washington University, to identify genetic predictors of long-term persistent smoking; and the European Cancer Cohort Consortium for Gene, Environment and Metabolism Studies, coordinated by Imperial College London and IARC, Lyon, to investigate genetic predisposition, environmental, lifestyle, and metabolic factors and their complex interactions in the development of the common cancers.

10.7 Proposal for future work and expected benefits

To continue the postintervention follow-up for cancer and cardiovascular disease to disclose possible late effects of supplemental alpha-tocopherol and beta-carotene on these endpoints

To continue collaboration with current large-scale consortia and possibly join new ones to exploit the ATBC Study material in a more powerful entity which allows the study of associations of exposure and endpoint data also in smaller subgroups

To study new endpoints from the ATBC Study material. Currently we have completed the assessment of incident diabetes cases diagnosed through 1997 and are analysing the effects of supplemental antioxidants on the risk of diabetes as well as examining the associations between a large number of risk factors and diabetes. Dementia is a disease whose incidence is increasing strongly. The ATBC Study material could also be exploited in the study of risk factors for dementia but this activity is dependent on finding the necessary manpower and funding.

10.8 Main publications

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11 CHRONIC DISEASE PREVENTION UNIT

11.1 Research and public health significance of the area

The Chronic Disease Prevention Unit was established in 2001. Several already ongoing projects related to chronic disease prevention were relocated to this new unit. The first new activity was the centralization of tobacco control, as tobacco activities had been scattered in other units and departments. The Unit carries out research, monitoring and expert activities related to chronic diseases, their risk factors and prevention. Equity in health over the life course and international comparisons are common themes in the research projects. By actively participating in international cooperation, the Unit transfers Finnish expertise in chronic disease prevention and monitoring to other countries and brings new ideas and views from abroad to Finnish prevention activities. The main areas of activity are: health, lifestyles and inequalities, tobacco control and research, healthy ageing and international health promotion.

11.1.1 Health lifestyles and inequalities

Unhealthy behaviours are important risk factors for several chronic diseases. Knowledge of factors influencing health behaviours is a prerequisite for effective interventions and policies to improve public health. The projects within the area "health, lifestyles and inequalities" include, in addition to research, expert functions of public health. The goal is to produce scientific knowledge on health behaviours and their determinants and to distribute up-to-date knowledge to public health experts and decision makers. As unhealthy behaviours and chronic diseases are unequally distributed among population groups, the activities of the area focus on socio-demographic differences in health behaviours and on their changes over time. Other relevant themes are interactions between the various domains of health behaviour and the contribution of health behaviours to socio-economic inequalities in mortality.

11.1.2 Tobacco control and research

Tobacco use is a major public health threat causing about 2 million premature deaths in Europe annually and it is a strong determinant of socio-economic differences in morbidity and mortality. In Finland, every fifth adult and every third 16-year-old is a daily smoker. Prevalence of tobacco use depends on three processes: 1) initiation rate at adolescence, 2) maintenance since adolescence and early adulthood and 3) smoking cessation and mortality in adulthood. In order to influence smoking behaviour, all three processes need to be covered both at population and at individual level. The basis for preventing tobacco use has been legislative measures, health education and providing aid for smoking cessation. Research has provided feedback from legislative processes, provided grounds for treatment and actions and showed new areas of public health and further research. However, smoking has become more socially discriminating, which requires new views, approaches and tools for successful tobacco use prevention and cessation treatment. The National Public Health Institute KTL is a national centre of tobacco studies with wide collaboration with universities and research institutes and has an obligation to implement research into policy and practice. In 2001 the tobacco control group built a network within KTL and nationally. The network consists of research communities and different levels of professionals working with tobacco or participating in tobacco control. For these purposes, a KTL strategy of tobacco control and research was produced. Research areas and activities are divided into three entities: smoking prevention, tobacco control (including monitoring tobacco use and diseases), tobacco use prevention and tobacco dependency and cessation. More details from www.ktl.fi/tobaccocontrol.

11.1.3 Healthy ageing

Because of the worldwide ageing phenomenon of the population, the functional capacity and cognition of the elderly population has increasing public health relevance. Research on health and functional capacity among the ageing population is done in several projects in collaboration with national and international partners. Large population-based surveys in KTL enable the aetiological research on functional capacity especially on cognition and memory and their association with cardiovascular disease risk factors.

11.1.4 International health promotion

The Unit is involved in several international research projects and health promotion programmes and networks. It works in close collaboration especially with the WHO Regional Office for Europe and with the European Union in chronic disease prevention activities and health promotion. The Department of Health Promotion and Chronic Disease Prevention is a WHO Collaborating Centre for Noncommunicable Disease Prevention, Health Promotion and Monitoring. The Chronic Disease Prevention Unit mainly coordinates the joint activities.

Research and health promotion collaboration is most active with the Baltic countries and neighbouring areas in Russia. One of the main objectives in collaboration is to develop health monitoring systems and utilization of health research data in disease prevention

planning. Data gathered in health surveys are also used for epidemiological research on prevalence and aetiology of chronic diseases. Planning and implementation of chronic disease prevention interventions, training and other expert functions are also an important part of collaboration.

11.2 The main scientific achievements

11.2.1 Health lifestyles and inequalities

The first research projects of the group "Health Lifestyles and Inequalities" focused on food habits and on the interactions between smoking, food habits, alcohol consumption and physical activity. Lately, more attention has been paid to physical activity, because physical activity and food habits are equally important for the prevention of obesity. The food studies have been dealing with areas not fully covered by other units of KTL. Due to the increasing public health relevance of health inequalities, the scope of research on health behaviours has been broadened. The current research focuses on the contribution of health behaviour and psychological distress to socio-economic differences in mortality.

11.2.2 Interrelationships among health behaviours (1995-2002)

Previous research was concentrated on one or two health behaviours at a time. Therefore, studies on the associations between smoking, alcohol consumption, physical activity and food habits were initiated. It was assumed that while few people behave consistently in a healthy or unhealthy way, health behaviours are not independent of each other. Furthermore, it was assumed that health behaviours are closely linked with various socio-demographic factors. The project focused on risk behaviours rather than on health-promoting behaviours. The goal of the project was to obtain a comprehensive account of the associations among the daily health behaviours.

The data consisted of men and women participating in postal surveys conducted annually among a random sample of Finnish adults since 1978. Smoking played a primary role in determining the associations between and co-occurrence of health behaviours. As smoking also predicted other unhealthy behaviours, smoking could act as a behaviour that promotes the adoption or inhibits the abandonment of other healthy behaviours. Hence, intervening in smoking, we could possibly hope for favourable side-effects in other behaviours. In future research and health promotion, special attention should be paid to the association between smoking and other health behaviours.

11.2.3 Behavioural and psychosocial determinants of health inequalities (1998-)

In all European countries low socio-economic position is associated with poor health and short life expectancy. In Finland socio-economic differences in mortality have increased during the last decades.
This project consists of several consecutive studies initiated in 1998. A larger study on be-

havioural and psychosocial determinants of health inequalities was launched in 2003. A sub-study focusing on the various domains of physical activity was started in 2006. The project will examine the associations of occupation, education and income with health behaviours and psychosocial factors and their contribution to the socio-economic mortality differentials. The overall goal of the project is to search for potential entry points to interventions and policies to reduce health inequalities. The project is based on the assumption that socio-economic position has a causal effect on health through specific behavioural and psychosocial determinants.

The study design combines repeated cross-sectional surveys with a mortality follow-up (over 20 years) of cohorts invited to the surveys in 1978-2002. The Finnish survey data have been linked with socio-economic and mortality data from two registers. The Finnish health behaviour and socio-economic data will be used in the comparative study of over 20 European countries. The surveys include questions on health behaviours (e.g. smoking, alcohol consumption, food habits, physical activity) and psychosocial factors (e.g. depressiveness, family status). Physical activity has been assessed by questionnaires and recalls, including questions on occupational, leisure-time, and commuting physical activity, as well as self-rated physical fitness and energy expenditure.

Sociodemographic differences in psychological distress exist but the strength and direction of the association depends on the measurements used. People from higher socio-economic groups have healthier behaviours. Educational level is the most important determinant of most health behaviours. However, income and occupation have independent effects on physical activity and the use of fresh vegetables. The socio-economic patterns of health behaviours are relatively stable over time, with the exception of vegetables. The most significant health behaviours contributing to socio-economic differences in all-cause and cardiovascular mortality are smoking, physical activity and the use of fresh vegetables.

The decreasing socio-economic differences in the use of vegetables, at the same time as vegetable consumption is increasing in the population, is one of the few cases demonstrating that socio-economic differences in health or its determinants can diminish. For future mortality differentials, the direction in which socioeconomic differences in health behaviours develop is of crucial importance.

11.2.4 Comparing health behaviours in Estonia, Finland, Latvia and Lithuania - Finbalt Health Monitor (1994-)

The Baltic countries share public health problems typical of most Eastern European transition economies: morbidity and mortality from non-communicable diseases is higher than in Western European countries. This situation has many similarities with Finland of the late 1960s. Health disadvantage may be increasing among the less advantaged population groups in the Baltic countries. The Finbalt Health Monitor is a system for monitoring health-related behaviour, practices and lifestyles in Finland and in the Baltic countries. The collaborative work has been carried out since 1994. The Finbalt Health Monitor has both practical and theoretical goals. In terms of research the goal is to compare changes and variations in health behaviours and their social determinants in the four countries.

The data consist of similar cross-sectional postal surveys conducted every second year on adult populations in Estonia, Latvia, Lithuania and Finland since 1994. Perceived health is

worse in the Baltic countries than in Finland. Poor health is associated with older age and lower education in all countries studied. The educational inequalities in health remained stable over time from 1994 to 2004. In the Baltic countries, however, improvement in perceived health was mainly found among the better educated. Food habits have changed in a healthier direction in all the countries, especially in the Baltic countries, where the use of vegetables and vegetable oil has increased remarkably. Women in higher educational groups make healthier food choices than men in lower educational groups. Daily smoking is associated with lower education in all countries. Among Lithuanian women, the educational gradient in smoking was weakest, and the overall prevalence of smoking increased over time.
The Baltic countries resemble Western European countries rather than other transition societies. While health inequalities have not markedly changed and substantial inequalities do remain, there are indications of favourable developments mainly among the better educated. Pressures towards increasing health inequalities may therefore be visible in the future.

11.2.5 Food habits, meal patterns and eating outside home (1995-)

A common trait to the food research of the group is the interest in food patterns and their social determinants. The study objects include meals and foods relevant for public health (e.g. dietary fats, vegetables).

Disparities in Food Habits in Europe (1997-2003)

The Disparities project reviewed, on the basis of existing studies and reports, socio-economic differences in food habits in 15 European countries. The underlying hypothesis was that socio-economic status affects the healthiness of the diet. The aim of the project was to provide a comprehensive overview of existing data sources on socio-economic differences in food habits in Europe in 1985-1997, and to give a description of the similarities and differences in the patterns of food-related disparities. There were data available on socio-economic differences in food consumption and nutrient intake, but very limited data on meal patterns. People belonging to higher social classes tended to have healthier diets. Those with higher education with the exception of the South consumed more vegetables and fruits and less fats and oils. However, they also ate more cheese. The socioeconomic differences in food consumption were not homogenous across Europe. The nature and magnitude of food-related disparities should be taken into account in planning food and nutrition policies and dietary interventions aimed at promoting health among underprivileged population groups.

