

Environmental pollutants lurk long after they 'disappear'

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The health implications of polluting the environment weigh increasingly on our public consciousness, and pharmaceutical wastes continue to be a main culprit. Now a Tel Aviv University researcher says that current testing for these dangerous contaminants isn't going far enough.

Dr. Dror Avisar, head of the Hydro-Chemistry Laboratory at TAU's Department of Geography and the Human Environment, says that, when our environment doesn't test positive for the presence of a specific [drug](#), we assume it's not there. But through biological or [chemical processes](#) such as [sun exposure](#) or oxidization, drugs break down, or degrade, into different forms — and could still be lurking in our water or soil.

In his lab, Dr. Avisar is doing extensive testing to determine how drugs degrade and identify the many forms they take in the environment. He has published his findings in *Environmental Chemistry* and the Journal of Environmental Science and Health.

Replicating nature

Drug products have been in our environment for years, whether they derive from domestic wastewater, hospitals, industry or agriculture. But those who are searching for these drugs in the environment are typically looking for known compounds — parent drugs — such as antibiotics, pain killers, lipid controllers, anti-psychotic medications and many more.

"If we don't find a particular compound, we don't see contamination — but that's not true," Dr. Avisar explains. "We may have several degradation products with even higher levels of bioactivity." Not only do environmental scientists need to identify the degraded products, but they must also understand the biological-chemical processes that produce them in natural environments. When they degrade, compounds form new chemicals entirely, he cautions.

For the first time, Dr. Avisar and his research group have been working to simulate environmental conditions identical to our natural environment, down to the last molecule, in order to identify the conditions under which compounds degrade, how they degrade, and the resulting chemical products. Among the factors they consider are sun exposure, water composition, temperatures, pH levels and organic content.

Currently using amoxicillin, a common antibiotic prescribed for bacterial infections such as strep throat, as a test case, Dr. Avisar has successfully identified nine degradation products with different levels of stability. Two may even be toxic, he notes.

Classifying compounds with a fine-tooth comb

According to Dr. Avisar, who will soon expand his research to include the degraded products of chemotherapy drugs, his research is breaking new ground, extending past research. And while the attempt to catalogue the degraded products of common compounds in our environment may feel like looking for needles in haystacks, it's research that the world can't afford to ignore.

"It's important to talk about the new chemicals in our [environment](#), derived from parent drugs. They are part of the mixture," Dr. Avisar warns. "Chemicals do not simply disappear — we must understand what

they've turned into. We are dealing with a whole new range of contaminants."

Provided by Tel Aviv University

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