

Ready for a shock?

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Translated by Mark Hucko, Checkbiotech

Tobacco plants can now produce vaccine against Lyme disease – a tick-borne disease from the bacterium *Borrelia burgdorferi*. Dr. Heribert Warzecha, from the University of Würzburg, Germany, describes how his group was able to accomplish this feat in the scientific journal *Nature Biotechnology*.

Scientists have already several times tried to generate plant-made vaccines with the aid of genetic engineering. Generally it works since many vaccines are protein-based, whose building code can be inserted into the plant hereditary material as DNA. However, until now, enhanced plants have produced only minute amounts of the desired substances.

In an innovative approach, Dr. Warzecha and his team built in the additional hereditary information in the tobacco plant's chloroplasts – not in the cellular nucleus. Chloroplasts are small cellular organelles with their own hereditary material, which help the plants to produce energy from sunlight. The advantage: in one cell there are around one hundred chloroplasts in comparison to only one nucleus. Thus, plants with transgenic chloroplasts are more effective vaccine producers, in that the yield of a target protein is much higher than those that target the nucleus.

Dr. Würzburg's plants produce an OspA protein, which is also found on the surface of the bacterium *Borrelia burgdorferi*. However, OspA alone is not suitable as a vaccine. To be effective it must be combined with fatty acids – and to Dr. Würzburg's fortune his genetically modified plants were able to accomplish this combination.

Experiments with mice showed that the tobacco vaccine has comparable effectiveness with vaccines produced in conventional bacterial cultures. However, it appears that people cannot take advantage of this protection yet, since *Borrelia burgdorferi* vaccines have not been granted public use by regulatory officials.

Nature Biotechnology, Bd. 24, S. 76

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