Meal patterns and eating outside home (1995-)

Food is eaten as meals and snacks, not as single food items or nutrients. Therefore, knowledge on meal patterns is relevant for nutritional educators and health policy planners. The first meal projects, launched in the mid-90s, dealt with the definitions of the meal and other eating occasions and with the association of daily meal patterns with food consumption and nutrient intake. In Finland there is a long tradition of eating at a staff canteen which may be related to women's participation in the workforce. Frequent consumption of foods prepared outside home can lead to unhealthy diets. However, staff canteens can improve employees' diets by offering servings that are balanced according to dietary guidelines. The project "Eating patterns during working hours among Finnish adults" was launched in 2002. The project will explain variation between population groups in eating patterns by socio-demographic factors (education, family status, place of residence) and working conditions. The prevalence of staff canteen use in 1979-2001 and associations between canteen use and quality of diet will be assessed.

The data derive from repeated cross-sectional surveys collected by the National Public Health Institute and the Institute for Occupational Health. The Finnish habit of having a mid-day lunch at the canteen of one's respective workplace has resisted major changes in working and living conditions and social structures during the past two decades. Socio-demographic differences in the use of staff canteen have remained stable. The use of staff canteen is largely determined by the size of workplace and by the employee's education: staff canteens are used more often at large workplaces and in higher educational groups. The analyses suggest that lunches eaten at the workplace canteen can improve the nutrient quality of the diet.

11.2.6 Tobacco use, prevention and cessation

The main tobacco research areas in KTL are: tobacco use and diseases, tobacco use prevention and tobacco dependency and cessation. KTL monitors tobacco dependency and use among adults at the national level, carries out several risk assessment and mortality studies on tobacco-related diseases, e.g. smoking as independent risk factor of diabetes, and studies the differences in tobacco use (both smoked and snuff) between Finland and Sweden. The aim has been to respond to the current tobacco control needs. Vulnerable groups have been identified and specific studies directed at these groups (e.g. pregnancy period, young adults). In several studies methods for prevention of smoking have been evaluated (European Smoking Prevention Framework approach, ESFA and co-morbidity prevention programme SYKE). These studies have shown that tobacco use is linked with a wide range of environmental and behavioural risk factors like poor schooling or low parental attendance. Tobacco dependency and cessation is a new area with both quantitative approaches to measure physiological, psychological and social dimensions of addiction at population level, and qualitative methods that deepen our understanding of the underlying

mechanisms of tobacco use at individual level. In addition attitudes toward smoking and cessation skills of health professionals have been studied.

Tobacco use and diseases

The tobacco research group widely utilizes the existing data sources that include data on smoking and addiction, e.g. the National FINRISK Study, the Health Behaviour among Finnish Adult Population Study and the Health 2000 Study. Tobacco use has marginalised and tobacco has become more of an indicator as well as an independent risk factor for diseases like diabetes or depression. For instance, in diabetes, smoking had a graded association with the risk of type 2 diabetes, and it remained significant after controlling for age and major risk factors. The adjusted hazard ratio was 1.22 (95% CI 1.04-1.43) among men smoking less than 20 cigarettes per day and 1.57 (1.34-1.84) among men smoking 20 or more cigarettes per day. Tobacco use is more common among people with lower socioeconomic status. There are also specific groups of interest. Athletes do not smoke and they serve as role models for children and adolescents on healthy lifestyles. However, in the mid-1990´s the use of snuff became popular in certain sports and seemed to spread within sports. There became a need to assess tobacco use more widely. The Health 2000 study gave an opportunity to compare the tobacco use of athletes to that of a population-based sample of young adults. Snuff use was reported by 24.6% of the athletes (9.6% daily and 15.0% occasionally) and 3.7% of the controls (1.8% and 1.9%). Currently we are exploring the phase of young adulthood in respect of tobacco use, which is often neglected. Specific interest areas are psychosocial stress and its association to smoking. Another link to new threats, like snuff use, has been collaboration with the Swedish Public Health Institute to compare tobacco use between these two countries. This study shows that in Sweden, a new group of tobacco users has formed, never-smoking males using snuff, which underlines the importance of comprehensive tobacco control, not just a smoking policy. Tobacco can affect health throughout the life span. Vulnerable groups include children, and parental smoking is the major source of environmental tobacco smoke for children of all ages. Understanding processes underlying parental smoking during the child´s growth will form a ground for preventive actions. There are two ongoing studies on the environmental exposure of children in Finland.

Tobacco use prevention

The first adolescents' smoking prevention programme was carried out in North Karelia in the 1970´s with six schools participating. This two-year school and community-based smoking prevention programme had a significant effect on smoking between intervention and control groups. The 8-year follow-up results showed that at the age of 21 youths in the intervention group still smoked less compared to the control group. In 1997 the three-year smoking prevention programme European Smoking Framework Approach (ESFA) was implemented in 27 secondary schools in the Helsinki area (13 as intervention and 14 as control groups). The community-element of the programme included participation of parents, parish confirmation camps and dentists. Among baseline never-smokers, the programme had a significant effect on the onset of weekly smoking in the intervention group [OR=0.63 (0.45-0.90) p=0.009]

when compared to the control group. The third preventive programme concentrated on the known link between childhood mental disorders and smoking. SYKE was a school-based childhood life skills developing and problem solving programme based on a programme called FRIENDS, which is about preventing childhood anxiety and depression through the application of firm cognitive behavioural principles and the building of emotional resilience. This programme was implemented in three primary schools in the Helsinki area between 2006 and 2007. The programme fit well into Finnish schools. Based on students' feedback, results showed that students learnt to recognize feelings and problem solving skills.

Tobacco dependency and cessation

Tobacco use is a dependence syndrome constituting of physiological, psychological and social components. The addictive substance in tobacco, nicotine, changes the structure of the central nervous system and initiates synaptic and cellular changes that underlie the motivational and behavioural alterations that culminate in addiction. Conditioned learning, social and psychosocial factors contribute to the formation and maintenance of tobacco addiction connected with nicotine addiction. Psychological addiction develops slowly as the smoker starts to use tobacco for coping in emotionally difficult situations and as a reward from work or stressful events. The components of addiction interact and mediate with each other throughout the life course. In the National FINRISK 2007 Study, we have had a separate, specific questionnaire for smokers and quitters (n=3500) with questions on tobacco and nicotine dependency, and internationally recognised instruments for assessing various aspects of tobacco dependency (e.g. NDSS, HONC). These will be validated for use in Finland. Along with this, a qualitative study of tobacco addiction with 70 interviews will study the interpretations of smoking, addiction and their health effects among smokers and ex-smokers, with special interest in smoking-related pleasures during the life course.

Cessation services are currently located within the health care system. The quality and content of the services have not been studied in Finland and therefore it was necessary to carry out multiprofessional research within health professions to locate the blockades for providing cessation and assess the need for new tools. Smoking prevalence among Finnish physicians is very low and the attitudes towards smoking are surprisingly neutral and the practical skills needed in order to encourage and help smokers to quit is lacking to a surprisingly high degree. Currently a new sample of working physicians and nurses is under analysis. Tobacco dependency and cessation studies aim at the development of tools for both smokers and professionals. Therefore it is necessary to understand the underlying mechanisms of smoking and treatment of tobacco dependency.

11.2.7 Healthy ageing

Because of the worldwide ageing phenomenon of the population, Alzheimer's disease (AD) and other illnesses decreasing the functional capacity of the elderly have increasing public health relevance. Until recently, there have been no strategies available for e.g. the prevention of AD. Definition of modifiable risk factors for impaired functional capacity and devel-

opment of effective prevention models are needed. Recent projects concentrate on the association between cardiovascular risk factors at midlife, and dementia and Alzheimer's disease at late life, the aetiology of cardiovascular disease among women and the health and functional capacity of war veterans.

Cardiovascular risk factors, Aging and Dementia (CAIDE) (1998-)

The CAIDE study examines the role of environmental factors from midlife to old age together with genetic factors on the development of cognitive impairment and Alzheimer's disease, and sheds some light on the pathophysiological processes leading to dementia. The ultimate goal of this research project is to find modifiable risk factors for Alzheimer's disease and to open new avenues for its prevention.

The CAIDE study is a large, longitudinal, population-based study investigating the role of vascular, lifestyle, and genetic factors in the development of dementia/Alzheimer's disease and mild cognitive impairment (MCI). Since the baseline assessments of vascular risk factors and health behaviour in 1972-1992, two follow-up studies have been carried out. The CAIDE study is one of the very few studies in the world having a large and representative population-based cohort including both males and females, a long follow-up time, and measurements of several risk factors and health-related outcomes from midlife and late-life.

The CAIDE study has shown that high systolic blood pressure and high serum total cholesterol at midlife are significant risk factors for late-life Alzheimer's disease. Our recent findings indicate that midlife obesity, high cholesterol, and systolic blood pressure were all significant risk factors for dementia with ORs of around 2 for each factor, and they increased the risk additively (OR 6.2 for the combination). We have also recently reported that persons participating in leisure-time physical activity at least twice a week at midlife had a 50% lower risk for dementia and a 60% lower risk for AD compared to the sedentary persons.

Based on the risk factors that are found to be significantly associated with the risk of dementia, a composite dementia risk score was developed. The risk score is similar to existing cardiovascular or diabetes risk scores. The aim is to provide a tool for estimating the risk of dementia for an individual, and thereby also to increase the awareness of what can be done in terms of prevention of Alzheimer's disease/dementia. The research is a scientific collaboration between KTL and the University of Kuopio from Finland and Karolinska Institutet from Sweden and funded by the Academy of Finland, the American Alzheimer Association, the University of Kuopio, Karolinska Institutet and KTL.

Ageing Women in Eastern Finland (ITSYT) study (1992-)

Due to the lack of knowledge about cardiovascular health and related health behaviour among ageing women in the 1990's, the project started to examine the development of lifestyle-related biological and behavioural risk factors of cardiovascular health among ageing women. The 10, 12 and 20 year follow-up examinations of a cohort of 50 to 60 year old women, who participated in the FINRISK Study in 1972, have included comprehensive assessments of health behaviour and biological risk factors, and most recently also mental, physical and social capacity. The recent results show that the metabolic syndrome increased

from 13% to 46 % among 60 to 70 year old women in 12 year follow-up, and the increase in carotid intima-media thickness was two times greater in those who developed metabolic syndrome. Furthermore, even a slight (0-1mg/l) increment in serum high sensitivity C-reactive protein level was associated with an increased (4.5 fold higher) risk of developing metabolic syndrome. The focus of future analysis is on functional capacity and nutrition. The study has contributed to the knowledge on the determinants of cardiovascular health on ageing women. However, more research is needed on the factors influencing female ageing. The project has been carried out in collaboration with the National Public Health Institute, the Kuopio Research Institute of Exercise Medicine and the University of Kuopio.

