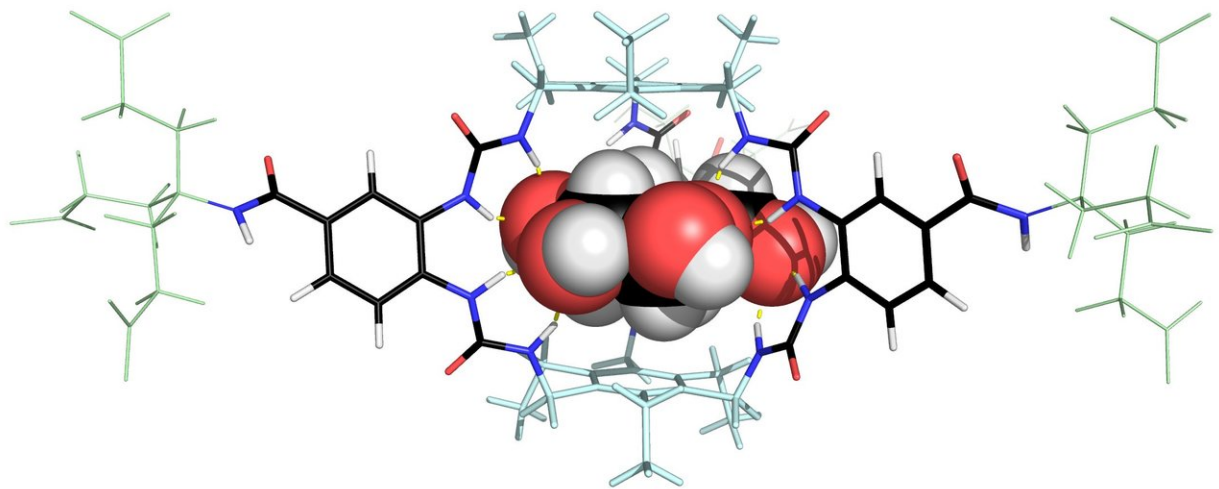


Glucose binding molecule could transform the treatment of diabetes

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Receptor binding glucose. Credit: University of Bristol

Scientists from the University of Bristol have designed a new synthetic glucose binding molecule platform that brings us one step closer to the development of the world's first glucose-responsive insulin which, say researchers, will transform the treatment of diabetes.

The World Health Organization estimate that over 382 million people worldwide, including 4.05 million people in the UK, have diabetes—a metabolic disorder affecting [blood sugar levels](#). Everyone with Type 1 diabetes and some people with Type 2 diabetes need to take insulin,

either by injection or a pump, to control their [blood glucose levels](#).

The team from the University's School of Chemistry, led by Professor Anthony Davis, in conjunction with spin-out company Ziylo, have developed an innovative technology platform, which could be a key component to enable the next generation of insulin, able to react and adapt to [glucose](#) levels in the blood. This could eliminate the risk of hypoglycaemia—dangerously low blood sugar levels—leading to better metabolic control for people living with the disease.

Earlier this year Ziylo was bought by global healthcare company Novo Nordisk in a deal which was worth around \$800 million—the biggest deal of its kind in the history of the University of Bristol.

Now, the science behind the research has been published in the journal *Nature Chemistry*.

Professor Davis, who has been at the forefront of research into synthetic sugar receptors for the last 20 years, said: "For many years we have been trying to design a molecule which binds glucose strongly and selectively in its natural environment (water).

"Until recently we had achieved some success, but never sufficient for practical applications. Now we have made a design change and finally solved the problem.

"Indeed, our new molecule performs better than anyone would have thought possible. It binds glucose 100 times more strongly than any of our previous efforts and is almost perfectly selective for its target. It is fully comparable with the natural molecules that bind glucose, despite being many times smaller."

There are good prospects for using the synthetic receptor to help

diabetics.

Firstly, it could be the key to developing glucose-responsive insulin—[insulin](#) which becomes inactive when glucose is not present. This could free diabetics from the fear of hypoglycemia, where glucose levels sink to dangerously low levels.

Secondly it could be used in continuous glucose monitors, which would allow diabetics to know their glucose levels at all times.

Professor Davis added: "On a scientific level, we have shown that small synthetic molecule can match the performance of evolved natural [molecules](#) (proteins), even when the task is unusually difficult (the selective binding of glucose in water has always been thought to be exceptionally challenging).

"After so many years trying, it is fantastic that we have made something that could save so many lives."

More information: Robert A. Tromans et al, A biomimetic receptor for glucose, *Nature Chemistry* (2018). [DOI: 10.1038/s41557-018-0155-z](https://doi.org/10.1038/s41557-018-0155-z)

Provided by University of Bristol

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