

## **Quantitative Measurements of Antidepressants in the Norwegian Environment by HPLC-MS/MS**

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The production and consumption of both human and veterinary drugs are increasing throughout the world today. Pharmaceuticals are discharged to the environment through sewage systems and terrestrial run-off after application on humans or animals either as the unchanged compounds or as metabolites. These compounds might possibly pose a threat to non-target organisms in the environment.

To evaluate whether specific pharmaceuticals are present in environmentally hazardous concentrations in the Norwegian environment a LPME extraction method coupled to HPLC-MS/MS have been developed during this project. The LPME method was time- and work saving compared to a SPE method used earlier, and became the preferred method at our laboratory.

Based on sales numbers the selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs) were selected for the study. Approximately 5% of the Norwegian population are treated with one of the antidepressants, and of these the SSRIs are used in approximately two out of three cases.

The LPME method has been applied to TCAs in waste water, and on SSRIs in seawater in addition to waste water.

The results show that all SSRIs and TCAs are present in every analysed waste water sample. It is also shown that different sewage treatment techniques are not capable of removing the pharmaceuticals from the waste water; hence they are released to the sea. Concentrations in the nearby sea seem to be very dependent of temperature and currents at the release point.

However, there is no doubt about that pharmaceuticals are constantly being released to the marine environment, and might possibly be seen as persistent organic pollutants.