FINE-study in collaboration with the SEVEN COUNTRIES and the EAST-WEST studies (1984-)

Two cohorts of Finnish men born in 1900-1919 were included in the Seven Countries Study, which started in the late 1950's. The Study demonstrated the link between dietary-related serum total cholesterol and coronary heart disease. The follow-up of the original Seven Countries Study is still continuing. The regular follow-up of the Finnish cohorts (the EAST-WEST study) has been organized since 1959, and the results have been widely reported in scientific journals. The FINE study (Finnish, Italian and the Netherlands Elderly Study) started in the late 1980's in collaboration with the three countries. The aim was to find the lifestyle and biological factors, collected in the framework of the Seven Countries Study at middle-age, that predict cardiovascular health and functional capacity at old age. The results from the pooled data show e.g. differences in coronary heart disease and in physical, mental and social capacities between men born in different parts of Europe. Along the ageing of the men the focus of the analysis has changed towards older age. The FINE study has been part of the European HALE project in the late 1990's.

The Veteran Project

In 1992, a survey on Finnish war veterans initiated by the Ministry of Social Affairs and Health was carried out. The aim was to collect information on war veterans' living conditions, health, use of health and rehabilitation services and their additional service needs. The survey was linked to a development project where the aim was to find those veterans whose rehabilitation, social and health services were inadequate and to inform the local authorities in municipalities about their needs. The Veteran Project was continued in 2004 when a follow-up survey was conducted among a randomly selected sub-sample of veterans. The follow-up study showed that the health, functional capacity and living conditions of war veterans had improved.

11.2.8 Chronic disease risk factors and prevention

Cardiovascular disease risk factors and related health behaviour in the Republic of Karelia, Russia (1991-)

The border between Finland and Russia marks one of the sharpest differences in living standards and also in health in the world. Before the break-up of the Soviet Union, the Republic of Karelia in Russia was a very isolated area. Non-communicable diseases (NCD) and especially cardiovascular diseases (CVD) represent the major health burden in the area. In 1991, collaboration on NCD prevention between the Republic of Karelia and Finland was started. One of the main aims in the collaboration was to build up an internationally comparable health monitoring system to serve the needs of health promotion and health policy planning in the republic. Survey activities are carried out in the selected demonstration area, the Pitkäranta district, aiming at a monitoring system in the whole republic later. In addition to policy and health promotion purposes, the collected data have been actively used for epidemiological research.

Risk factor surveys conducted in Pitkäranta in 1992, 1997, 2002 and 2007 have followed the WHO MONICA protocol and later the new recommendations of the European Health Risk Monitoring project. According to the population surveys in Pitkäranta, the cardiovascular risk factor levels in the area are high, i.e. about 65 % of men were daily smokers, more than 50 % of population could be regarded as hypertensives and 12 % of men and 34 % of women could be regarded as obese (BMI > 30 kg/m2) with no real improvement in the situation in ten year follow-up.

Health behaviour surveys following the idea of the Finnish Health Behaviour among Adult Population Survey were carried out in Pitkäranta in 1994, 1996, 1998, 2000 and 2004. Surveys were conducted by mailed self-administered questionnaire. In the Pitkäranta region, some unfavourable trends in health behaviour can be observed. Smoking among women is increasing, total physical activity is decreasing and obesity rates are increasing.

Similar risk factor and health behaviour surveys have also been carried out among the youth in Pitkäranta in 1995 and 2004. Surveys show that the biological cardiovascular risk factor levels are not yet very high, but some unfavourable trends are seen in health behaviours. For example, smoking among girls has doubled from 7% to 15% in Pitkäranta in ten years and alcohol consumption has increased both among boys and girls.

Karelian asthma and allergy survey (1997-)

An intense search has been going on to find factors responsible for the asthma and atopy epidemic in Western societies. Saprophytic bacteria in the gut and environment might play a crucial role in immunomodulation in early life. Not only viable microbes but also nonviable microbial components, such as LPS, peptidoglycan, and bacterial DNA, are recognized by the innate immune system, leading to immune responses that might have immunomodulatory potential. In affluent Western societies characterized by living in apartment houses in environments heavily covered with asphalt, exposure to such micro-organisms has been dramatically reduced. In 1998, we carried out a study among adults in the province of North

Karelia, Finland, and in the Pitkäranta district, the Republic of Karelia, Russia, to examine the occurrence of atopy and atopic disease. These areas are geographically adjacent but differ fundamentally in living conditions. We found significant differences between the Finns and the Russians in the occurrence of asthma and atopy. In Finland 34.3% and in Russia 23.3% of the study population was atopic ($p<0.001$). Also, the association between markers of infections and occurrence of atopy was investigated, revealing that H. pylori alone can explain 32% of the difference in atopy between the countries.

The study was continued in 2003 by surveying 7-15 year old children and their mothers to examine the occurrence of atopy and atopic disease. We wanted to examine whether any signs of increasing prevalence of atopy, a proxy for westernization, are discernible in the Republic of Karelia, Russia, by assessing generational differences in atopy prevalence. In children a 4-fold higher risk for atopy (positive prick test result) was found in Finland compared with Russia. Sensitization rates in Finland were generally higher among children compared with those of their mothers, whereas in Russia the opposite trends emerged. Parental farming in early life (<1 year) in Finland (OR 0.53; 95%CI 0.28-0.99) and in Russia (OR 0.47; 95%CI 0.22-1.03) and currently in Finland (OR 0.45; 95%CI 0.22-0.91) conferred protection against atopy. In this study, genetical analyses are also carried out, and samples of dust from households and water from main water supplies in the area (schools, wells etc.) were collected.

In 2007, the study is continued by surveying 25 to 54 year old adults in North Karelia and Pitkäranta. The survey includes a questionnaire similar to the one used in 1998 survey, blood sampling for IgE analyses and as a new component a measurement of nitrogen oxide from exhaled air. The aim of this study is to follow-up using comparable data sets the development of the prevalence of asthma and allergy in these two geographically adjacent areas with fundamental differences in living conditions and lifestyles. This study has been carried out in collaboration between the Helsinki University Skin and Allergy Hospital and the National Public Health Institute.

Table 11. 1 Summary of main scientific achievements during 1997-2006

Scientific output	N	Comments
Original articles and reviews in international peer-review journals	225	
Original articles and reviews in domestic peer-review journals	44	
Textbooks and chapters in textbooks, reports and proceedings	93	e.g. Finbalt, Quit and Win and ENYPAT reports
Theses	PhD 4 Master 8	E Roos 1998, T Laatikainen 2000, M Laaksonen 2002, M Paavola 2006 S Juka 1997, L Uusitalo 1997, E Mäkipää 1998, K Koski 2000, T Kinnunen 2001, M Kallio 2006, T Vlasoff 2001, H Konttinen 2007
Organization of scientific meetings and conferences	5	Monitoring health behaviours 2001, Research and expert meeting on Health lifestyles 2004, WCTOH pre-conference 2003, WCTOH 2003, EURONCD 2005
Presidencies and memberships in scientific committees of international meetings	7	AGEV, public health and nutrition (Berlin 1997), Global behavioural monitoring (Tuusula 2001, Uruguay 2005), WCTOH (Helsinki 2003), EURONCD (Helsinki 2005), International Association of Intellectual Disability Studies (European Conference 2006), Nordic Conference on Public Health (Östersund 2008)
Presidencies and memberships in other scientific committees	6	Finnish Physical Exercise Scientific Board, Research Advisory Board of Social Insurance Institution of Finland, Women's Research Fund, North Karelia Project Research Foundation Board, Scientific board of the Finnish Centre for Health Promotion, Executive board of the DPPH doctoral programme
Invited lectures and chairmanships in international meetings	32	e.g. Global Behavioural Monitoring (Atlanta, Noosa), WCTOH 2003, Conference of the Asia-Pacific Academic Consortium for Public Health 2004 (APACPH), Scandinavian Pulmonology Conference 2007, the European Union for School and University Health and Medicine (EUSUHM) 2007, World Congress of Behavioural and Cognitive Therapies in Barcelona 2007 (WCBCT)
Lectures in domestic scientific meetings	about 100	
Editorial tasks in international peer-review journals	2	Editorial board of the Journal of Food Service, Editorial group for the short scientific reviews in Finnish Medical Journal
Opponent of dissertation	7	6 PhD + 1 Lic Thesis
Supervision of dissertations	28	
Review of PhD thesis, evaluation of docentship or professorship	18	10 PhD theses, 6 docentships and 2 professorships
Review of scientific papers	about 100	e.g. for journals like Eur J Public Health, Appetite, Public Health Nutrition, Scand J Public Health, Nicotine & Tobacco Research, Patient Counseling. Alcohol and Alcoholism, Alcohol Clin Exp Research
Research visits to/from international research institutes or universities	6	Tiina Laatikainen, University of Deakin and University of Flinders, Australia,Marjaana Pennanen, University of Maastricht, Norbet Hirschhorn, University of Minnesota, Olanre Onibogi, Nigeria, Aida Pilav, Federal Public Health Institute of Bosnia and Herzegovina Iveta Pudule, Latvian Public Health Institute

11.3 The main public health achievements

11.3.1 Health lifestyles and inequalities

The research project "Behavioural and Psychosocial Determinants of Health Inequalities" contributes to the planning of Finnish health policies. The researchers of the group have several expert functions in the TEROKA (Reducing Socioeconomic Health Inequalities in Finland) project. TEROKA, launched in 2004, aims to increase awareness of health differences and develop measures for promoting health equality in practice. One task is to collate information for the assessment of the current state and trends in inequalities in health. TEROKA includes a partnership network that disseminates information to decision makers and other actors both at the local and the national level.

TEROKA has catalysed various activities. A memorandum prepared by TEROKA was presented to the group of ministers responsible for social policy. In 2006 the group of ministers delegated the Ministry of Social Affairs and Health preparations for a national action plan to tackle health inequalities in Finland. The national plan aims to identify the policy areas and measures required to achieve the national target to reduce socioeconomic differences in health. Representatives from several administrative sectors, local government, the health service system, NGOs and professional organisations, and health research institutes are involved in the preparation. TEROKA is also taking part in the preparation. Expertise provided by the research project on behavioural and psychosocial determinants of health inequalities is utilized in writing the corresponding chapters of the action plan.

For the public health achievements of food research and the Finbalt health monitor see "Development of Health Monitoring Systems" and "International Health Promotion".

11.3.2 Tobacco control

KTL experts are involved in many tobacco control activities and carry out various expert functions in this field. They serve as experts in policy preparations in tobacco control carried out by the Ministry of Social Affairs and Health. KTL produces annual figures indicating tobacco consumption that are available in Tobacco Statistics and Health Behaviour and Health among Finnish Adult Population and publishes Tobacco Control Report every third year. One of the key functions is also to support and provide expert help to public health organisations by passing latest research information and developing tools for health professionals and for the people.

