



# Karolinska Institutet

## FLYING PERSONNEL – CANCER, ACUTE MYOCARDIAL INFARCTION AND MORTALITY

THESIS FOR LICENTIATE DEGREE (LIC. MED. SCI)

Publicly defended in Swedish in Hillarpsalen, Retzius väg 8, KI  
Monday the 9<sup>th</sup> of June 2014 at 13.00

By

### **Anette Lannersjö**

*Principal Supervisor:*

Professor Niklas Hammar  
Karolinska Institutet  
Institute of Environmental Medicine  
Unit of Epidemiology

*Co-supervisors:*

Professor Lars Alfredsson  
Karolinska Institutet  
Institute of Environmental Medicine  
Unit of Cardiovascular Epidemiology

Professor Lars-Åke Brodin  
KTH Royal Institute of Technology  
School of Technology and health  
Department of Medical Engineering  
Unit of Medical Imaging

*Examination Board:*

Associate Professor Bodil Persson  
Lund University  
Faculty of Medicine  
Department of Laboratory Medicine  
Division of Occupational and Environmental  
Medicine

Professor Ola Eiken  
KTH Royal Institute of Technology  
School of Technology and Health  
Department of Basic Science and Biomedicine  
Unit of Environmental Physiology

Associate Professor Agneta Åkesson  
Karolinska Institutet  
Institute of Environmental Medicine  
Unit of Nutritional Epidemiology

## ABSTRACT

**Aim:** Flying personnel are exposed to several factors in the work environment that can potentially increase their cancer incidence, mortality and acute myocardial infarction (AMI) incidence. The aim of this licentiate thesis is to study cancer incidence among Swedish cabin crew in relation to exposures in the work environment and to study mortality and AMI incidence in Swedish airline and military flying personnel.

**Methods:** Cancer incidence among cabin crew at the Swedish Scandinavian Airlines (SAS) was determined from the Swedish National Cancer Register. Their cancer incidence was compared with that of the general Swedish population by comparing observed and expected number of cases. To study exposure of total flight hours and exposure to “high altitude, long distance” flights a nested case-control study was performed, including cancer cases diagnosed after 1979 and four controls per case. A cohort of flying personnel employed at the Swedish part of SAS or the Swedish Air Force was followed regarding mortality and AMI incidence using national registers of hospital discharges and deaths. The observed mortality and AMI incidence was compared with the expected rate in the Swedish population.

**Results:** Swedish cabin crew had an overall cancer incidence similar to that of the general population. An increased incidence of malignant skin melanoma in both male and females and non-melanoma skin cancer among men may be associated with exposure to UV radiation, either at work or outside work. An increased risk of breast cancer in female cabin crew is consistent with our results and may in part be due to differences in reproductive history. No clear associations were found between length of employment or cumulative block hours and cancer incidence.

Swedish flying personnel, except male cabin crew, had lower-than-expected all-cause mortality mostly due to a reduced cardiovascular mortality reflecting a low AMI incidence during the working life as well as after retirement.

**Conclusions:** Flying personnel in Sweden have a low mortality and acute myocardial infarction incidence through the life course. Swedish cabin crew have a similar cancer incidence as the population, despite the potential risk factors in the work environment. However, the increased incidences of malignant skin melanoma and non-melanoma skin cancer and the tendency to an increased incidence of breast cancer need to be addressed further regarding possibilities to prevent new cases.