cells in this population should reduce the chances of transplants giving rise to tumors caused by the use of heterogeneous populations, which is not uncommon with current protocols. The big question left unanswered is whether a technique that works so well on mouse embryonic stem cells can be adapted to work on human stem cells as well.

Daniel Evanko

RESEARCH PAPERS

Bibel, M. *et al.* Differentiation of mouse embryonic stem cells into a defined neuronal lineage. *Nat. Neurosci.* **7**, 1003–1009 (2004).

SPECTROSCOPY

NMR UNCOVERS THE SECRET OF SPIDER VENOM

Spiders have their bad reputation for a reason. Not only do they scare people with hairy, scurrying legs, they also include neurotoxic compounds in their venom, some of which have so far escaped analytical detection. In an effort to thoroughly characterize spider venom, a research group at Cornell University used NMR spectroscopy directly on the crude sample to identify as yet undiscovered compounds (Taggi *et al.*, 2004).

Standard protocols usually start with extraction and fractionation prior to analytical procedures such as NMR or mass spectrometry. Unfortunately, these initial steps often discriminate against some groups of molecules while favoring others, so that not all of the original compounds can be identified.

In a recent issue of the *Journal of the American Chemical Society,* Frank Schroeder and his colleagues present a strategy to circumvent this bias. They obtained two-dimensional NMR spectra directly from the crude venom of the grass spider *Hololena curta* without prior fractionation. These spectra showed the presence of unusual nucleoside derivatives. Based on this structural information, a specific purification scheme could be developed, which allowed the researchers to characterize the new compounds as sulfated ribonucleosides. "The strength of this method," Schroeder points out, "is that you have the original NMR spectra [of the unfractionated sample] as a reference and so you are able to detect any degradation or decomposition of the biological material during the fractionation procedures."

The next step for Schroeder and his team is to pinpoint the biological properties of the sulfated nucleosides, which are expected to function as neurotoxins. Furthermore, certain nucleoside derivatives are known to act as inhibitors of viral progression, and spider venom could thus contain information that will help develop potent antiviral drugs. The good news for spiders is that this may improve their reputation.

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RESEARCH PAPERS

Taggi, A.E. *et al.* A new approach to natural product discovery exemplified by the identification of sulfated nucleosides in spider venom. *J. Am. Chem. Soc* **126**, 10364–10369 (2004).