

# Scientists developing protection mechanisms for genetic data

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Professor Stefan Katzenbeisser develops special methods to encrypt genomic data. Credit: Katrin Binner

The more we know about our genome data, the better our doctors will be able to treat us in the future. But how can we make use of this sensitive data, without allowing it to be misused? The IT specialists around Stefan Katzenbeisser and Kay Hamacher from the Technische Universität Darmstadt want to encrypt genome data so skilfully that it is still possible to carry out mathematical analyses.

Dirk von Gehlen is a journalist who works for the Süddeutsche Zeitung newspaper, which is published in Southern Germany. He was recently visited by colleagues from the North German Broadcasting Corporation, Norddeutscher Rundfunk (NDR). They brought him a USB stick on which was stored a complete month of his browser history – the websites

he had visited, the search keys he had entered in Google and the train journeys he had booked. The NDR reporter had bought the data over the Internet. Gehlen was flabbergasted! He had no idea that a company was using a harmless browser add-on to secretly record the Internet activities of millions of users and offer the data for sale internationally.

Researchers fear that something similar could happen in future with [genome](#) data that provides ever-deeper insights into our biological identity. A few years ago, for example, customers of the American company 23andme were already paying a fee and sending in a saliva sample. The company analysed the inherited genetic variations – the so-called SNPs (Single Nucleotide Polymorphisms). From this, they could discern whether someone has an increased risk of developing cancer, Huntington's disease or Parkinson's disease.

Admittedly the American authorities banned the transaction, because they feared that customers could misunderstand the findings without medical advice. But the company is still able to keep on collecting genome data, so that now it can ascertain the customers' genetic parentage. The data is digitally stored and could theoretically be sold on. It would be worth its weight in gold to medical insurance and [life insurance companies](#).

## **Basis for personalised medicine**

But despite everything, it is not a good idea to ban the storage and use of this data. Because it could revolutionise medicine. "Genome data is the basis for personalised medicine", says Kay Hamacher, bio-informatics specialist at the TU Darmstadt. "Behind it is the vision that in future, doctors will be able to offer their patients individually tailored forms of treatment on the basis of genetic information." The genome data could, for example, provide information about whether or not someone will tolerate certain medication, or whether a particular treatment would

work really well.

Kay Hamacher and Stefan Katzenbeisser from the Cybersecurity (CYSEC) profile area are looking to harness [genome data](#) for these purposes, whilst making its misuse as impossible as current cryptotechnology allows. The risk is always present, when doctors and clinics release the data for research. Genome research is assigned to powerful computers, so IT service providers often have to be involved, using supercomputers to trawl through the data. "So we need a method that, although it encrypts the data, still allows its use in subsequent calculations", says Stefan Katzenbeisser. "It must never be possible for the service provider performing the calculation to see the unencrypted data."

Provided by Technische Universitat Darmstadt

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