JORDAN STUBLESKI is a doctoral student in analytical chemistry. She started her doctoral studies in 2014 at the Man-Technology-Environment Research Centre at Örebro University. Her research has focused on developing and applying high-throughput analytical methods for the determination and evaluation of the longitudinal trend of persistent organic pollutant (POP) concentrations in human blood.

Persistent organic pollutants (POPs) are a group of anthropogenic chemicals that are stable in the environment and bioaccumulate in animals and humans. Over the years, regulatory efforts have resulted in declined levels of some POPs, while the levels of others have increased. Longitudinal studies, which resample the same individuals over time, should ideally be used to evaluate the changes in POP levels, as these designs provide accurate information about how the trend in POP levels is affected by physiological changes and differences that vary from person to person. Despite this, longitudinal biomonitoring studies are scarce. This thesis describes the development and application of high-throughput sample preparation methods used for the analysis of over 2,000 follow-up samples collected from the Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS) cohort. The longitudinal trend in plasma concentrations of chlorinated, brominated and fluorinated POPs and the relationship between the observed trends and residential location, gender, and changes in body weight and lipid levels are also discussed.

The 10 year (2001-2014) longitudinal trend in plasma concentrations of some fluorinated POPs, for example perfluorooctane sulfonic acid and perfluorooctanoic acid, showed an overall significant decrease, while perfluorobutane sulfonic acid (PFBS) and longer chain perfluoralkyl carboxylic acids showed an overall significant increase. This trend was similar to other temporal trend studies with the exception of PFHxS, which showed an overall decrease in other studies, but an increase in the PIVUS cohort as a result of their exposure to drinking water contaminated with fluorinated POPs, including PFHxS. Larger increases in plasma concentrations of PFHxS were observed in Uppsala residents who received between 10-89% and 90-100% of contaminated drinking water. For the chlorinated and brominated POPs, the 5 year (2001-2009) longitudinal trend showed a significant decrease in all pollutants, which is similar to other temporal trend studies. This substantial decrease is likely due to the implemented restrictions placed on the production and use of these chemicals beginning in the late 1970s. The rate of decline was faster in over half of the pollutants in men compared to women, which was not due to differences in the amount of weight lost, but could possibly be a result of differences in diet and residential location. Individuals who lost more weight over time had slower declines in POP concentrations and those who had greater increases in plasma lipids also had slower declines in POP concentrations. Thus, people who lose weight and have an increase in lipid levels are likely to have a higher body burden of chlorinated and brominated POPs.

By applying the high-throughput methods to the plasma samples collected from the PIVUS cohort, more efficient sample processing and evaluation of the trend in POP concentrations was achieved. Conclusively, POP internal body burdens are highly individual and can be greatly influenced by external (residential location) and internal (changes in body weight and blood lipid levels) factors.