The public health tasks for tobacco dependency and cessation are to inform the population about the health hazards of tobacco, support quitting, provide tools for the population and professionals, and support the maintenance of smoke-free life. KTL has been active in building networks to produce information channels for the population. National Quitline Stumppi and web-cessation site www.stumppi.fi have been built by the KTL tobacco group. Also, an information site has been built on the KTL web-pages and the team is actively participating in the construction of a citizen's health portal. Other activities include participation in campaigns by non-governmental organizations, developing tools for quitters and taking

part in actions promoting smoke-free adolescence. Training health professional to screen smokers who are willing to quit and then advising them properly has been one major task for tobacco control work. These items support each other and our vision is to build a seamless chain of care for those willing to try quitting.

Tobacco control work is highly international. Current WHO/ EU activities include: 1) WHO/GARD (a comprehensive approach to fight chronic respiratory diseases, where KTL is a national representative, 2) SCIII-WHO Collaborating Centre for the Epidemiology of Environment Related Diseases, where KTL acts as an expert in environmental tobacco smoke and 3) WHO/EURO, Children's Environment and Health Action Plan for Europe (CEHAPE), where expertise in environmental tobacco smoke is provided.

11.3.3 International tobacco control networks run by KTL

Tobacco control work and research demands close collaboration with European Community and EU programmes and WHO. KTL has been responsible for several international collaboration programmes.

The International Quit&Win network consisted of national coordinators representing approximately 130 countries all over the world. The network was coordinated from KTL in years 1994 - 2006. In 1994, 13 countries belonging to the WHO CINDI (Countrywide Integrated Noncommunicable Diseases Intervention Programme) network participated in the first International Quit&Win. In 1996, 25 countries and a total of 70,000 smokers participated, and in May 1998 already 48 countries and over 200,000 smokers all over the world took part in the contest. Quit&Win 2000 was the largest practical global smoking cessation campaign ever carried out with a total of 426,000 participants from 69 countries. Since then Quit&Win grew even further with the number of participants reaching 675,000 in 2002, 690,000 in 2004 and 630,000 participants from 86 countries representing all WHO regions in Quit&Win 2006. Evaluation of Quit&Win campaigns has shown Quit&Win to be a very cost effective smoking cessation method.

The European Network on Young People and Tobacco (ENYPAT) was hosted by the National Public Health Institute (KTL) during 1996-2006. ENYPAT was a network for specialists working in the area of tobacco control among youth and it aimed to prevent tobacco use by young people through Europe-wide collaboration, information exchange and programme building. It was co-funded by the Public Health Programme of the European Union. ENYPAT coordinated smoking prevention and cessation programmes concerning young people. ENYPAT programmes were interventions organized in all European Union Member States and every year more than half a million youngsters participated in them. With the programmes and research projects ENYPAT organized a one-week Spring School for public health experts six times, produced common tools and methods for tobacco control in Europe, published a bilingual newsletter, Internet site, reports and information sheets. The network had about 2,000 members.

Smoking cessation on the internet in the European Union Countries from the Public Health Programme of the European Union: "A web-based Evaluation Tool for evaluating quality of smoking cessation websites and best practices guidelines" has been run in years 2005-07. The project consisted of an overview of smoking cessation websites in the European Union area in 2005; an analysis of smoking cessation websites in some European Union countries; a web-based Evaluation Tool for evaluating quality of smoking cessation websites and best practices guidelines for identifying background, definition, justifications and high quality standards for smoking cessation websites.

11.3.4 Development of health monitoring systems

Development of Child Health Monitoring System (LATE) (2006-)

There is a lack of information on the health status of Finnish children. At the moment the development of a system to monitor health in childhood is one of the priorities in Finland. The National Public Health Institute is accomplishing the Development of Child Health Monitoring -project, which is a part of a larger project conducted by the Ministry of Social Affairs and Health. This project aims to develop a comprehensive children's health monitoring system in Finland, including data collection from child health clinics and school health care settings and separate health surveys conducted among children. The purpose of the project is to develop recommendations and practical tools for data collection. One main target of the project is to test the system of standardized data collection in different circumstances in child health clinics and school health care settings. The LATE project aims to define indicators which are important in regard to children's health and public health and are based on earlier studies of children's health, on national recommendations for child health care and school health care and on expert opinion. The National Public Health Institute will conduct a pilot study in 10 municipalities around Finland to evaluate standardized data collection in spring 2007. The purpose is to have a systematic data collection system of children's health and welfare in Finland which allows collecting comparable data over time and looking at national trends in the status of children's health.
In 2002, the government made a decision that Finland should have a nationally interoperable electronic patient data system by the end of the year 2007. Based on experiences received in the LATE pilot study, the definitions of the nationally recommended core information of children's growth and development will be made.

Development of a monitoring system of catering services (2002-)

The Finnish large-scale catering kitchens of schools, cafeterias, restaurants, old people's and children's homes, hospitals, workplaces etc. serve some 150 meals per person per year. In order to evaluate and improve the quality of the meals, the providers of catering services and the decision makers of nutrition policies have expressed the need for timely information on meals served outside the home. The project on catering services, launched in 2002, will describe the use and quality of food services provided by institutional kitchens and develop monitoring of these services. The project is based on existing data. The na-

tional health surveys chosen for secondary analyses cover age groups from school children to the elderly and include questions on meals eaten outside the home. The surveys are regularly conducted by KTL, the Finnish Institute of Occupational Health and STAKES. The ongoing project has shown that it is feasible to produce information requested by providers and planners of catering services from current health monitoring systems. Analysing and complementing the existing data with a few additional measures is a cost-effective way to serve the experts, to broaden the use of monitoring data and to create new forms of collaboration between the food and health sectors.

11.3.5 International Health Promotion

CINDI Finland (1984-)

Finland is a member state in the WHO EURO CINDI programme. The CINDI Programme (Countrywide Integrated Noncommunicable Disease Intervention) was developed in 1984. The aim of the CINDI programme is to develop and evaluate intervention strategies and methods for chronic disease prevention. Finland has been part of the CINDI network since the beginning in 1984. In Finland, the CINDI programme is coordinated in KTL in the Department of Health Promotion and Chronic Disease Prevention, which is also a WHO Collaborating Centre for Noncommunicable Disease Prevention, Health Promotion and Monitoring. The Finnish CINDI Director is Professor Erkki Vartiainen. Practical coordination of the programme is carried out in his department in the Chronic Disease Prevention Unit. The Unit coordinates several CINDI activities such as the development of a health monitoring system in CINDI countries (CINDI Health Monitor) and the International training seminar on integrated noncommunicable disease strategies and prevention (Noncommunicable Disease Seminar).

Finbalt and CINDI Health Monitor (1994-)

The Finbalt Health Monitor is a system for monitoring health behaviour and its determinants in Finland and the Baltic countries. The collaboration was initiated in the early 1990s. The Health Behaviour and Health among the Finnish Adult Population survey (AVTK) provided a model for the Baltic countries. The collaboration has promoted exchange of information between researchers and public health experts and developed a feasible and cost-effective system for monitoring health behaviours. The Finbalt data are used to provide information for health policy decisions in all the partner countries. The results contribute to the evaluation of health promotion and policies. They also increase public awareness on the national and local health situation when presented in the mass media. In addition, the data and the results are widely used in the education and training of public health experts. The Finbalt model has provoked wide interest elsewhere in Europe and also on other continents. The model has been applied for example in the CINDI project coordinated by the WHO Regional Office for Europe. The CINDI Health Monitor system is based on the Finbalt Health Monitor.

Public health collaboration in Russia (1991-)

The neighbourhood area collaboration in the area of chronic diseases was started between the National Public Health Institute and the Ministry of Health in the Republic of Karelia in 1991. The Pitkäranta district has been the special demonstration and collaboration area in the health promotion programme. Mortality and morbidity from non-communicable diseases (NCD's) and injuries are markedly higher in Russia than in Western-European countries and in the remote areas like the Republic of Karelia the situation is even worse. High NCD mortality is explained mainly by cardiovascular diseases (CVD). Injuries are the main killer among young and middle-aged adults. In addition to National Public Health Institute and the Karelian Health Ministry, the North Karelia Centre for Public Health in Finland and the Central Hospital of Pitkäranta have been the key stakeholders in the collaboration. The aims of this collaboration are to reduce chronic disease mortality and morbidity, to develop a health monitoring system (risk factors and health behaviour) and to increase the capacity of the local authorities to plan and implement preventive action and health promotion. Several research, educational and intervention activities have been organized in collaboration including risk factor surveys, health behaviour surveys, school surveys, asthma and allergy surveys, medical conferences and other training seminars and sessions, pilot interventions including for example Quit and Win smoking cessation contests and intervention in non-pharmaceutical treatment of cholesterol and hypertension. One of the recent intervention activities is an ongoing school and community-based "Together Against Substance Misuse" project (2006-2008) that aims to prevent the use of alcohol and tobacco among youth and to develop a frame of action that can be utilized in the whole republic in the future. Some of the activities are described in section 11.2.

Public Health project in Bosnia and Herzegovina (2002-2003)

A development project for capacity building, establishment of health monitoring systems and development of tobacco control strategy for the Federal Institute of Public Health in Bosnia and Herzegovina was coordinated by KTL. The project included four major components: management support, development of mortality register, establishment of health monitoring system among both adults and children and development of tobacco control strategy. Several experts from different departments in KTL, the Ministry of Health and Social Affairs and the Cancer Society collaborated in the project. During the project for example the first risk factor survey and health behaviour among school children survey were carried out. Research collaboration with the Federal Public Health Institute in BiH continues.

11.3.6 International conferences and training

The 12th World Conference on Tobacco or Health (WCTOH) and pre-conference training (2003)

The 12th World Conference on Tobacco or Health (WCTOH) took place in Helsinki, Finland, on 3-8 August 2003. The three main organisers of the conference were the National Public

Health Institute, the Cancer Society of Finland and the Finnish Centre for Health Promotion. The mission of the WCTOH 2003 was to carry on the important task of motivating and empowering advocates, policy makers, researchers and academics involved in tobacco control. KTL was responsible, among other things, for the scientific programme and organising of the pre-conference training of the 12th World Conference on Tobacco or Health for 72 students from developing countries. The programme was organised jointly by KTL and the US Public Health Service represented by the Centers for Disease Control and Prevention, the Office of Smoking and Health (CDC) and the American Cancer Society (ACS). The networking and coalition-building started prior to the training and still continues. The global FCTC treaty took important steps toward implementation. Strategic work will continue, better equipped and with new leaders in tobacco control.

As a part of the WCTOH 2003 pre-conference training, a networking meeting, "Strengthening collaboration and networking in tobacco control", for neighbouring countries (Estonia, Finland, Latvia, Lithuania, and Russia) was organized on August 7, 2003 in Helsinki, Finland and a follow-up meeting, "EU-coordination Meeting in Tobacco Control", took place on February 28, 2004, in Tallinn, Estonia. At these meetings issues like prospective strategic measures and current challenges in tobacco control were discussed. Tobacco programmes in the EU Public Health programme were introduced, as the Baltic countries were joining EU at that time. This project strengthened the close collaboration between Finland, the Baltic countries and Russia in public health with a special focus on tobacco.

