Drug used to treat skin conditions is a marine pollutant

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This is Tobias Porsbring from University of Gothenburg. Credit: University of Gothenburg

Clotrimazole is a common ingredient in over-the-counter skin creams. Recent results from the University of Gothenburg, Sweden, now show that it is associated with major environmental risks.

"The pharmaceuticals and chemicals in everyday use form a mixture in the ocean that has a direct impact on the growth and reproduction of organisms", says scientist Tobias Porsbring.

When Euorpean authorities assess environmental risks, they often do so for one chemical at a time. Recent research, however, shows that the hazardous chemicals that humans spread in the environment do not work alone. Chemicals, drugs and personal-care products that accompany

wastewater often end up in the oceans, where they form a "cocktail" of chemicals. This "cocktail-effect" may be more harmful than the individual chemicals alone.

Environmental risks

Scientist Tobias Porsbring at the Department of Plant and Environmental Sciences at the University of Gothenburg has studied natural communities of microalgae along the Swedish west coast. He presents results in his doctoral thesis that show how the use of a common agent against skin fungi, clotrimazole, is associated with major environmental risks.

"The levels of clotrimazole that are measured in the environment affect the synthesis of sterols in the algae, and these are important in several functions in the algal cells. The growth and reproduction of the algae are disturbed. Single-cell microalgae are the fundamental basis of the ocean food chain, and the use of clotrimazole thus may affect the complete ocean ecosystem", says Tobias Porsbring.

"Cocktail effect" on microalgae

Clotrimazole, however, does not act alone in the ocean ecosystem. Many other substances are often found in the oceans, including propranolol (a drug to lower blood pressure), triclosan (an anti-bacterial agent commonly found in soap and deodorants), fluoxetine (an anti-depressant pharmaceutical) and zinc pyrithione (found in anti-dandruff shampoos). The results that Tobias Porsbring presents show that a mixture of such compounds forms a "cocktail effect" that has a direct impact on the growth of the microalgal community.

Theoretical model

The fact that low levels of a pollutant that are insufficient to cause a detectable effect may contribute to a larger, combined effect with other chemicals emphasises that cocktail effects are a real environmental problem. Despite this, assessments of environmental risk are usually carried out on one chemical at a time. Through knowledge of environmental levels and the impact of individual chemicals Tobias Porsbring's thesis launch a theoretical model for calculating how cocktail effects arise. This model can be used to obtain highly reliable estimates of the composite environmental risk from mixtures of chemicals in the ocean ecosystem.

Source: University of Gothenburg (news : web)