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Food grade titanium dioxide consumption may induce adenomas and DNA damage in colon of mice

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Food grade titanium dioxide (E171), is used in food industry as a whitening and brightening agent and in personal care products. The Food and Drug Administration allows the use of E171 in up to 1% of the final product weight. However, the IARC has classified TiO₂ as a possible carcinogen to humans by inhalation but the oral route has been poorly investigated. Here we investigated the effect of E171 in colon, liver and spleen after oral administration to mice in the solid diet. For this purpose, BALB/c mice were fed with 0.5% E171 through the solid diet during 4 and 10 weeks. We found that two of the five mice treated for 10 weeks developed adenomas (4 and 6 tumors each) in the distal colon. DNA damage in these organs was measured using the γ -H2AX immuno-staining assay and measuring ATM and ATR expression in colon, E171 consumption induced a 1.5-fold of increase of fluorescence in liver, 2-fold in spleen and 3-fold in colon after 4 weeks and the DNA damage was sustained at least until 10 weeks. There were no changes in ATM and ATR expression. These results suggest that oral consumption of 0.5% E171 in the solid diet can cause the formation of adenomas in colon and DNA double strand breaks in these organs. Also, that probably colon tissue could have higher susceptibility followed by spleen and liver.