

J Anim Sci. 1996 Jul;74(7):1672-80.

Bioactivation of aflatoxin B1 in the nasal and tracheal mucosa in swine

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Abstract

Whole-body autoradiography of 3H-labeled aflatoxin B1 in young pigs showed a localization of bound label in the nasal olfactory and respiratory mucosa, in the tracheo-laryngeal mucosa, and in the conjunctiva, in addition to the liver. Whole-body and microautoradiography also showed a labeling of pigmented tissues, which can be ascribed to a melanin binding of AFB1. In vitro experiments with microsomal preparations of various tissues from sows revealed that the nasal respiratory and olfactory mucosa had the highest capacity to form DNA-bound aflatoxin B1-metabolites. The tracheal mucosa and the liver, in order, had lesser binding capacity. The lung was found to be devoid of aflatoxin B1-bioactivating capacity. In vitro microautoradiography revealed bound label in specific cell types in the nose and trachea and in some cells of the conjunctiva. A drastic decrease in the aflatoxin B1-DNA binding was observed when microsomal preparations of the nasal respiratory and olfactory mucosa were incubated in the presence of reduced glutathione, but without any addition of cytosolic glutathione-S-transferases. In incubations of liver microsomes under these conditions a somewhat lower inhibition of the aflatoxin B1-DNA binding was seen. Our results demonstrate that the nasal olfactory and respiratory mucosa and the tracheal mucosa have a higher capacity than the liver to bioactivate aflatoxin B1 in swine. Our data further show that microsomal-associated glutathione-S-transferases with a high capacity to catalyze the conjugation of the reactive aflatoxin B1-epoxide to reduced glutathione are present in the nasal olfactory and respiratory mucosa of swine.

PMID: 8818814

Source: <http://www.ncbi.nlm.nih.gov/pubmed/?term=8818814>