Awarded COFAS Marie Curie fellows
– For the FOIP programme

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Project: EPIOMICS, a model for combining epidemiological and molecular research with application to the disease Rheumatoid Arthritis

Abstract: Traditional public health research on risk factors for developing common diseases such as cancers and cardiovascular diseases have focused solely on environmental factors without information on genetic factors. On the other hand, most of the research on genetic factors has not considered the impact of environmental factors. Many common diseases are however considered to be caused by both environmental and genetic risk factors acting together as well as by themselves. Recent progresses in the development of methods for analysing genes have led to an explosion of data. Unfortunately new methods and algorithms for data processing and data analysis regarding large amounts of data have not progressed with the same speed as the molecular methods used and still environmental and genetic information is often considered separately.

This project aims to develop algorithms for processing and analysing large amounts of data regarding environmental-molecular factors and to use these algorithms for processing and analysing data regarding one of the most common arthritic diseases called Rheumatoid Arthritis. In this environmental-genetic context different definitions of gene-environmental interaction and synergism will be considered as well as different subtypes of Rheumatoid Arthritis. The algorithms will be used for analysing data from the EIRA (Epidemiological Investigation of Rheumatoid Arthritis) study in which more than 4000 cases and controls have been analyzed for more than 300000 genetic markers. Cases and controls have answered a questionnaire regarding environmental exposures such as smoking. We also plan to replicate potential findings in studies carried out in the US on Rheumatoid Arthritis. We also plan to develop a visualisation tool for visualisation of combinations of risk factors for different diseases and disorders. In conclusion, this project is important for future public health research due to the combination of epidemiological and molecular research.

Career plan: Being one of the lucky few with the opportunity to get finance through COFAS made it possible to spend my time as a Post Doc at Harvard Medical School and Broad Institute of Harvard and MIT. This made it possible for me to meet many of the top researchers in the field of Genomics and epidemiology and make contacts that will make future collaborations possible. It also made me aware of how important it is to have strong computational resources in order to produce high quality research and that we need similar resources in Sweden. We are now trying to set up a group of computational researchers with the ability to tackle computational problems related to combining public health information with molecular data. In conclusion, I believe that my Post Doc experience funded through COFAS was very useful for me and for others as well.