**The potential for phytoremediation of type II antidiabetic drug metformin by *Typha. Latifolia***

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Pharmaceuticals and personal care products (PPCPs) have attracted increasing concern in the last decades (Daughton and Ternes, 1999). Many pharmaceuticals are are recalcitrant and completely removed in traditional wastewater treatment plants (WWTPs). Therefore, It is not surprising that these chemicals are detected in aquatic environment, and cause a potential public health problem and an environmental safety risk.

Metformin is a widely used type II antidiabetic drug and excreted unchanged in the urine. Recent studies show that metformin were detected in WWTPs effluents and also in surface water (Scheurer et al., 2009; 2012). Phytoremediation is a successful technology to clean up organic contaminants in the environment and have low operating and maintenance. Plants can be used for phytoremediation in different ways, such as constructed wetlands or hydroponic systems. However, the mechanism of these contaminants in plants is largely unknown.

We used pitman chamber experiments to investigate uptake and transport of metformin in *T. latifolia* roots (Cui et al., 2015). The results showed that metformin can through into the roots from the water medium. Interestingly, the uptake process is independent of the initial concentrations (0.5, 1.0 and 2.0 mM) of metformin. Quinidine, an inhibitor of organic cation transporters, can significantly inhibit transport of metformin by *T. latifolia* roots with an inhibition ratios of 70~74%.

In the ensuing studies, we used hydroponic incubation systems to assess the the removal and in planta degradation of metformin by *T. latifolia.* In all three initial concentration treatments (50, 150 and 250 μM), the removal processes followed first order kinetics. After 28 days exposure of metformin, the removal efficiencies were in a range of 74.0±4.1~81.1±3.3%. The bioaccumulation factors for *T. latifolia* roots, rhizomes and leaves were in a range of 8.37~53.34, 0.20~4.40 and 0.09~1.39, respectively. These mean bioaccumulation of metformin in roots was much greater than in leaves and rhizomes. Methylbiguanide was found as the only biodegradation product in plant, which has never been reported previously. The study is helpful for understanding of metformin degradation pathway in plant-based systems.