

# Making biological drugs with spider silk protein

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Jumping spider. Credit: Lena Holm

Researchers at Karolinska Institutet in Sweden have managed to synthesise lung surfactant, a drug used in the care of preterm babies, by mimicking the production of spider silk. Animal studies reveal it to be

just as effective as the biological drugs currently in clinical use. The study is published in *Nature Communications*.

Surfactant revolutionised the care of preterm babies by reducing the surface tension in their pulmonary alveoli and allowing them to be inflated at the moment of birth. Curosurf, the most globally widespread [drug](#), was developed by scientists at Karolinska Institutet in the 1970s and 1980s. The drug is produced by the isolation of proteins from pig lungs, a process that is expensive, complicated and potentially risky. Researchers at Karolinska Institutet and their colleagues from the University of Riga amongst other institutions, have now developed a surfactant drug that can be produced much more simply and cheaply using spider protein.

"The manufacturing process is based on the method spiders use to keep their extremely easily aggregated proteins soluble for silk-spinning," explains Professor Jan Johansson at Karolinska Institutet's Department of Neurobiology, Care Sciences and Society. "We chose to produce [lung](#) surfactant protein C because it is probably the world's most aggregation-inclined protein."

By applying this method, the researchers have managed to produce a range of potential biological drugs using the part of the spider protein that ensures that the proteins remain soluble, namely the N-terminal domain.

"We had bacteria produce this part of the protein and then linked it to different [protein](#) drug candidates," says docent Anna Rising at Karolinska Institutet's Department of Neurobiology, Care Sciences and Society who co-led the study with Professor Johansson.

The researchers also compared their synthetic lung surfactant with the biological analogue currently on the market and found it equally

effective at reducing the [surface tension](#) in an animal model of neonate respiratory disorders.

"Since this production method is much simpler and cheaper, it might one day be possible to use our synthetic lung surfactant to treat more lung diseases than just [preterm babies](#)," adds Professor Johansson. "The method will also hopefully enable the production of other biological drugs."

**More information:** Nina Kronqvist et al. Efficient protein production inspired by how spiders make silk, *Nature Communications* (2017). [DOI: 10.1038/ncomms15504](https://doi.org/10.1038/ncomms15504)

Provided by Karolinska Institutet

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