

## Can the active substance in contraceptives have a molecular effect on snails?

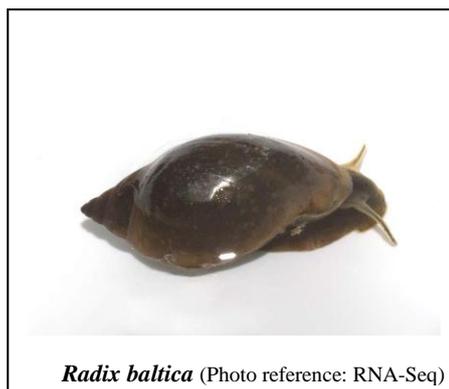
A lot of studies on EDCs, endocrine disrupting chemicals, have been made on vertebrates like fish; less work has been done on the effects on snails. The synthetic sex hormone in contraceptives, *17 $\alpha$ -ethinylestradiol* (EE2), is being discharged into rivers and estuaries through the waste water treatment plants. Reproductive effects on fish have been seen and in recent studies also snails. Studies are now trying to investigate the hormone system of water snails to try to investigate the biochemical pathway of the observed effects.

Sex steroids like the natural human sex hormones  $17\beta$ - estradiol (E2), testosterone and progesterone have been found in snails and estrogen receptors (ERs) in humans, vertebrates (e.g. fish) and snails are similar. The presence of sex hormones and ERs in snails might point to that they have a connection similar to the one in humans. Earlier studies have not been able to show the binding of the sex hormones to the ER and its function is therefore yet to be discovered.

Different species of snails show different reactions to exposure, for e.g. the prosobranch (with gills) species *Potamopyrgus antipodarum* has shown a response in the activity of the ER gene when exposed to EE2 while the pulmonate (with lungs) species *Radix baltica* has not. The results raise the question about whether prosobranch and pulmonate species have a different sensitivity to EE2. Scientist have shown that *R.baltica*'s relative *Lymnaea Stagnalis* has an increase in embryo production when exposed to the high concentration 500 ng/L EE2, while the *P.antipodarum* showed an effect at the same endpoint when exposed to 1 ng/L.

### Reproductive differences might be the reason

The prosobranch and pulmonate species mentioned are reproducing differently, *P.antipodarum* is self-fertilizing and *R.baltica* is a hermaphrodite. This can be the reason for the difference in sensitivity because their hormone systems may function differently. Although, prosobranch species can reproduce in several different ways so the difference might be due to the way of reproduction with no connection to the subclass itself. The sensitivity can also be independent of the endocrine systems and may be due to that prosobranch are breathing through gills compared to pulmonates that breathe through lungs. This might make them more vulnerable for EE2 exposure in rivers and estuaries.



*Radix baltica* (Photo reference: RNA-Seq)