Copenhagen
Aging and
Midlife Biobank
(CAMB)
Symposium
7th June 2018
Rikke Lund PI
Associate professor
Section of Social Medicine
Programme

9.30  **Rikke Lund**, PI for CAMB: Welcome and introduction to the symposium. CAMB, the cohort and main themes

10.10  Keynote speaker: **Rachel Cooper**, Programme Leader Track and Senior Lecturer at the MRC Unit for Lifelong Health and Ageing at UCL, London: “Using life course studies to gain insights into ageing”

10.45  Break

11.15  Keynote speaker: **Rebecca Hardy**, Professor, Programme leader at the MRC Unit for Lifelong Health and Ageing at UCL and Professor in Epidemiology and Medical Statistics at UCL, London: “Life course studies of ageing: opportunities and challenges”

11.50  Keynote speaker: **Carlos Mendes de Leon**, Professor, Department of Epidemiology, Director of the Center for Social Epidemiology and Population Health and the Center for Integrative Approaches to Health Disparities, University of Michigan School of Public Health, Ann Arbor, Michigan: “Mid-life psychosocial determinants of healthy ageing: the role of work and economic well-being”

12.25  Introduction to posters and the afternoon, associate professor **Charlotte Juul Nilsson**

12.30  Lunch and posters (**Faculty Lounge, Building 35, 3rd floor, room 35.3.20**)
Programme

13.45 Oral presentations of selected CAMB projects Jolene Lee Masters Pedersen, Gitte Lindved Petersen, Nadya Dich, Anne Møller, Dinne Skjærlund and Julie Aarestrup

15.15 Break, coffea/tea

15.45 Panel discussion lead by associate professor Bernard Jeune, University of Southern Denmark

16.30 Summing up, implications and discussion, PI Rikke Lund
Studying ageing in a life course perspective

• Why is it important in a Nordic context?
The establishment of CAMB

• The need for a large Danish ageing cohort that could be followed from middle-age into ageing and which allowed a life course perspective
Purpose of CAMB

• To establish a large middle-aged cohort based on three existing cohorts which should be thoroughly examined for signs of early ageing with a focus on physical function, cognitive function and low grade inflammation as a baseline for studying development in and consequences of early ageing in future follow-ups.

• To establish the first Danish ageing cohort including information on life-course social, biological and psychological determinants for early ageing.
Early aging

- There is no criterion reference for assessing healthy ageing and this creates difficulties when conducting and comparing research on ageing across studies. A cardinal feature of ageing is loss of function which translates into wide-ranging consequences for the individual and for family, carers and society (Lara et al. 2015)
- Measures for CAMB were selected to discriminate function in a middle-aged population across physical, cognitive, immunological, physiological and social domains
- Objective measures (e.g. physical capability, cognitive function, inflammatory status, blood pressure, HbA1c, lung function)
- Self-reported measures (fatigue, vitality, functional ability, self-reported health, social relations etc.)
The three cohorts in CAMB

Pregnancy/birth → Childhood/young adulthood → Midlife

The Danish Longitudinal Study on Work, Unemployment and Health (men and women born 1949 or 1959)

(PI’s Rikke Lund og Ulla Christensen)

40/50 → 45/55

Metropolit Birth Cohort (boys born 1953 in Metropolitan CPH) (PI Merete Osler)

0 → 12 → 18 → 51

Copenhagen Perinatal Cohort (girls and boys born at Rigshospitalet 1959-61)

(PI Erik Lykke Mortensen)

0 → 1 - 6 → 20 → 34 → 45


The establishment of CAMB

• Three generous grants from the VELUX FOUNDATION have supported the large data collection and the establishment of CAMB as a permanent infrastructure
• In 2007: 10.683.000 DKK and 2008: 8.791.000 DKK for the data collection and in 2012: 6.305.460 DKK for the establishment of a permanent infrastructure
• In total 25.779.460 DKK (~3.5 mio. Euros or 4 mio USD)
10. VELUX FONDEN

188,7 mio. kr.

Velux Fonden er en almennyttig fond, der støtter humanvidenskabelige, kulturelle, sociale og miljømæssige formål. I 2017 med i alt 210 mio. kr.

Fonden arbejder tæt sammen med de humanistiske og samfundsvidskabelige institutter, som selv foretager den første udvælgelse af de bedste projektforlæg. Støtten er på 5-6 mio. kr. pr. projekt.


