Scientists modify Botox for the treatment of pain

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A team of 22 scientists from 11 research institutes led by Professor Bazbek Davletov, now at the University of Sheffield, created and characterised a new molecule that was able to alleviate hypersensitivity to inflammatory pain.

The work is featured on the cover of the October 2013 issue of the scientific journal *Bioconjugate Chemistry*.

Professor Bazbek Davletov joined the Department of Biomedical Science in September last year from the Medical Research Council's Laboratory of Molecular Biology in Cambridge, where his team developed a new way of joining and rebuilding molecules.

By using elements of *Clostridium botulinum* and *Clostridium tetani* neurotoxins, commonly known as Botox and tetanus toxin respectively, the scientists were able to develop a molecule with new biomedical properties, without unwanted toxic effects.

While the Botox element is able to block neuronal communication – and therefore pain signals - for months, the tetanus component targets the central nervous system very effectively. The combination of the two elements is of great interest for neuroscience and can be applied to the treatment of several neurological disorders, particularly chronic pain conditions and epilepsy.

Botox and tetanus neurotoxins hold great promise for clinical

applications, but their paralytic activity was a stumbling block until now. The team demonstrated that their newly engineered molecule is a potent non-paralysing neuronal blocker. Preclinical collaborative studies with Dr Enrico Ferrari at the University of Lincoln and Professor Stephen Hunt at University College London indicate usefulness of the new molecule for alleviation of inflammatory pain.

Professor Davletov added: "Currently painkillers relieve lingering pain only temporarily and often have unwanted side effects. A single injection of the new molecule at the site of pain could potentially relieve pain for many months in humans and this now needs to be tested. "We hope that the engineered molecule could improve the quality of life for those people who suffer from chronic pain. We are now negotiating transfer of the technology to a major pharmaceutical company."

Professor Davletov's team in the Department of Biomedical Science is now working not only on neuronal blockers tailored for various neurological conditions but also on developing new cancer drugs.

More information: Synthetic Self-Assembling Clostridial Chimera for Modulation of Sensory Functions, *Bioconjugate Chemistry*, DOI: 10.1021/bc4003103

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