Genetic safety switches could help curb potential bioterror risks

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The potential threat of bioterrorism using man-made biological organisms could be reduced, thanks to a new method developed by scientists.

Synthetic biologists - who can design and modify the DNA of living organisms to give them novel, useful functions - have devised a way of containing their products to help ensure that they work only as intended.

Researchers have developed a set of genetic switches that can be built into engineered organisms, to control the function of genes they need to survive.

The genetic switches are controlled by the addition of a mixture of naturally occurring chemicals, which can be customised for a variety of products.

These could prevent potential harm from either the theft or misuse of these substances, which are used in biofuels, food, and medicines.

Researchers at the Universities of Edinburgh and NYU Langone Medical Center have developed two types of molecular switch that work in yeast, a commonly used model organism.

The team inserted a second set of on and off switches to target another vital gene, to mitigate the risk that changes in the live yeast might enable it to circumvent chemical control.

The study, published in *Proceedings of the National Academy of Sciences*, was funded by the US Defense Advanced Research Projects Agency and the Biotechnology and Biological Sciences Research Council.

Dr Patrick Yizhi Cai of the University of Edinburgh's School of Biological Sciences, who jointly led the research, said: "Synthetic biology is a fast-developing field with huge potential to benefit society, but we need to be mindful about its potential risks and take active steps to limit them in our biological designs. With these genetic safety switches, we can contain engineered organisms with a special combination of small molecules."

More information: Intrinsic biocontainment: Multiplex genome safeguards combine transcriptional and recombinational control of essential yeast genes, *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1424704112

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