Monitoring Health Behaviour - Towards Global Surveillance (2001)

The 2nd global conference on behavioural monitoring was organized in Tuusula, Finland on October 1-3, 2001. The aim of the conference was to promote global networking of researchers, public health experts and institutions, as well as to discuss theoretical and practical uses of health behaviour monitoring/surveillance systems. The conference was organised by KTL in collaboration with CDC (USA).

European NCD Conference (2006)

The conference was organised by the National Public Health Institute and held in Helsinki, Finland on 8th-10th December 2005. By reviewing the progress and experience of chronic disease prevention in the European region over the past, the conference gathered the best available knowledge on good practices, pros and cons of in-depth health impact assessment, and how to improve the use of other policies to enhance health and reduce disparities. The conference discussed the theory and practice of chronic disease prevention in the population, proposed effective strategies and actions for chronic disease prevention on different levels, contributed to the development of the new WHO European NCD strategy in 2006, and as such, provided background information for the Finnish EU presidency work on health. The Helsinki conference hosted 193 participants from 45 countries. First and foremost the audience consisted of public health experts, researchers and decision makers from around the world.

North Karelia Project and WHO CINDI network training seminars (1982-)

The North Karelia Project is a well known example of a community-based chronic disease prevention programme. The experience of the North Karelia Project has been of great interest internationally. Since 1979 training seminars called the North Karelia Project international visitors' programme have been organized twice a year to share the experiences and results of the North Karelia Project. The seminar reviews the experiences of the North Karelia Project in planning, implementation and evaluation of prevention interventions. Between 1997 and 2006 twenty training seminars were organized. In each seminar there were between 20 and 45 participants.

As part of the collaboration with the WHO/EURO office and as an activity of WHO collaborating centre WHO CINDI Winter School seminars have been organized once a year since 1997. The last seminar was organized in 2006. These training seminars have concentrated on practical aspects of chronic disease prevention, including programme planning, implementation of interventions, health policy and national and international collaboration. Training has been planned and organized by the international faculty. Between 1997 and 2006 ten one-week training seminars were organized. There were 20-45 participants in each seminar.

As the new European NCD strategy was launched in 2006, the North Karelia project visitors' programme and the WHO CINDI Winter School were reformulated into a new concept to better address the new strategy and the need for its implementation. The NCD Seminar is an international training seminar on integrated noncommunicable disease strategies and prevention. The seminar is organized yearly in collaboration with the WHO Regional Office for Europe and the North Karelia Centre for Public Health. The programme includes a three-day interactive training in the National Public Health Institute in Helsinki and a two-day site visit in North Karelia. During the first three days examples of the global, European and national NCD strategies are reviewed and theories, methods and examples of chronic disease prevention are discussed using also the North Karelia Project experiences as an example. The seminar is aimed at health authorities and health professionals working with national NCD strategies and prevention programmes. Training is given in English by international experts. This new concept was launched in January 2007 and in the future will be organized once a year.

Table 11.2 Summary table of committee memberships, coordination and proceedings with public health impact

Public health output	N	Comments
Articles and reviews in non-peer-review journals	over 50	
TV, radio, newspaper interviews	over 100	issues like smoking cessation methods, environmental tobacco smoke, health consequences of smoking, trends in cardiovascular risk factors, results from risk factor surveys, Russian health situation, food habits, health inequalities
Health education material, websites, information databases	20	www-pages of research and development projects, project handbooks, intervention manuals and materials
Membership in international committees with public health impact	11	e.g. Member of EFMA Tobacco Action Group, National Medical Associations in Europe 2006-, WHO/EURO CINDI Programme, WHO commission on social determinants of health, Nordic sub-group, 2006-, Nordic group on indicators of health monitoring
Membership in domestic committees with public health impact	about 40	e.g. Board of Finnish Health Promotion Association, Expert group for monitoring of catering services, Working Groups for Strategy and Action Plan to Tackle Health Inequalities in Finland, Working group for statute in child health clinics and school and student health care
Coordination and/or implementation of development projects	15	e.g. Finbalt Health Monitor, Monitoring of catering services, TEROKA (together with KTL/ TTO, STAKES, TTL), Development of Child Health Monitoring System, Bosnia and Herzegovina Public Health project
Coordination of public health networks	3	EU network of Web cessation, ENYPAT, International Quit and Win
Organization of international training with public health impact	47	e.g. North Karelia Project International Visitors' Programme, CINDI Winter School, ENYPAT Spring School, International Quit and Win training seminars, Training seminars for behavioural monitoring, AMNET (Americas' Network for Chronic Disease Surveillance, Honduras 2006, Mexico, 2007), Baltic collaboration network 2003-04
Organization of domestic training with public health impact	8	e.g. Global Health School, Health professionals and tobacco training seminars
Lectures and training in expert meetings, universities and polytechnics	about 250	

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11.4 Funding for research and public health programmes

Two senior posts in the Unit are funded by KTL budgetary funds. Other personnel costs are covered with external, mainly competitive funds. Some development funding from the Ministry of Health and Social Affairs is received for tobacco control and development of health monitoring activities.

The sources of funding for all research and public health programmes are presented in the table belowin table 11.3

Areas of research and public health activities	National public Health Institute Finland	Ministry of Social Affairs and Health	Ministry of Education	Ministry of Foreign Affairs	Finnish Institute of Occupational Health	Academy of Finland	European Union	WHO	Doctoral Program for Public Health	Corporate Funding	International Collaborator	Research Foundation
Health lifestyles and inequalities	X	X	X		X	X	X		X			X
Tobacco use, prevention and cessation		X					X	X		X	X	X
Healthy ageing	X	X		X		X					X	X
International research projects and health promotion	X			X		X	X	X				X

11.5 Personnel

Since the establishment of the Unit in 2001 the amount of staff has varied between 14 and 20. Most of the senior researchers working in the Unit have earlier been working in other units in the Department.

Current Staff (May 2007)
Tiina Laatikainen, MD, PhD, Adjunct professor/docent, Head of Unit, chronic disease epidemiology, health monitoring, Jan 1996-
Samu Hakala, M.Soc.Sc., statistician, March 2006-
Elina Hirvikallio, secretary, coordination of international training seminars, March 1991-

Health lifestyles and inequalities
Ritva Prättälä, PhD, Adjunct professor/docent, senior researcher, nutrition, sociology, Aug 1995-
Päivi Mäki, health education, M.Sc, specialist, March 2006-
Tomi Mäkinen, M.Soc.Sc., PhD-student, researcher, social policy, March 2006-
Laura Paalanen, M.Sc., PhD student, researcher, nutrition, Aug 2003- (on maternity leave)
Susanna Raulio, M.Sc., PhD student, researher, nutrition, Nov 2002-
Kirsi Talala, M.Soc.Sc., PhD-student, researcher, social psychology, Aug 2003-

Tobacco control and research
Kristiina Patja, MD PhD, medical specialist in health care, senior researcher, tobacco research and control, Jan 2001-
Hanne Heikkinen, M.Sc. in sociology, PhD student, researcher, Dec 2003-
Marjaana Pennanen, M. Sc. in health sciences, PhD student, researcher, adolescents smoking prevention and cessation, Oct 2003-
Patrick Sandström, BM, PhD student, researcher, health professionals and smoking cessation, Quit&Win (medical expert), Jan 2000-
Ellen Tuomaala, M.Sc. in sociology, project coordinator March 2005- Jun 2007
Sari Yrjölä, M.Sc., press officer (ETEO), ENYPAT project Manager 2004-2006

Healthy ageing
Aulikki Nissinen, MD, PhD, professor, retired, cardiovascular disease epidemiology, March 2001 (retired June 2005) (
Sinikka Äijänseppä, MD, researcher, Jan 2004- (on maternity leave)

International health promotion
Hanna Heikkilä, M.Ed., project coordinator, Feb 2007-
Miia Mannonen, project coordinator, May 2006- (on maternity leave)
Anastasiya Rogacheva, MD, PhD student, researcher, health behaviour among youth, May 2004-

11.6 National and international collaboration

One of the main features of the Chronic Disease Prevention Unit is wide national and international collaboration. As a major part of the main activities in all areas (tobacco control, health inequalities and healthy ageing) is formed by expert functions in different working groups, committees and networks, a wide spectrum of national collaboration is required. The Unit coordinates several international research projects and public health networks such as ENYPAT, Quit and Win and Finbalt, and researchers also act as active members in various networks and research teams.

11.6.1 Health lifestyles and inequalities

All the projects of the group 'Health lifestyles and inequalities' include collaboration with other Finnish research institutes or public health bodies, the most important of them being the University of Helsinki, the other health research institutes (STAKES, TTL, UKK) and the Ministry of Social Affairs and Health. The majority of the projects include a strong international component, such as comparative research between European countries. The most important international partners are the Erasmus University of Medicine (Netherlands), the Kaunas University of Medicine and the Latvian and Estonian public health institutes (previously health promotion centres), the WHO Regional Office for Europe, and the Global Network of Behavioural Monitoring. In research collaboration the Universities and research institutes have a significant role. In regard to public health activities the NGOs (e.g. the Finnish Heart Association and the Centre for Health Promotion), the Ministries and local public health actors are more important. The forms of collaboration include coordinating of and participating in projects, preparing scientific papers and collaborative reports, producing drafts for policy papers, organising national and international conferences and training seminars, serving as advisors, teaching in the universities and giving expert lectures, as well as supervising and reviewing theses.

11.6.2 Tobacco control

Research projects on tobacco use and diseases are carried out together with the Department of Public Health at the University of Turku and the Department of Mental Health and Alcohol at KTL as well as Karolinska Institutet and the Swedish Public Health Institute in Sweden. Studies on preventing tobacco use are carried out in collaboration with the Department of Social Psychology at the University of Helsinki and studies on tobacco dependency with the Department of Sociology and the Department of Public Health, University of Helsinki. Collaborators abroad include University of Edinburgh, UK, and University of Maastricht, the Netherlands.

Tobacco policy from legislative process to everyday practice is based on wide collaboration with organisations. The National Public Health Institute is an expert institute for the Ministry of Social Affairs and Health (STM) but collaborates with other ministries. There are developmental projects with municipalities, hospital districts and provinces. In public health, non-governmental organisations (NGOs) are important collaborators and we have several initia-

tives and programmes with public health NGOs and sports associations. We have developed tools for the general population which have been implemented and developed further in collaboration with NGOs, like the national Quitline and web cessation site with the Pulmonary Association Heli and an adolescence web cessation site with the Cancer Society of Finland. In smoking prevention, the smoke-free class competition has originated from KTL and is now run by the Finnish Health Association. There is long-term collaboration with sports associations. Hospital districts have announced themselves smoke-free in recent years and KTL has been supporting this development by consulting and training. There has also been collaboration with large private companies when building smoking restrictions and support systems for quitting in companies. This work has been conducted in collaboration with the Finnish Occupational Institute and pharmaceutical companies.

