

# Ask a Researcher

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**Question:** Are Parkinson disease patients protected from some but not all cancers?

## **Answer 1**

There is substantial evidence based on well designed epidemiologic studies for low cancer rates in patients with Parkinson disease (PD). This risk reduction cannot be attributed to the recognized low life-long incidence of smoking in patients with PD, as not only smoking-related cancers but also non-smoking-related ones are less common in PD.

Whereas the risk for most cancers appears to be relatively low in patients with PD, breast cancer and melanomas occur more frequently in the PD population as compared with controls. The relationship between this peculiar pattern of cancer rates and PD might be related to the involvement of common genes in both diseases. Mutations in parkin gene, for example, have been reported in several types of cancer.

Furthermore, genes involved in familial forms of PD appear to be abnormally expressed in cancers. Thus, parkin and PINK1 might be tumor suppressor genes, whereas DJ-1 is an oncogene. Cell survival signals may differ owing to mutated genes and represent two opposite extremes such as cell proliferation in cancer and cell death due to apoptosis in PD. Unraveling the link between PD and cancer may open a therapeutic window for both diseases.

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## **Answer 2**

Associations between PD and cancers are weak, but most published studies have shown a decrease in risk of cancer (mainly lung cancer) in patients with PD, with no change in this association detected for familial PD.

One study has shown an increase in expression of genes associated with cancer in the substantia nigra of PD patients but the data suggests that the gene changes identified are independently related to both disease states, rather than being causative for PD.

MSH-2 expression has not been directly studied in PD in the human. It must be remembered that changes in MSH-2 expression demonstrated in the study by Belloni (the stimulus for this question) occurred in a cell line in response to a specific toxin known to induce DNA damage. As such the relevance of these changes for the human brain, especially in PD, are unknown.

In summary, the data to date suggests that persons with PD are less likely to suffer cancer compared with the general population and no particular role for MSH2 has been suggested in the aetiology of PD.

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