

# Degradation of Pharmaceuticals and Personal Care Products by White-Rot Fungi—a Critical Review

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**Abstract** White-rot fungi (WRF) mediated treatment can offer an environmentally friendly platform for the removal of pharmaceuticals and personal care products (PPCPs) from wastewater. These PPCPs may have adverse impacts on aquatic organisms and even human and thus their removal during wastewater treatment is of significant interest to the water industry. Whole-cell WRF or their extracellular lignin modifying enzymes (LMEs) have been reported to efficiently degrade PPCPs that are persistent to conventional activated sludge process. WRF mediated treatment of PPCPs depends on a number of factors including physicochemical properties of PPCPs (e.g., hydrophobicity and chemical structure) and wastewater matrix (e.g., pH, temperature, and dissolved

constituents), type of WRF species and their specific extracellular enzymes. This review critically analyzes the performance of whole-cell WRF and their LMEs for the removal of PPCPs; particularly, it offers insights into PPCP removal mechanisms (e.g., biosorption vs. biodegradation) and degradation pathways as well as the formation of intermediate byproducts.

**Keywords** White-rot fungi · Lignin modifying enzymes (LMEs) · Pharmaceuticals and personal care products (PPCPs) · Biodegradation · Redox-mediators · Metabolites

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