Tobacco-related training of health professionals is among the major tasks. In 2004, KTL initiated a collaboration project between KTL, the University of Kuopio and Savonia University of Applied Sciences in Kuopio. The project is financed by the Ministry of Health and Social Affairs. International cooperation with King Charles University, Czech republic, is ongoing, investigating international applications of the interactive internet-based smoking cessation tool for health professionals that have been developed in Finland.

KTL tobacco personnel are represented in several working bodies of the EU and WHO such as the European Network of Quitlines (ENQ), the European Forum of Medical Associations and WHO (EFMA).

11.6.3 Healthy ageing

Healthy ageing research has been done in wide collaboration with both national and international research teams and institutions. The CAIDE Study is a scientific collaboration between KTL and the University of Kuopio from Finland and Karolinska Institutet from Sweden. The ITSYT study has been carried out in collaboration with the Kuopio Research Institute of Exercise Medicine and the University of Kuopio. The FINE study has been part of the larger European HALE project with collaborators from various European countries. Research utilizing the data gathered in the Veteran Project is done in collaboration with Oulu Central Hospital and the University of Helsinki.

11.7 Proposal for future work and expected benefits

KTL has large population samples, which give good grounds for research. However, in developing preventive measures and tools, there is a continuous need for more detailed analyses of changes in lifestyles and chronic disease risk factors. Active development of pilot interventions and their evaluation as well as broader comparative analyses of the long-term effects of interventions and national policies aiming to prevent chronic diseases and reduce inequalities in them are needed.

11.7.1 Tobacco control and research

Tobacco control in Finland has been a success story and rates are in constant decline. However, smoking has become more socially discriminating, which requires new views, approaches and tools for successful tobacco prevention and cessation treatment. Future tasks for research include deepening our understanding of tobacco dependency syndrome and development of tools for smokers and professionals to support cessation and prevention. A life-span approach to tobacco is urgent in both research and policy. New technologies will provide support, but their applicability, effect and efficacy are uncertain. KTL has been active in the development of new tools, and the task is to evaluate their effectiveness and role in tobacco control. The WHO Framework Convention on Tobacco Control, FCTC, and the EU tobacco policy will provide new tasks to cope with multinational tobacco industry activities. The aim is to maintain the declining trend and at the same time narrow the gap between socio-economic groups in all ages.

11.7.2 Health lifestyles and inequalities

The ongoing research on specific determinants of health inequalities analyses whether the effect of socio-economic position on mortality is mediated through behavioural and psychosocial factors. Working conditions are closely related to socio-economic factors, such as occupation. The current funding does not allow analyses of the contribution of working conditions. However, the data prepared for the project would require only minor editing to suit further analyses. As research on the contribution of working conditions to health at different stages of life is currently relevant in Finland, further studies are planned, in collaboration with the Finnish Institute of Occupational Health, on this theme. Working conditions will also be included in the future research on the nutritional significance of workplace lunches.

The earlier studies of the group have not analysed in detail the association between physical activity and other health behaviours, the main reason being weaknesses in measurements of physical activity. The future studies will use data including more accurate measurements of physical activity. New studies will also be conducted on trends and socio-economic differences in psychological distress. The combined effect of behavioural and psychosocial determinants on health inequalities is a future area that will require more resources.

The major public health challenge of the group 'Health lifestyles and inequalities' is to contribute actively to the policies on health inequalities. The group contributes to the preparation of the national strategy and action plan to tackle health inequalities. After the completion of the strategy (Dec 2007), the group is prepared to provide information and expert consultations about the implementation of the action plan.

11.7.3 Healthy ageing

With the ageing of the population, preserving the functional capacity of the elderly population has increasing public health relevance. Further knowledge on biological and behavioural factors contributing to cognition and especially development of effective strategies to

prevent functional impairment are needed. In KTL a future challenge is to create a comprehensive research and development strategy on healthy ageing in collaboration with several departments.

11.7.4 Development of health monitoring and risk prediction

KTL has a long history in developing and organizing health monitoring. Experience gathered in the institute has also been utilized in international networks, and KTL consultants have assisted in developing similar health monitoring systems in various countries. Our future challenge is to improve the health monitoring of different population groups in Finland such as children and adolescents. The new public health law in Finland also mandates municipalities to follow the health of their population even by socioeconomic groups. This evidently creates challenges for KTL to develop standardized indicators, data collection systems and consultation networks to support the municipalities.
The importance of forecasting future threats in public health like lung cancer and COPD among women, increasing health inequalities and deterioration of children's lifestyles will increase in next decade. In addition to health monitoring, the large population samples and cohorts can be more effectively utilized in the prediction of future health threats based on recent trends in risk factors and behaviour.

11.8 Main publications

The main publications are selected to widely represent the research carried out in the Unit, not only papers published in high-impact journals.

Borodulin K, Mäkinen T, Fogelholm M, Lahti-Koski M, Prättälä R. Trends and socioeconomic differences in overweight among physically active and inactive Finns in 1978-2002. Prev Med 2007; EPub. (Impact factor 2.195)

Giskes K, Kunst AE, Benach J, Borrell C, Helmert U, Judge K, Lahelma E, Moussa K, Ostergren, Patja K, Platt S, Prättälä R, Willemsen M, Mackenbach JP. Applying an equity lens to tobacco-control policies and their uptake in six Western-European countries. J Public Health Policy 2007;in press. (Impact factor 1.405)

Helakorpi S, Martelin T, Torppa J, Patja K, Vartiainen E, Uutela A. Did Finland's Tobacco Control Act of 1976 have an impact on ever smoking? An examination based on male and female cohort trends. J Epidemiol Community Health 2004;8(8):649-54. (Impact factor 3.003)

Kastarinen M, Laatikainen T, Salomaa V, Jousilahti P, Antikainen R, Tuomilehto J, Nissinen A, Vartiainen E. Trends in lifestyle factors affecting blood pressure in hypertensive and normotensive Finns during 1982 to 2002. J Hypertens 2007;25:299-305. (Impact factor 5.218)

Kivipelto M, Ngandu T, Laatikainen T, Winblad B, Soininen H, Tuomilehto J. Risk score for the prediction of dementia risk in 20 years among middle aged people: a longitudinal, population-based study. Lancet Neurol 2006 Sep;5(9):735-41. (Impact factor 11.231)

Laatikainen T, Critchley J, Vartiainen E, Salomaa V, Ketonen M, Capewell S. Explaining the Decline in Coronary Heart Disease Mortality in Finland between 1982 and 1997. Am J Epidemiol 2005;162:1-10. (Impact factor 5.068)

Laatikainen T, Manninen L, Poikolainen K, Vartiainen E. Increased mortality related to heavy alcohol intake pattern. J Epidemiol Community Health 2003;57:379-384. (Impact factor 3.003)

Mackenbach, J. P. and M. J. Bakker for the European Network on Interventions and Policies to Reduce Inequalities in Health (R Prättälä). "Tackling socioeconomic inequalities in health: analysis of European experiences." Lancet 2003;362(9393):1409-14. (Impact factor 23.878)

Patja K, Jousilahti P, Hu G, Valle T, Qiao Q, Tuomilehto J. Effects of smoking, obesity and physical activity on the risk of type 2 diabetes in middle-aged Finnish men and women. J Int Med 2005;258(4):356-361. (Impact factor 4.040)

Pelkonen M, Notkola I-L, Tukiainen M, Tervahauta J, Tuomilehto J, Nissinen A. Smoking cessation, decline in pulmonary funtion and total mortality: a 30 year follow up study among the Finnih cohorts of the Seven Countries Study. Thorax 2001;56:703-707. (Impact factor 6.150)

Prättälä R, Paalanen L, Grinberga D, Helasoja V, Kasmel A, Petkevicience J. Gender differences in the consumption of meat, fruit and vegetables are similar in Finland and the Baltic countries. Eur J Publ Health 2006;EPub.(Impact factor 1.118)

Raulio S, Roos E, Mukala K, Prättälä R. Can working conditions explain differences in eating patterns during working hours? Public Health Nutrition 2007;in press.(Impact factor 2.123)

Roos E, Talala K, Helakorpi S, Laaksonen M, Rahkonen O, Uutela A, Prättälä R. 2007. Trends of socioeconomic differences in daily vegetable consumption, 1979-2002. Eur J Clin Nutr 2007;EPub. (Impact factor 2.163)

Vartiainen E, Pennanen M, Haukkala A, Dijk F, Lehtovuori R, De Vries H. The effects of a three-year smoking prevention programme in secondary schools in Helsinki. Eur J Publ Health 2007;17(3):249-56.(Impact factor 1.118)

von Hertzen L, Mäkelä M, Petäys T, Jousilahti P, Kosunen TU, Laatikainen T, Vartiainen E, Haahtela T. Growing disparities in atopy between the Finns and the Russians: A comparison of 2 generations. J Allergy Clin Immunol 2006;117(1):151-157. (Impact factor 7.667)

12 INJURY PREVENTION UNIT

12.1 Research and public health significance of the area

The statistics on injury deaths show that deaths due to home and leisure-time injuries are more frequent in Finland than in the EU15 countries. Each year almost 3000 Finnish people die due to unintentional injuries, which translates into around 6 per cent of all deaths. Accidents in the home and in leisure-time activities account for around 80 per cent of all these injurious deaths. All together, about 700,000 accidents in the home and in leisure time lead to injuries every year. Injuries at home, in sports and in other leisure-time activities are a major cause of death, lost working days, medical treatment and treatment costs. This recognition has raised an urgent need to strengthen the national capacity for injury prevention in new settings.

During the past 30 years the injury situation in Finland has changed dramatically. Whereas over 1200 people were killed in road traffic accidents in 1970, the annual number of deaths has been below 400 in 2003 and the following years. Furthermore, the number of deaths due to occupational accidents has remained at a low level (around 50 annually). The challenge is to duplicate this positive development also in the area of home and leisure-time injuries.

In August 2004, the Injury Prevention Unit was established at the National Public Health Institute (KTL). Scientists and officers representing universities, research organizations, insurance companies, NGOs (such as the Traffic Safety Association) and government departments were invited to the Unit's advisory board. The advisory board meets twice a year to critically overview the activities and future plans of the Unit, promote networking and take national initiatives.

The Injury Prevention Unit has its focus on promoting the prevention of home and leisure-time injuries and raising awareness of injuries as a public health concern. The Unit produces and disseminates information on the incidence, risk factors and prevention of injuries. Priority areas include development of an information system for comprehensive injury monitoring and conducting interventions with other national parties, promoting and facilitating capacity building and supporting local work in the framework of WHO's Safe Community programme and improving multichannel communication and dissemination of information. The Unit has been an active partner in working groups and committees formulating national targets, action plans and strategies. In addition, the Unit ensures that policymakers and other decision makers in society as well as ordinary citizens have the best possible knowledge for preventing injuries. When the Unit began its work, there was a lack of infrastructure support for this kind of activity in the field of home and leisure-time injuries, and it has been important to work with government departments and non-governmental organizations to establish such support.