Fonden har også de seneste år haft fokus på at støtte tværgående forsknings- og udviklingsprojekter mellem humanvidenskabelige forskere og praksisaktører inden for social-, aldrings- eller miljøområdet. Satsningen hedder HUMpraxis-programmet.

Universitetsavisen 31. maj 2018
Population all three cohorts
N=29,355

Died or asked to be excluded from future follow-ups N=4,604

N=24,751 eligible

Excluded due to residence in Western part of Denmark (ressource restrictions) N=6,814

N=17,937 invited for CAMB

N=5,576 (31%) all tests
N=7,191 (40%) questionnaire
What was collected?

• Comprehensive survey data (health, fatigue/tiredness, social and psychosocial factors, health behaviours, working environment, indoor climate)

• Tests of: physical function, cognitive function, lung function, body composition, blood pressure, height, weight. Oral health and fitness test in subpopulations

• Blood samples for immediate analysis (basic tests and inflammation) and for storage in the biobank
A proposed panel of biomarkers of healthy aging Lara et al. BMC Medicine 2015
UNIVERSITY OF COPENHAGEN

Seminar on CAMB 2, 25th Sept. 2015

Faculty of Health and Medical Sciences

- Causes of Death Registry
- Central Psychiatric Registry
- National Patient Registry
- Register of Medicinal Product Statistics
- Social and labour market registries
- Cancer registry
- Diabetes registry
- Danish Civil Registration System

From 1980 - present

CAMB

- Danish Longitudinal Study on Work Unemployment and Health
- Metropolit
- Copenhagen Perinatal Cohort

Projects and publications

• More than 70 research projects making use of CAMB data

• A large number of collaborators nationally and internationally

• 60 publications since data collection ended in 2011 and more on the way
Main results

• Cross sectional studies
• Life course studies
Main themes cross-sectional studies

- Socioeconomic position and ageing
- Vitality
- Social relations and ageing
- Cognition
- Inflammation and health
What has been found? Cross-sectional studies

- Cognition demographic variation (Mortensen et al. 2014)
- Personality demographic variation (Mortensen et al. 2014)
- Vitality (Maynard et al. 2013 and 2015)
- Social relations/loneliness and physical capability/inflammation (Lund et al. 2018 and 2016)
- Low grade inflammation and health (Weddel-Neergaard A et al. 2018, Bruunsgaard et al. submitted 2018)
Results from cross sectional studies show

- a strong **social gradient** in all measures of physical capability, allostatic load, and cognitive ability among both men and women, suggesting a potentially socially graded accelerated ageing
- a strong social gradient in mental distress and depressive symptoms
- no association between **loneliness** and measures of physical capability
- higher levels of low-grade inflammation in those **living alone**, with no variation across other measures of social relations (preliminary results)
Results from cross sectional studies show

• that the higher the cardiorespiratory fitness the lower the scores on metabolic syndrome factors. Obesity and low grade inflammation explained part of this association.

• that IL-1α-specific autoantibodies co-exist with depression/anxiety and risk factors of cardiovascular disease in men, but not women. (preliminary results)

• that self-reported persistent vitality is not associated with specific mitochondrial oxidative phosphorylation capacity in peripheral blood, but is associated with DNA damage, BMI and objectively measured physical performance. (subpopulation)
Main themes life course studies

- Socioeconomic position and ageing
- Occupational physical activity
- Intelligence
- Decline in cognition
- Body size
- Infertility
- Stress and major life events
What has been found? Life course studies

• **Socio-economic position** and early ageing (physical and cognitive function, inflammation), and mental health (Foverskov et al. 2017, Petersen et al. submitted 2018, Pedersen et al. submitted 2018, Osler et al. 2013, 2015a, 2015b)

• **Occupational physical activity** and midlife physical capability (Møller et al. 2013, 2015, Sundstrup et al. 2017a,b, 2018)

• **Intelligence and birth weight**, physical performance, mortality (Flensborg Madsen et al. 2017, Meincke et al. 2014, 2016 a,b)

• **Body size** and inflammation, **change in BMI** (Pedersen et al. 2016, Aarestrup et al. 2016)

• **Infertility** and inflammation (Hærvig et al. 2018)

• **Major life events/stress** and inflammation, allostatic load, telomere length (Dich et al. 2015, Osler et al. 2016, Pedersen et al. 2017)
Results from life course studies show

• that young adult cognitive function explains a substantial part of the social gradient in cognitive function. But that especially the indirect effect of the early social environment and the direct effect of occupational complexity may influence later life individual differences in cognitive ability.

