Marijuana Smoke

This is a compilation of key cancer epidemiology studies, animal cancer bioassays, other relevant data, and review articles identified during the preliminary toxicological evaluation of marijuana smoke. The epidemiological literature includes studies on cancers related to mixed exposures to marijuana smoke and tobacco smoke. Based on a preliminary evaluation, this compilation is limited to those epidemiology studies that appear to have reasonably well defined measures of exposure to marijuana smoke, and that have been able to differentiate marijuana smoke exposure from tobacco smoke exposure. Similar to tobacco leaves smoked intentionally in pipes or as cigarettes, marijuana (*Cannabis*) flowers, leaves and resin are also intentionally burned, and the smoke inhaled. Marijuana may be smoked for recreational, medicinal, or religious purposes.

Epidemiological data

Marijuana smoking and adult cancers

- Case-control study of head and neck cancers: Zhang *et al.* (1999)
- Case-control study of lung and upper aerodigestive tract cancers: Hashibe *et al.* (2006)
- Case-control study of oral squamous cell carcinoma: Rosenblatt *et al*. (2004)
- Case-control study of transitional cell carcinoma of the bladder: Chacko *et al.* (2006)
- Retrospective cohort study of all cancers: Sidney *et al.* (1997)
- Case series of respiratory tract cancers: Taylor (1988)
- Case reports of transitional cell carcinoma: Nieder *et al*. (2006); Moiche *et al*. (2001)

Parental marijuana smoking and childhood cancers

- Case-control study of acute nonlymphoblastic leukemia: Robison *et al.* (1989)
- Case-control study of childhood rhabdosarcoma: Grufferman *et al.* (1993)

Animal carcinogenicity data

Marijuana smoke condensate

- Skin painting study in mice: Hoffmann *et al.* (1975)
- Subcutaneous administration study in rats: Repetto *et al.* (1979)

Marijuana smoke

- Inhalation study in rats: Murthy *et al.* (1985).

Other relevant data

- Genotoxicity: Ammenheuser *et al.* (1998); Talaska *et al.* (1992).
- Structure activity considerations comparing marijuana smoke with tobacco smoke

a. ≈ 120 PAH compounds present in both marijuana and tobacco smoke: Lee *et al.* (1976)
b. Mutagenicity in the Ames assay of marijuana and tobacco smoke condensate fractions: Sparacino *et al.* (1990)
c. Common constituents of marijuana and tobacco smoke that are carcinogens

Carcinogenic constituents in both marijuana and tobacco smoke	**CAS No.**
Acetaldehyde	75-07-0
Benz[a]anthracene	56-55-3
Benzo[a]pyrene	50-32-8
Benzo[k]fluoranthene	207-08-9
Chrysene	218-01-9
Dibenz[a,h]anthracene	53-70-3
Dibenzo[a,e]pyrene	192-65-4

- Respiratory and immunological effects: Zhu *et al*. (2000); Tashkin *et al.* (2002); McKallip *et al.* (2005); Massi *et al*. (2006).
- Endocrine-like effects: Watanabe *et al.* (2005).
- Molecular mechanism: Hart *et al.* (2004)
- Reviews: Hashibe *et al*. (2002); Taylor and Hall (2003); Hall *et al.* (2005); Hashibe *et al*., (2005); Mehra *et al.* (2006).

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[1] Copies of these listed references, as either the abstract or the complete publication, have been provided to members of the Carcinogen Identification Committee. The abstracts or papers have been provided in the order in which they are discussed in this document; they have not been ordered alphabetically.

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