12.2 The main scientific achievements

12.2.1 Finjury - Monitoring of injury situation in Finland

The establishment of appropriate injury databases has been the first step in the Unit's injury prevention research. Currently data from two national registers and from one national survey are used for research. The availability of data has created research cooperation within KTL and with other research organizations.

12.2.2 Register-based study

The goal of the study is to evaluate the incidence of serious injuries in Finland since 1971. In addition to incidence research, other major goals of the study are: evaluation of the reliability of information in national registries, development of indicators and of reporting formats. The main activity currently in this study is the development of a database that contains injury-related information from the hospital discharge registry maintained at the National Research and Development Centre for Welfare and Health and the statistics on causes of death maintained at Statistics Finland. While these data contain valuable information on injuries, their limitations are widely recognized. Our aim is to investigate the value of other registries for our purposes in the future. The registries could be linked together by using the national ID number of Finnish citizens. By combining data from multiple registries, a unique database can be formed to serve as a basis for increasing information on long-term changes in injury incidence and identifying specific risks to develop well-targeted prevention programmes. The first version of the database has been completed and it is currently being used internally in our group for the production of statistical information. We are planning to implement a public Internet-based version of the database during the first half of 2007.

12.2.3 National Victimisation Survey (Kansallinen UHRI tutkimus)

The National Victimisation Survey is an interview study in which a statistical sample of the Finnish population is interviewed about injuries and crimes. The surveys have been conducted in 1980, 1988, 1993, 1997, 2003 and 2006. The data were collected by telephone or face-to-face interviews with about 8,300 people aged 15 years or over. The interview questions in victimisation surveys relate to accidents, violence and attitudes concerning safety issues. The surveys conducted in 2003 and 2006 have been reported by the Injury Prevention Unit and have been published in KTL's Publication Series B (B15/2005 and B4/2007). Based on these data, the Finnish population aged 15 and over experienced more than 980,000 accidents or assaults that resulted in physical injury in 2006. Most of the cases were home, sports or other leisure-time accidents. The number of traffic accidents that resulted in physical injury was about 58,000 and the number of work accidents about 194,000.

In addition to several statistical reports produced for decision makers and for the general public in print and on the Unit's internet pages, two master's theses has been written, one scien-

tific article published (Lunetta et al 2006), two accepted (Lunetta et al 2006, Tiirikainen et al 2007) and two submitted (Tiirikainen et al 2007, Lunetta et al 2007) based on the above data.

12.2.4 Local injury prevention work

To increase safety promotion activities at the local level is a long-term goal in several strategies, target programmes and action plans adopted by the Finnish government or by the government departments. These policy documents recognize that municipalities are responsible by law for local health and safety promotion, but the structures for such activities are not well developed. Furthermore the output evaluations carried out in Sweden and in Norway, in municipalities using the WHO Safe Community approach, have been encouraging. The WHO Safe Communities model provides a comprehensive approach to injury prevention and safety promotion in which a local infrastructure is created to address injury prevention and safety promotion initiatives. This approach emphasizes a structured way to conduct injury prevention activities, long-term sustainable programmes and targets aiming to reduce injuries and safety hazards in areas defined by the community itself and using local data to monitor changes.

In 2006 the Injury Prevention Unit started a study to trace activity and organizational changes as well as health effects in two Finnish municipalities which have participated in national pilot programmes and developed injury prevention activities using WHO's Safe Community principles as their framework. The major goals of this research are to trace activity changes in selected key areas of injury prevention work: 1) the creation of a local data source and monitoring system for documenting the frequency and causes of injury, 2) the formation of a cross-sectional group to govern and organize injury prevention and safety promotion activities locally, 3) the activation of local professionals and 4) to assess and discuss the health effects possibly due to organizational and activity changes at local level. The research is in the data collection phase.

12.2.5 IKINÄ-Prevention of falls and fractures among older people

Falls are a major cause of disability and the leading cause of mortality resulting from injury in people aged over 50 in Finland. One third to one half of people aged over 65 fall each year. Annually up to 1200 older adults die as a result of a fall and approximately 7000 older people sustain a hip fracture. Falling, therefore, has a great impact on the quality of life, health and healthcare costs.

Effective evidence-based fall prevention interventions need to be developed and implemented into the health care system throughout Finland. The IKINÄ (Prevention of falls and fractures among older people) programme aims to improve the identification of older adults with high risk for falling and provides information on effective prevention methods using multifaceted approaches. The IKINÄ programme includes the development of evidence-based national guidelines and clinical tools for falls prevention in primary health care and in institutions. A guidelines publication including CD material for prevention of falls and fractures among older adults was published in 2006 in KTL B-series (8/2006).

Research concerning falls prevention methods has been carried out with research groups in KTL and the Universities of Jyväskylä, Helsinki and Turku.

The study on "Muscle strength and power in old age: special emphasis on lower limb asymmetry, mobility and balance" was carried out with the Department of Health Sciences / Finnish Centre for Interdisciplinary Gerontology, University of Jyväskylä (directed by Sarianna Sipilä, PhD, docent) and the Central Finland Central Hospital. The aim of the study was to investigate whether difference in muscle function between the lower limbs is an important determinant of mobility, postural balance, bone characteristics, falls and fear of falling in older people. In addition, the effects of intensive strength-power training on muscle strength and power, mobility, postural balance, falls, fear of falling and overall health in 60-85-year-old people with lower limb asymmetry was assessed.

The results of the study showed that the majority of older people with hip fracture history (84%) had mobility problems and up to 50% reported decreased outdoor mobility. In addition, 60 % had difficulties walking 500m and negotiating stairs, whereas in the age-matched controls the corresponding percentages were 9% and 16%. The balance confidence, which is a marker of fear of falling, was also lower in the hip fracture group compared to the controls. The intensive strength-power training of three months resulted in improvement in lower limb muscle strength and increased lower limb function in tasks requiring high-speed power production. Three articles on the study, one accepted (Kulmala et al. 2007), two submitted (Portegijs et al. 2007, Sihvonen et al.2007), have been thus far reported.

The Injury Prevention Unit has participated in the GOAL (Good Ageing in Lahti region) Functional Capacity Intervention study directed by Health Promotion Unit, KTL and Palmenia Centre for Continuing Education, University of Helsinki. This intervention study seeks to promote healthy ageing among old-aged (over 70 years of age) clients of the municipal homecare. The specific objectives of the study are to develop a measurement kit for and practical methods to promote the functional capacity of the elderly to be used by homecare personnel. In the first phase of the study, clients were randomly selected to one of the three arms of the study: standard care; group-based strength and balance exercise; or home-based strength and balance exercise. In the second phase, clients were randomized either to a goal-oriented activity programme with group-based strength and balance exercise or to a goal-oriented activity programme with home-based strength and balance exercise. Before the intervention, intensive training seminars on the use of functional assessments for physical capacity and exercise methods for home care and health care personnel was carried out. In the first phase, each study group included 40 participants. In the second wave, the number of participants per study arm was 24. This intervention study started in the year 2005, with the interventions running in 2006. In 2007, the one-year follow-up data collection will be completed and the analysis and reporting started.

Dr Sihvonen has also participated in reporting the results of the study "Prevention of falls among the home-dwelling elderly" conducted in University of Turku, Institute of Clinical Medicine, General Practice (directed by prof. Sirkka-Liisa Kivelä). This study implemented a prevention intervention on falls among older persons living at home to evaluate its effects on falls, injurious falls, functional abilities and quality of life. Two manuscripts have been

submitted concerning the effects of risk-based fall prevention on postural balance (Salminen et al. 2007a) and on maximal isometric muscle strength (Salminen et al. 2007b).

Table 12.1 Summary of main scientific achievements during 2004-2007

Scientific output	N	Comments
Original articles and reviews in international peer-review journals	7	plus 6 original articles submitted
Original articles and reviews in domestic peer-review journals	1	
Textbooks and chapters in textbooks, reports and proceedings	8	
Theses	1 Doctoral Thesis 2 Master's Theses	Sihvonen S Koskinen M, Tiirikainen K
Presidencies and memberships in scientific committees of international meetings	1	Member of Scientific Committee 14th International Conference on Safe Communities, June 2005, Bergen, Norway
Invited lectures and chairmanships in international meetings	4	
Lectures in domestic scientific meetings	4	
Opponent of dissertation		
Supervision of dissertations	2	2 Master's theses 1 ongoing Doctoral Thesis
Review of scientific papers	5	
Research visits to/from international research institutes or universities	2	Sanna Sihvonen, Prince of Wales Medical Research Institute and University of North South Wales, Sydney, Australia Prof. Lucie Laflamme and research group, Department of Health Sciences, Karolinska Institutet, Sweden

12.3 The main public health activities and achievements

12.3.1 IKINÄ-Prevention of falls and fractures among older people

The educational intervention in the IKINÄ programme is targeted for social and health care professionals working with older adults. The education intervention was started in fall 2006 and is carried out in close co-operation with health care districts, county administrative boards, municipalities, NGOs (such as Age Institute, Centre Union for the Welfare of the Aged, and Finnish Osteoporosis Association) and polytechnics for social and health care. Evaluation and development of assessment tools have been conducted with health care professionals from Espoo municipality and the Teknosko (utilization of technology in home care services) project in Pirkanmaa Polytechnic in the Tampere region. By the end of May 2007, 50 seminars and lectures have been organized and 2500 social and health care workers, administrators and students have participated in the training.

12.3.2 AdRisk

The AdRisk - Community Action on Adolescents and Injury Risk - project responds to the call for an integrated approach to reduce the injury risk among adolescents aged 15-24 in Europe. The project as whole focuses on national policy and strategy development, situation analysis, network development and the provision of tools and good practices. AdRisk refers to the 2006 EC Communication "Actions for a safer Europe" which defines injury and accident prevention as a priority for the Public Health Programme. The project is co-ordinated by the Austrian Road Safety Board and carried out in collaboration with four other European institutions.

The Injury Prevention Unit at KTL is responsible for the Work Package "Development of the European Situation Analysis Report". The project period is September 2006-February 2008. The objective is to produce a comprehensive European situation analysis of injury risks among adolescents and their prevention and to use the resulting report for developing an evidence-based national response to youth risk-taking behaviour on behalf of the Member States. The main deliverable of this work package will be a document on the major injury risks adolescents in Europe are exposed to, assessing the main determinants of risk exposure and identifying models of good practices in injury prevention in adolescence. This report will be addressed to European and national authorities and interest groups that have a role to play in preventing predictable and avoidable injuries among adolescents. Based on the situation analysis, strategy recommendations will be provided to the governments. National and youth-related agencies will be encouraged to develop national programmes for action on injury prevention among adolescents and integrate the youth into existing programmes.

