Breast cancer is the most common cancer affecting women worldwide. Some risk factors are well-acknowledged and mainly relate to reproduction, lifestyle, use of endogenous hormones, and genetics. Several common environmental agents have been suggested to play a role in breast cancer development. However, limited evidence exists on potential mammary carcinogens, including various breast cancer outcomes with possibly distinctive etiologies and potential critical time windows of exposure. Environmental exposures are encountered on a regular basis and often at higher intensity levels at the workplace, and occupational studies are thus an important way of investigating environmental factors potentially affecting the development of cancer. During the last part of the 20th century, women entered the workforce in high numbers, and explorations of occupational factors influencing female breast cancer risk are thus feasible.

To contribute with knowledge in this research area, the main goal of this thesis was to examine a number of occupational agents suspected to affect the risk of breast cancer, including organic solvents (e.g. ‘other organic solvents’ reflecting various types, ethanol, trichloroethylene (TCE)), diesel exhaust, polycyclic aromatic hydrocarbons (PAH) and solar ultraviolet-B radiation (UVR), focusing on investigating various female breast cancer outcomes and potential susceptible time windows.

Two datasets were used for these investigations and both entailed information on women with primary breast cancer and breast-cancer-free women, matched on year of birth, who had been identified in the Danish Cancer Registry and Civil Registration System, respectively. The first dataset entailed self-reported information on occupational exposure to different agents, e.g. organic solvents, and information mainly relating to lifestyle and reproduction, which had been ascertained in an interview study. The second dataset entailed full employment history, which had been retrieved from the Danish Supplementary Pension Fund, and this information was linked to job exposure matrices (JEMs) to assess occupational exposures. Additional register-based information was available on parity, age at first live birth and job title reflecting socioeconomic status. Based on these two datasets, four case-control studies were conducted using logistic regression for the estimation of the risk of breast cancer.
Divergent findings emerged regarding the risk of various breast cancer outcomes following exposure to investigated agents; ethanol and ‘overall organic solvents’ were observed to elevate the risk of all investigated breast cancer outcomes, including pre- and postmenopausal breast cancer and estrogen receptor positive (ER+) and negative (ER-) tumors. TCE was indicated to increase the risk of ER+ tumors after age 50, while the risk of ER- tumors before age 50 following diesel exhaust was increased. UVR was indicated to reduce the risk of breast cancer after age 50 and the risk did not vary by ER status. No noteworthy risk patterns were observed for all other investigated chemical agents, e.g. PAH, and explorations of potential critical time windows of exposure did not reveal any striking results.

The findings in this thesis indicate that specific occupational exposures may affect various breast cancer outcomes. However, the potential of various exposure misclassification bias directing the results in different directions, reduced statistical power to detect potential risk elevations of rare breast cancers, and the potential of chance findings should be reflected upon when interpreting these results. As evidence in this research area regarding breast cancer to date remains limited, our findings need to be confirmed by future studies before any firm conclusions can be drawn. Still, efforts to reduce the investigated chemical exposures at work, which are presently acknowledged or suspected to be carcinogenic in relation to other cancer sites, should already at this point be a priority. In addition, indoor female workers may also be recommended to spend short periods of time in the sun during the summer.