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 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

<table>
<thead>
<tr>
<th>Carcinogenic constituents in both marijuana and tobacco smoke</th>
<th>CAS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaldehyde</td>
<td>75-07-0</td>
</tr>
<tr>
<td>Benz[a]anthracene</td>
<td>56-55-3</td>
</tr>
<tr>
<td>Benzo[a]pyrene</td>
<td>50-32-8</td>
</tr>
<tr>
<td>Benzo[k]fluoranethene</td>
<td>207-08-9</td>
</tr>
<tr>
<td>Chrysene</td>
<td>218-01-9</td>
</tr>
<tr>
<td>Dibenz[a,h]anthracene</td>
<td>53-70-3</td>
</tr>
<tr>
<td>Dibenzo[a,e]pyrene</td>
<td>192-65-4</td>
</tr>
</tbody>
</table>

- 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).


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.


