Nicotine

Smoking and "pharmacologic" doses of nicotine accelerate heart rate, elevate blood pressure, and constrict skin blood vessels (Osweiler G. Clinical and Diagnostic Veterinary Toxicology, 3rd ed. Dubuque: Kendall/Hunt Publishing Company, 1984; 480.).

Anabasine

- *Nicotiana glauca* - 99% of total alkaloid is anabasine (Cheeke and Shull, 1985).
- Case report - One heifer consuming *N. glauca* had detectable anabasine levels in liver, urine, and rumen contents. No nicotine was detected. Nicotine and anabasine levels from a fresh plant revealed levels of 2 and 1430 ppm respectively (Plumlee KH, 1993).
- Anabasine binds to nicotinic binding sites but is less potent than nicotine (Plumlee KH, 1993).
- Nicotine, anabasine, and cotinine (metabolite of nicotine) cause direct and specific inhibition of aldosterone synthesis (in freshly isolated rat adrenal cells) via enzymatic blockade. This would be thought to activate renin-angiotensin system *in vivo* and this mechanism might then contribute to the cardiovascular damage that occurs with long term tobacco use (Skowronski RJ, 1994).

Smokeless Tobacco

- Oral cells, peritoneal macrophages, and hepatic mitochondria and microsomes produce reactive oxygen species following *in vitro* incubation with aqueous extract of smokeless tobacco (Bagchi M, 1996).
- High doses of smokeless tobacco extract reduced pre- and post-weaning offspring weight gain and increased fetal mortality in rats exposed during gestation. Smokeless tobacco at low dose had the opposite effect so that these offspring's weights exceeded control weights (Paulson RB, 1994).
- *In vitro*, nicotine inhibits the growth of gingival fibroblasts and their production of fibronectin and collagen, while also promoting collagen breakdown. Nicotine may itself augment the destruction of the gingival extracellular matrix occurring during periodontal inflammation associated with smokeless tobacco (Tipton DA, 1995).
- Inhibition of the aerobic antimicrobial functions of neutrophils and monocytes by nicotine may alter the microbial ecology of the oral cavity, and this might be one mechanism by which nicotine compromises the oral health of users of tobacco products (Pabst, 1995).

Tobacco Smoke

- The nitrosamine NNK is produced in tobacco smoke from nicotine (Osweiler G. Clinical and Diagnostic Veterinary Toxicology, 3rd ed. Dubuque: Kendall/Hunt Publishing Company, 1984; 203.).
- DNA adducts of carcinogenic polycyclic aromatic hydrocarbons have been demonstrated in RBC's of smokers (Osweiler G. Clinical and Diagnostic Veterinary Toxicology, 3rd ed. Dubuque: Kendall/Hunt Publishing Company, 1984; 222.).
- 30% of all deaths in the U.S. result from smoking (this includes not only lung cancer, but also cancers of the bladder, GI tract and upper respiratory tract).
- Nonsmoking adults normally do not have more than 1% carboxyhemoglobin, while heavy smokers can be as high as 5 - 10% (Osweiler G. Clinical and Diagnostic Veterinary Toxicology, 3rd ed. Dubuque: Kendall/Hunt Publishing Company, 1984; 344.).
- Smokers have increased alveolar macrophages in an activated state, but these macrophages seem to have decreased phagocytic and bactericidal activity (Osweiler G. Clinical and Diagnostic Veterinary Toxicology, 3rd ed. Dubuque: Kendall/Hunt Publishing Company, 1984; 344.).
Company, 1984; 379.).

- Smokers who inhale radon or asbestos fibers increase their risk of developing lung cancer severalfold (Osweiler G. Clinical and Diagnostic Veterinary Toxicology, 3rd ed. Dubuque: Kendall/Hunt Publishing Company, 1984; 452.).
- Tobacco plants exposed to mercury chloride solution or mercury vapor accumulated mercury in the roots and/or shoots (Suszcynsky EM, 1995).
- Smokers are more slender and have a lower bone density than nonsmokers. Smokers have poorer oral hygiene and less teeth than their nonsmoking counterparts (Johnston JD, 1994).
- Cigarette smoke condensate of two different brands was assayed. The most relevant elements in cigarette smoke condensate based on concentrates and toxicity were arsenic, cadmium, and lead (Krivan V, 1994).
- Because the smoker of lower nicotine cigarettes tends to smoke more intensely and to inhale the smoke more deeply than the smoker of plain cigarettes, the peripheral lung is exposed to higher amounts of nitrogen oxides, nitrosated compounds, and lung-specific smoke carcinogens (Hoffmann D, 1996).
- Rats exposed to pure nicotine in inhalation chambers for 20 hours per day, 5 days per week, and over 2 years had no harmful effects, except for a reduction in body weights compared to controls (Waldum, 1996).
- The offspring of pregnant mice exposed to cigarette smoke in a smoking machine for 10 minutes 3 times per day showed dose related retardation in embryonic growth which was more marked with exposure on days 0, 1, and 2. No difference was seen with higher or lower tar cigarettes (Seller, 1995).
- Neither nicotine nor its metabolites increased the frequency of mutations in the Salmonella mutagenicity assay, or the frequency of sister chromatid exchanges in Chinese hamster ovary assays (Doolittle, 1995).

**Imidacloprid**

- Active ingredient of Advantage ® by Bayer.
- It is a chlorinated derivative of nicotine. LD50 > 2000 mg/kg.
- Imidacloprid binds to nicotinic receptors; these receptors are more common in insects than in other animals (Moffat, 1993).
- Persistent activation of the nicotinic receptors leads to an overstimulation of cholinergic synapses and hyperexcitation, convulsions, paralysis, and death of the insect (Bloomquist, 1995).

**References**

2. Bloomquist JR. Insecticides: Chemistries and characteristics. From: Department of Entomology, Virginia Polytechnic Institute and State University, Blacksburg 24061, VA, USA. 1995 (Obtained from Internet).