

Association between Parkinson's disease and rotenone

BfR opinion No. 042/2012, 6 December 2012

In November 2012, results from a study with the insecticide rotenone were published in the scientific journal "Nature Scientific Reports". Rotenone has not been authorised as a pesticide in the Federal Republic of Germany since 1987, largely because of a lack of toxicological studies on the health effects of this active ingredient. In the opinion of the BfR, the published results are to be seen as further indications of a possible association between rotenone exposure and Parkinson's disease (Morbus Parkinson).

The insecticide rotenone is derived from the roots of certain leguminous plants originating in tropical regions (*Derris spp.*, *Lonchocarpus spp.*, *Terphrosia spp.*). Rotenone acts on insects as a contact and stomach poison; it interferes with the mitochondrial electron transport chain (respiratory chain).

In Germany, the active ingredient rotenone has, due to a lack of toxicological studies on the health effects of the substance, not been authorized as a pesticide since 1987.

In the EU, the non-inclusion of rotenone in Annex I to Council Directive 91/414/EEC was adopted by the Commission Decision of 10 April 2008 (2008/317/EC). Accordingly, all authorisations for rotenone-containing pesticides had to be withdrawn by 10 October 2008. In contrast, in France, Italy and Great Britain, authorisations for certain applications (limited to professional users with appropriate protective equipment) were allowed to continue until 30 April 2011.

It is known from animal experiments that rotenone can cause symptoms that are typical for Parkinson's disease, as movement disorders, and can also lead to corresponding pathological changes in cells. The histopathological features include, for example, cytoplasmic inclusions in the neurons of the substantia nigra, a region of the midbrain. In addition, it can lead to a progressive loss of nerve cells (degeneration of nigrostriatal dopaminergic neurons (BfR, 2006).

The results reported in the current publication on the mechanism of inducing Parkinson's symptoms by rotenone in mice (Pan-Montojo et al., 2012) can therefore be interpreted as further indications of a possible association between rotenone exposure and Parkinson's-like disease.

Literature

BfR (2006) Pesticide exposure and Parkinson's disease: the BfR believes there is an association but no causal relationship. BfR opinion No. 033/2006, 27 June 2006.

Pan-Montojo et al. (2012) Environmental toxins trigger PD-like progression via increased alpha-synuclein release from enteric neurons in mice. Nature, Scientific Reports, Article number 898, published 30 November 2012.