Old drugs can treat new diseases

Scientists find more than 30,000 possible new applications for existing drugs.

Schizophrenia is a dangerous psychological disease that creates an imbalance in the brain’s neurotransmitters.

Tuberculosis, on the other hand, is an infectious disease in the lungs caused by the bacteria Mycobacterium tuberculosis. In severe cases it can lead to Encephalitis, an acute infection and inflammation of the brain.

You might not think that these two diseases have much in common. But scientists have discovered that a particular drug for schizophrenia may also cure tuberculosis.

The drug is called chlorpromazine and is but one of thousands of drugs that could potentially be used to treat more diseases than they are currently approved for.

The new results are published in the scientific journal, Drug Discovery Today.

Computer software matches drugs with diseases

The researchers have developed a special computer software to predict which drugs might work on other diseases.

When the system detects a possible match, the scientists then search through the scientific literature to see whether the drug has ever been used in this way before.

“Our platform attempts to solve the challenge of finding out if known drugs can be used for other diseases than initially designed for,” says lead author Jan Baumbach, an associate professor at the Department of Mathematics and Computer Science at the University of Southern Denmark.

Many drugs work against more than one disease

Professor and Head of Department of Drug Design and Pharmacology at the University of Copenhagen, Denmark, Ole Thastrup, knows all too well that some drugs may be used to treat diseases other than the ones that they were developed for.

“We’ve worked with ‘therapy shift’ for many years in medicine so it’s well known that several drugs have effects in more than one disease,” he says.

Thastrup was not involved in the new study, but he finds the results interesting.

“The fact that you qualify substances by reviewing the literature is a really good start. It would have been interesting if they’d also tested whether any of the substances actually worked on the new diseases,” he says.
Medicine strikes many processes in the body

Most of the recyclable products can be used on similar diseases, for example, different types of cancer, says Baumbach.

But the scientists also discovered some more surprising new treatments. For example, schizophrenia medication that can be used on tuberculosis, and a remedy for inflammation to treat Parkinson's disease.

The reason is because the drugs do not just work by beating diseases to death, says Baumbach.

A drug will typically affect one or more proteins made in our body, which control various processes. For example, the schizophrenia medication affects the uptake of the neurotransmitter dopamine in the brain.

The production and absorption of the protein is controlled by one or more particular genes.

If another disease is linked to disturbances in this protein or the genes that control it, then there is a high probability that a drug will effectively treat both diseases.

“With tuberculosis and schizophrenia, it may be that the bacteria, which are the cause of tuberculosis, are in some way dependent on the receptors that release dopamine. And they are blocked by the schizophrenia medicine,” says Baumbach.

A cheap alternative

According to Baumbach, the new research could bring real benefits to patients.

To develop new drugs from the bottom up is time-consuming and expensive. The drug must first be developed and tested on animals before multiple rounds of large, expensive human clinical trials.

But it is not necessary to test the product’s safety once it has already been approved. Which means that you can skip the animal experiments and many of the clinical trials if an existing medicine is to be used to treat another disease.

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Read the Danish story on Videnskab.dk [7]

A new study documents how scientists can identify approved drugs that could be used to treat a range of diseases. (Photo: Shutterstock) [8]

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