

Arsenic for better drugs and cleaner crops

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Research carried out at the University of Gothenburg may lead to more effective arsenic-containing drugs. The results may also lead to more resistant plants, and crops with a limited absorption and storage of arsenic.

Even though [arsenic](#) is toxic for many organs in the human body, it is used in the treatment of some forms of cancer, and it is an active component of drugs against [parasitic diseases](#).

Healing arsenic

Arsenic is used in therapeutic medicine, but we know relatively little about the mechanisms by which cells develop resistance to arsenic, which may lead to a lower [therapeutic effect](#).

Proteins control cellular processes

Scientist Doryaneh Ahmadpour at the Department of Chemistry and [Molecular Biology](#), University of Gothenburg, has carried out experiments with common baker's yeast, in order to find out how inflow and outflow take place in cells.

"The knowledge we obtain from determining these mechanisms in [yeast](#) can be subsequently used in the long term to produce more effective drugs containing arsenic. A membrane protein known as Fps1 is particularly interesting. This protein transports the trivalent form of arsenic (arsenite) into and out from the cell," says Doryaneh

Ahmadpour.

She has worked with scientist Michael Thorsen to show how the Fps1 protein is regulated and how the inflow into the cell of arsenic is influenced by another protein, Hog1.

The results suggest that a reduction in the activity of Hog1 is an effective way of increasing the ability of the cell to absorb arsenic. This may make the cell more sensitive to arsenic and thus give more effective treatment.

Resistance to arsenic can be increased in a similar manner, by increasing the activity of Hog1, which reduces the inflow of arsenic into the cells.

"We have shown also that a protein known as Slt2 regulates the outflow of arsenic from the cell, and increases the resistance of the cell to arsenic. It is possible, in the same way, to regulate the cellular resistance against arsenic by controlling the activity of Slt2."

Arsenic as a problem

Arsenic is a toxic metalloid that is naturally found in earth crust. It can be leached out by water or spread by industrial activity.

Arsenic is a global problem due to the increasing contamination of water, soil and crops, not only in the industrialized world but also in developing countries.

"High levels of arsenic in groundwater can lead to humans being exposed to toxic levels in food and water. This affects mainly people in regions in which the crops are watered with arsenic-contaminated water, leading to arsenic being stored in the plants."

Resistant crops

Increased knowledge about arsenic can be used to produce plants with a high absorption, and these can be used to clean contaminated land. The knowledge can also be used to produce food crops, known as "safe crops", with a limited [absorption](#) and storage of arsenic.

Provided by University of Gothenburg

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