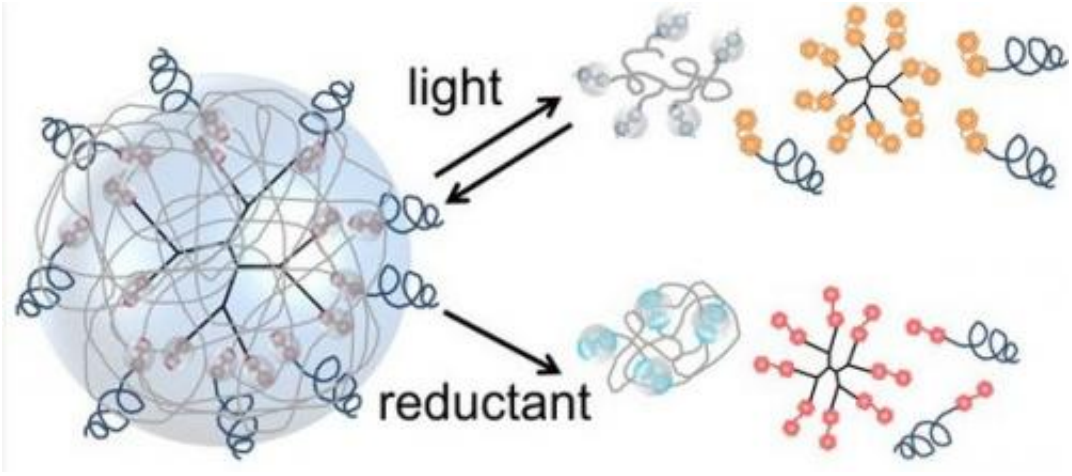
Researchers develop strategy for targeted drug delivery

March 3 2014, by Joost Bruysters



Researchers at the University of Twente's MESA+ research institute have developed a new strategy for delivering drugs to specific areas of the body in a targeted way. They have created a carrier that, in principle, is able to transport drugs, proteins or even DNA molecules. By shining UV light onto the carrier or by subjecting it to chemical reaction, the carrier disintegrates, releasing the drugs. Although the research is fundamental, the strategy itself is promising. The researchers have published their research in the leading scientific journal *Angewandte Chemie*.

Generally speaking, if you inject drugs into the bloodstream then they

are dispersed throughout the body. In the case of chemotherapy, for example, the drugs will then not only attack tumour cells but also the patient's healthy cells, with all the consequences this entails. You can prevent this from happening by introducing the drugs inside a carrier and targeting the right place in the body. Lower concentrations of the drugs are then also possible. This approach is called targeted therapeutics and is very promising.

Three-dimensional nanostructures

The challenge when developing a carrier for the drugs lies in finding a way of making the carrier disintegrate at the right spot so that the drugs are released there. Researchers at the University of Twente have now developed a new strategy for this. They have created supramolecular nanostructures that consist of three different components. These components automatically clump together to form a three-dimensional structure into which drugs, proteins and even DNA molecules fit. By shining UV light on the structure or by subjecting it to a specific chemical reaction, the structure disintegrates into its original component parts, releasing the load it is carrying. The structures developed measure between 50 and 100 nanometres (a nanometre is one million times smaller than a millimetre). This means that they are large enough to enclose drugs, but small enough to be transported in the bloodstream.

Disintegration

Professor Juriaan Huskens does not expect that the specific nanostructures he developed with his research group will end up actually being used for targeted drug delivery in clinics, but the strategy itself is very promising. "Clinical trials, which means scientific research involving patients, are currently taking place in the field of targeted therapeutics using comparable systems, but the drug carriers involved

cannot be made to disintegrate in a targeted way. Now, for the first time, we have found an approach that makes this possible."

More information: Stoffelen, C., Voskuhl, J., Jonkheijm, P. and Huskens, J. (2014), "Dual Stimuli-Responsive Self-Assembled Supramolecular Nanoparticles." *Angew. Chem.* Int. Ed.. DOI: 10.1002/anie.201310829

Provided by University of Twente