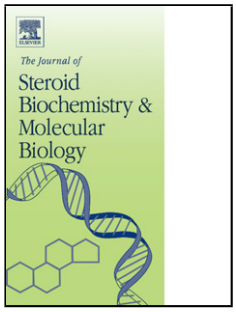

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Uptake and metabolism of water-borne progesterone by the mussel, *Mytilus* spp. (Mollusca)

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Highlights

- Mussel's capacity for uptake of P is very high.
- P was transformed into 3β-hydroxy-5α-pregnan-20-one and 5α-pregnane-3β,20β-diol.
- The P metabolites identified were free and esterified.
- Intact P could not be detected in any fraction of the mussel extract.
- Depuration does not reduce the overall progestogenic burden.

Abstract

Previous studies have shown that mussels can pick up 17β-estradiol [E_2] and testosterone [T] from water, metabolize them and conjugate them to fatty acids (esterification), leading to their accumulation in tissue. A key requirement for the esterification process is that a steroid must have a 'reactive' hydroxyl group to conjugate to a fatty acid (which in T, and probably E_2, is the β-hydroxyl group on carbon 17). Progesterone (P) lacks any hydroxyl groups and theoretically cannot be esterified and hence should not accumulate in mussels in the same way as E_2 or T. However, it is already known that mussels have an enzyme that can achieve 5α-reduction of the A ring of T and P and that there is also another reductase that can transform the 3-oxo group of the 5α-reduced A ring of T into a hydroxyl group. We hypothesized that, although intact P cannot be directly esterified, it might nevertheless be transformed into metabolites that can. To test this hypothesis, we investigated the rate and capacity of uptake, metabolism and potential depuration of tritiated P by the common mussel, *Mytilus* spp. We found that tritiated P was taken up from water at a similar rate to E_2 and T (mean clearance rate 49 mL^{-1} $animal^{-1}$ h^{-1})