12.3.3 Injury portal

The aim of the portal is to gather information, tools, guidelines, policies and actors on prevention of home and leisure-time injuries for the use of professionals and people interested

in safety promotion.
The injury portal was built up and content-developed during summer 2005. The internet pages (www.ktl.fi/tapaturmat) were published in the autumn and the informational content has been added and updated regularly. In 2006, educational material of the prevention of falls and fractures among older people was published in the injury portal. There have been 700 to 1300 visitors per month at the web pages.

Table 12.2. Summary table of committee memberships, coordination and proceedings with public health impact 2004-2007

Public health output	N	Comments
Articles and reviews in non-peer-review journals	11	
TV and radio interviews	12	plus several contacts monthly from journalists
Health education material, websites, information databases	6	e.g. injury portal, www-pages on national victimisation survey, injury deaths 2005, injuries as numbers, assessment tools for fall risk evaluation, material for balance training for Age Institute, www-pages to edu.fi and to Vision Zero pages for the Centre for Occupational Safety
Membership in international committees with public health impact	3	Task force leader, EuroSafe Association: Adolescents and risk-taking Member, Working Party on Accidents and Injuries. EU/DG SANCO Member, European Child Safety Alliance
Membership in domestic committees with public health impact	10	e.g. the Advisory Committee for the Prevention of Home and Leisure Accidents within the Ministry of Social Affairs and Health
Coordination and/or implementation of development projects	1	Implementation of preventive methods in Ikinä (falls prevention among older adults) programme
Coordination of public health networks	1	Network on local injury prevention
Organization of domestic training with public health impact	Around 55	e.g. falls prevention seminars and lectures for social and health care professionals

12.4 Funding for research and public health programMEs

Funding for the Unit has been received from the Ministry of Social Affairs and Health, Ministry of the Interior and Ministry of Education. The Ad-Risk project is funded by the EC Public Health Programme.

12.5 Personnel

The Unit was started by three full-time employees in August 2004 (Head of the Unit, Senior Researcher and Planner). Currently, the Unit has 3 Senior Researchers (1 working part-time), 1 project manager, 1 Web Information Officer, 5 Researchers (1 working part-time), 1 Data Manager and 1 Secretary (working part-time). Three researchers are currently enrolled in PhD studies.

Anne Lounamaa, M.Soc.Sc, BSc, OTR, Senior Researcher, Head of the Unit
Terhi Hulkko, MSc, RN (public health), Web Information Officer
Antti Impinen, MSc, Researcher
Heli Kumpula, M.Soc.Sc, Researcher
Mirka Koskinen, MSc, RN (public health), Researcher
Sakari Kääriäinen, Data Manager
Philippe Lunetta, MD, PhD, Senior Researcher, part-time
Nina Martikainen, Secretary of the Unit, part-time
Minna Mänty, MSc, Researcher, part-time
Meri Paavola, PhD, Project Manager
Sanna Sihvonen, PhD, pt, Senior Researcher
Kati Tiirikainen, M.Soc.Sc, Researcher

12.6 Collaboration

Collaboration and co-projects within KTL and within the Department provide opportunities for injury prevention and, vice versa, opportunities for the Unit as a whole and for each individual researcher at the Unit to develop research and public health skills. Ongoing cooperations include: with the Mental Health and Alcohol Department research on Alcohol, drugs and driving supported by the Academy of Finland, with the Department of Health and Functional Capacity on research and on the development of tools to measure functional capacity, and within the Department with the Health Promotion Unit on GOAL research and with the Chronic Disease Prevention Unit on LATE, the Development of Child Health Monitoring project.

12.6.1 National collaboration

Elderly safety

University of Jyväskylä, Department of Health Sciences / Finnish Centre for Interdisciplinary Gerontology (docent, PhD Sarianna Sipilä) research project on Muscle strength and power in old age: special emphasis on lower limb asymmetry, mobility and balance.

Palmenia Centre for Continuing Education, University of Helsinki, The GOAL (Good Ageing in Lahti region) Functional Capacity Intervention study

University of Turku, Institute of Clinical Medicine, General Practice (PhD Marika Salminen) reporting research project on prevention of falls among the home-dwelling elderly people.

Pirkanmaa Polytechnic, Teknosko project for piloting and implementing preventive activities for falls prevention among older adults using home care services.

Age Institute, Centre Union for the Welfare of the Aged, and Finnish Osteoporosis Association in organising educational seminars for social- and health care professionals on falls prevention among older adults.

Child Safety

Helsinki University Central Hospital (HUCH), Hospital for Children and Adolescents, research collaboration: Mortality and hospitalization due to injuries in Finnish children 0 - 18 years and regional differences in treatment practices.

University of Tampere/Tampere School of Public Health and the UKK institute, research collaboration: Poisonings, and their risk factors in Finnish children and adolescents.

Injury Prevention Unit is a partner and a member of the steering group in "Safety for Children", Lapsen Turvaksi - project, coordinated by the Mannerheim League for Child Welfare. The goals of this project are to develop working methods for prevention, for mental and physical first aid and for mental support after trauma experience of injuries among children. The development project is carried out in two geographical areas together with local actors: NGOs, maternity and child welfare clinics, day care centres and schools.

Sports safety

Sports Medicine Centre of Tampere (operates in the premises of the UKK Institute), health promotion collaboration: Prevention of sports injuries, nationwide LiVE project (MD, PhD, Docent Jari Parkkari)

Monitoring

START project (PhD, Project Manager Ilona Nurmi) developing information technology based system to gather detailed information on all unintentional injuries in the area of North Kymenlaakso to act as a reference area for national injury surveillance.

Communications, Awareness raising & Capacity building

The Finnish Virtual Polytechnic and 7 polytechnics (South Karelian Polytechnic, Laurea, Arcada, North Karelian Polytechnic, Savonia/Pelastusopisto, Kajaani Polytechnic and Oulu Polytechnic), web-based injury prevention and safety promotion education for polytechnic students in Finland, development of comprehensive introductory course (15 cus).

The National Injury Prevention Working Group and the Home Accident Prevention Campaign "You have only one life" that are national networks consisting of several national bodies (e.g. Ministry of Social Affairs and Health, Ministry of the Interior, Finnish National Rescue Association, Federation of Finnish Insurance Companies, Finnish Centre for Health Promotion, Finnish Red Cross, Association of Finnish Local and Regional Authorities, Finnish Institute of Occupational Health, Central Organization for Traffic Safety in Finland, Consumer Safety Institute). The National Injury Prevention Working Group is a network of all safety sectors, whose mission is to develop a positive and comprehensive safety-minded culture, and according to their strategy they organize training, arrange conferences, seminars, exhibitions and fairs (e.g. National Injury Prevention Day "Friday the 13th" annually). The Home Accident Prevention Campaign prepares material for home and leisure-time injury prevention e.g. leaflets, educational materials, check-lists and videos, arranges seminars and is active in media communications.

The Finnish Centre for Health Promotion, a project on preventing home and leisure-time injuries through participating member associations focusing on producing education material and disseminating information on injury prevention and safety promotion using media and organising national seminars.

12.6.2 International collaboration

The Injury Prevention Unit actively participates in international cooperation through several networks, including e.g. EU/DG SANCO's accidents and injuries network (AINW), EuroSafe network, the European Network of Safety and Health Practitioner Organisations (ENSPHO), Prevention of Falls Network Europe (ProFaNE) and WHO Collaborating Centre on Community Safety Promotion.

The Injury Prevention Unit is representing Finland in the European networks EuroSafe and Child Safety Alliance. EuroSafe is an umbrella network which aims to reduce both intentional and unintentional injuries through increased coordination and strategies that combine and build upon existing strengths and capacities in Europe. The focus of the Child Safety

Alliance is on child safety. Both networks organise European meetings and make joint European statements for injury prevention. The representatives of the Injury Prevention Unit participate in the meetings and write articles in the newsletters.

12.7 Proposal for future work and expected benefits

During its first three years the Unit has grown in the encouraging and stimulating atmosphere that KTL provides. All the expertise in the Department and in KTL has been valuable and available when developing a team of injury prevention experts in KTL. Our goal is to be a significant national actor to support citizens, professionals and the government to eliminate serious health losses due to injury. For this, improvements in injury surveillance, greater scientific and public health expertise among the Unit's employees and continuous financial resources are needed.

In its work, the Unit has emphasized the public health impact of all injuries, unintentional and intentional, but limited the preventive activities to unintentional home and leisure-time injuries. So far, the major emphasis has been on elderly safety. In the coming years promoting injury prevention among children and adolescents will be strengthened.

In the near future, the Unit will finalize the first phase of the monitoring system for injury surveillance. The endpoint at this stage is to have databases for two registers and for one repeated survey. These data can already be broadly used to monitor the injury situation at national level. The database is also expected to increase interest for cooperative research projects within KTL and other research organizations to further study the occurrence and severity of injuries in the Finnish population.

However, the currently available data are not sensitive enough to measure all important changes at national level and not detailed enough for local actors. The Unit will continue the co-operation with the START project and municipalities in developing usable ways to monitor injuries locally. Further work is needed in indicator development from the current database, to develop current register-based data systems together with responsible statistical organizations and to develop additional data collection methods to fill the data gaps. This includes detailed data on injury risk factors and injury mechanisms.

Because of a considerable increase in the proportion of the population aged over 65 in the future, there is a high need for effective preventive strategies for falls prevention among older adults. The IKINÄ programme on falls prevention among older adults will continue to enhance the translation of research into practice and policy. Evaluation of long-term effects of preventive activities is developed and disseminated to policy makers and other stakeholders. Unless preventive strategies are put in place, this will result in increased demands for health services for fall-related injuries.

The scope for injury prevention in areas and settings other than on the road or at the workplace is great because there are many proven measures which are yet to be implemented. Research can assist in identifying measures which are likely to achieve the greatest effect

per euro invested, as well as in fine-tuning, targeting and evaluating specific injury prevention programmes. The Injury Prevention Unit will continue its work in co-operation with the responsible government agencies, community organizations and the private sector to assist in achieving further injury reductions.

12.8 Main publications

Kulmala J, Sihvonen S, Kallinen M, Alén M, Kiviranta I, Sipilä S. Balance confidence and functional balance in relation to falls in older persons with hip fracture history. Journal of Geriatric Physical Therapy, in press.

Lunetta P, Lounamaa A, Sihvonen S. Surveillance of injury-related deaths. Medico-legal autopsy rates and trends in Finland. Injury Prevention, in press.

Lunetta P, Tiirikainen K, Smith GS, Penttilä A, Sajantila A. How well does a national newspaper reporting system profile drowning? International Journal of Injury Control and Safety Promotion 2006;13:35-41.

Sihvonen S. Postural Balance and Aging: cross-sectional comparative studies and a balance training intervention. Doctoral thesis. Studies in Sport, Physical Education and Health, University of Jyväskylä, 2004.

Sihvonen S, Era P, Helenius M. Postural balance and health-related factors in middle-aged and older women with injurious falls and non-fallers. Aging/Clinical and Experimental Research 2004; 16:139-146.

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Tiirikainen K, Lounamaa A, Paavola M, Kumpula H, Parkkari J. Trend in Sports Injuries Among Young People in Finland. International Journal of Sports Medicine, in press.