

# Sunlight can influence the breakdown of medicines in the body

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A study from Karolinska Institutet has shown that the body's ability to break down medicines may be closely related to exposure to sunlight, and thus may vary with the seasons. The findings offer a completely new model to explain individual differences in the effects of drugs, and how the surroundings can influence the body's ability to deal with toxins.

The study will be published in the scientific journal [Drug Metabolism & Disposition](#) and is based on nearly 70,000 analyses from patients who have undergone regular monitoring of the levels of drugs in their blood. The drugs taken by these patients are used to suppress the immune system in association with organ transplants. Samples taken during the winter months were compared with those taken late in the summer.

A more detailed analysis showed that the concentrations of drugs such as tacrolimus and sirolimus, which are used to prevent rejection following transplantation, vary throughout the year in a manner that closely reflects changes in the level of [vitamin D](#) in the body. The ability of the body to form vitamin D depends on sunlight, and the highest levels in the patients taking part in the study were reached during that part of the year when the levels of the drugs were lowest.

The connection between sunlight, vitamin D and variations in drug concentration is believed to arise from the activation by vitamin D of the detoxification system of the liver by increasing the amount of an enzyme known as CYP3A4. This enzyme, in turn, is responsible for the breakdown of tacrolimus and sirolimus.

"If the breakdown capacity increases, then higher doses of a drug are normally required in order to achieve the same effect", says Jonatan Lindh at the Department of Laboratory Medicine and one of the scientists who carried out the study. "More research will be needed to confirm the results, but CYP3A4 is considered to be the most important enzyme in [drug](#) turnover in the body, and the results may have significance for many drugs."

The effects of vitamin D on CYP3A4 have previously been demonstrated in experiments in cell cultures. But the study now to be published shows for the first time that the mechanism can play an important role in the pharmacological treatment of patients, and it shows for the first time that variation in exposure to [sunlight](#) may affect the sensitivity of individuals to drugs.

**More information:** Lindh JD, Andersson ML, Eliasson E, Björkhem-Bergman L, Seasonal variation in blood drug concentrations and a potential relationship to vitamin, [www.ncbi.nlm.nih.gov/entrez/quicksearch?term=CYP3A4+vitamin+D&itool=pubmed\\_docsum](http://www.ncbi.nlm.nih.gov/entrez/quicksearch?term=CYP3A4+vitamin+D&itool=pubmed_docsum)

Provided by Karolinska Institutet

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