• that increasing number of income drops across 20 years are associated with higher levels of low grade inflammation (preliminary results).

• that 4+ years lived below 60% of the national median income across 22 years is modestly associated with adverse midlife ageing outcomes (poorer physical capability, cognitive function and higher inflammatory levels) (preliminary results).
Results from life course studies show

- that a history of physical exposures at work was associated with only minor variation in physical capability in midlife.
- that cumulative hard physical work throughout life predicted risk of long-term sickness absence among older workers.
Results from life course studies show

• that **early life factors** (low birth weight, low SEP and lower intelligence) increase the risk of psychiatric diseases, in particular alcohol abuse which was also strongly associated with inflammatory biomarkers.

• that **higher intelligence** in young adulthood is closely related to better physical performance and survival in midlife.

• that **higher birth weight** was significantly associated with higher intelligence at age 19, 28 and 50. Not a weaker association at age 50. Exception for the highest BW.
Results from life course studies show

• that exposure to the **accumulation of prenatal and early life stressors**, is associated with higher levels of CRP and IL-6 in later life

• that **Stress and major life events** circumstances in both early life and adulthood independently predicted higher allostatic load

• that **stressful events in childhood** are associated with shorter telomere length in middle-aged men and that part of this relation is explained by depressive mood and low grade inflammation.
Results from life course studies show that

- Decline in cognition from youth to midlife is associated with:
  - Task induced deactivation of brains default mode network (Hansen et al. 2014)
  - Resting cerebral blood flow (reduced perfusion in precuneus and posterior cingulate gyrus) (Henriksen et al. 2017)
  - Higher cellular levels of deoxyribonucleotides (Desler et al. 2015)
  - Poor sleep quality (Waller et al. 2014)
  - Reduced nocturnal melatonin response at 4 am (Waller et al. 2016)
What has been found? Life course studies

• that high maternal BMI, high ‘BMI’ at birth and in early adulthood is associated with higher levels of inflammation.

• that BMI tracking was weaker at late adult ages than at young adult ages. Although BMI tracks across the life course, childhood BMI is relatively poor at identifying later adult overweight or obesity.

• that male factor infertility might be associated with an increased level of interleukin-6.
Future plans and possibilities

- Further use of existing data
- Extended use of the biological material of the Biobank
Future plans

• CAMB II new funding for data collection
  • Changes in physical capability
  • Changes in cognitive function
  • Changes in social function
  • Changes in inflammatory levels
  • Retirement (aged 58-70 in 2019)

• Dementia
• Multimorbidity/polyfarmacy
• Include their children for cross generational studies
CAMB steering committee

- **Associate professor Rikke Lund (PI)**, Section of Social Medicine, Department of Public Health, University of Copenhagen
- **Professor Erik Lykke Mortensen**, Section of Environmental Health and Medical Psychology, Department of Public Health, University of Copenhagen
- **Associate professor Ulla Christensen**, Section of Social Medicine, Department of Public Health, University of Copenhagen
- **Associate professor Charlotte Juul Nilsson**, Section of Social Medicine, Department of Public Health, University of Copenhagen
- **Professor Merete Osler**, Research Centre for Prevention and Health, Frederiksberg Hospital
- **Chief physician Helle Bruunsgaard**, Centre of Inflammation and Metabolism, Rigshospitalet
- **Associate professor Lisa Bøge Christensen**, Department of Odontology, University of Copenhagen
- **Professor Åse Marie Hansen**, Section of Social Medicine, Department of Public Health, University of Copenhagen
Project coordination and data management

• Drude Molbo, Data Manager

• Eva Jepsen, Project Coordinator

• Sissel Skogstad, Project Assistant
Thanks to

• Participants
• Data collecting team at NFA
THE VELUX FOUNDATIONS
VILLUM FONDEN ★ VELUX FONDEN

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Holbæk Sygehus, Arbejds- og social medicinsk Klinik

IMK Almene Fond

NORDEA FONDEN
Vi støtter gode liv

Center for Indeklima og Sundhed i Boliger (CISBO)

Læge Sofus Carl Emil Friis og Hustru Olga Doris Friis' Legat
• CAMB is the only Danish Ageing Cohort study following participants across a life span of up to 60 years with comprehensive measures of early ageing in midlife and including life course information on a wide range of factors.

• As such it serves as a unique resource for the study of how the Danish population is ageing and for the identification of factors across the life course that are candidates for prevention of accelerated ageing.