

The good side of the prion: A molecule that is not only dangerous, but can help the brain grow

February 14 2013



A few years ago it was found that certain proteins, the prions, when defective are dangerous, as they are involved in neurodegenerative syndromes such as the Creutzfeldt-Jakob and the Alzheimer diseases. But now research is showing their good side, too: when performing well, prions may be crucial in the development of the brain during childhood, as observed by a study carried out by a team of neuroscientists at Trieste's SISSA which appeared in the *Journal of Neuroscience*.

Doctor Jekyll and Mr. Hyde: the metaphor of the good man who hides an evil side suits well the prion (PrPC in its physiological cellular form), a protein which abounds in our brain. Unlike Doctor Jekyll, the prion was at first considered for its upsetting properties: if the molecule abnormally folds over itself it unfortunately plays a crucial role in neurodegenerative processes that lead to dreadful syndromes such as the [mad cow disease](#).

Prions, however, in their normal form abound in synapses, the contact points where the nervous signal is passed from a neuron to the next. Such protein relatively abounds in the brain of very young children, and this is the reason why scientists have assumed it may play a role in the nervous system development, and in particular in neurogenesis, in the development of new synaptic connections and in plasticity.

More in detail

Maddalena Caiati, Victoria Safiulina, Sudhir Sivakumaran, Giuseppe Legname, Enrico Cherubini, all researchers at SISSA, and Giorgia Fattorini of the Università Politecnica delle Marche have verified at the molecular level the effects of PrPC on the cell plasticity of the hippocampus, a [brain structure](#) which has important functions related to memory.

Maddalena Caiati and her colleagues have demonstrated that PrPC controls synaptic plasticity (the growth capacity of the [nervous tissue](#)) through a transduction pathway which involves also another protein, the [protein kinase A](#) enzyme (PKA).

The recently published research is only the starting point. As for the future, it will be interesting to get a closer look at the role played by the [prion](#) protein in the development of neuronal circuits both under physiological and pathologic conditions in neurodegenerative diseases.

More information: [DOI: 10.1523/JNEUROSCI.5019-12.2013](https://doi.org/10.1523/JNEUROSCI.5019-12.2013)

Provided by Sissa Medialab

Citation: The good side of the prion: A molecule that is not only dangerous, but can help the brain grow (2013, February 14) retrieved 25 April 2024 from <https://medicalxpress.com/news/2013-02-good-side-prion-molecule-dangerous.html>

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