

# HUMAN CARCINOGENS IDENTIFIED BY THE IARC MONOGRAPHS PROGRAM

To date, IARC has classified over 100 agents as carcinogenic to humans.

The IARC Monographs ([www.monographs.iarc.fr](http://www.monographs.iarc.fr)) identify environmental and occupational causes of human cancer. Sometimes called the WHO “Encyclopedia of Carcinogens,” the IARC Monographs are critical reviews and evaluations of the weight of the evidence that an agent can increase the risk of cancer in humans. Since its inception in 1971, some 1000 agents have been evaluated, including individual chemicals, complex mixtures, physical agents, biological agents, personal habits, and occupational exposures.

The agents are classified as “carcinogenic to humans” (Group 1), “probably carcinogenic to humans” (Group 2A), “possibly carcinogenic to humans” (Group 2B), “not classifiable as to their carcinogenicity to humans” (Group 3), or as “probably not carcinogenic to humans” (Group 4). This classification, based on all available scientific literature, reflects the strength of the evidence derived from epidemiological studies in humans, cancer bioassays in experimental animals, and in-vivo and in-vitro studies on the mechanisms of carcinogenicity. The studies in humans and in experimental animals are considered as providing sufficient evidence, limited evidence, inadequate evidence, or evidence suggesting lack of carcinogenicity. Data from mechanistic studies are considered as providing strong, moderate, or weak evidence

for a given mechanism. To date, over 100 agents have been classified in Group 1, the vast majority on the basis of sufficient evidence from epidemiological studies that the agent can cause cancer at one or several sites in humans. Nevertheless, some important risk factors widely known to cause cancer in humans, such as obesity or reproductive factors for breast cancer, have not been evaluated by the Monographs program.

The main figure shows, for each organ or group of organs in the human body, which agent(s) can cause an increased risk of cancer at a given site. Over 40 agents have more than one organ site, with up to 17 sites for tobacco smoking and 14 sites for X-radiation and gamma-radiation. Some agents have been classified in Group 1 with less than sufficient evidence from epidemiological studies (no target organ identified), often on the basis of sufficient evidence of carcinogenicity in experimental animals and strong evidence in exposed humans that the agent acts through a relevant mechanism of carcinogenicity. It is noteworthy that a few agents have been shown to cause cancer in the offspring of the person exposed.

## Agents without a Target Site

Areca nut	2,3,4,7,8-Pentachlorodibenzofuran
Aristolochic acid	3,4,5,3',4'-Pentachlorobiphenyl (PCB-126)
Benzidine, dyes metabolized to Benzo(a)pyrene	Polychlorinated biphenyls dioxin-like, with a Toxic Equivalent Factor according to WHO (PCBs 77, 81, 105, 114, 118, 123, 126, 156, 167, 169, 189)
Ethanol in alcoholic beverages	Radionuclides, alpha-particle emitting, internally deposited
Ethylene oxide	Radionuclides, beta-particle emitting, internally deposited,
Etoposide	Ultraviolet radiation
Ionizing radiation (all types)	
4, 4'-Methylenebis (2-chloroaniline) (MOCA)	
Neutron radiation	
N'-Nitrosornicotine, (NNN) and 4-(N-nitroso-methyl-amino-1-(3-pyridyl)-1-but none (NNK)	

## Multiple or All Sites

**MULTIPLE SITES (UNSPECIFIED)**  
Cyclosporine/Fission products, including Strontium-90  
X-ray gamma-radiation (exposure in utero)

## ALL CANCERS COMBINED

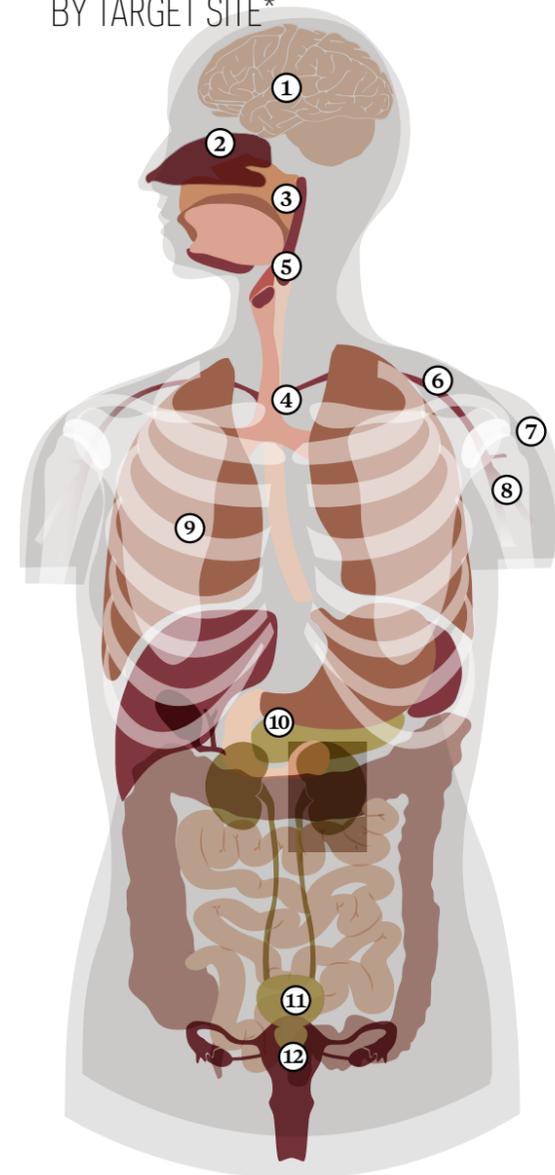
2,3,7,8-Tetrachlorodibenzo-para-dioxin

## Endothelium (Kaposi Sarcoma)

Human immunodeficiency virus type 1  
Kaposi sarcoma herpes-virus

<p><b>① Brain and Central Nervous System</b></p> <p>X-ray, gamma-radiation</p>									
<p><b>② Eye</b></p> <p>Human immunodeficiency virus type 1 Ultraviolet-emitting tanning devices Welding</p>									
<p><b>③ Oral Cavity and Pharynx</b></p> <table border="1"> <tr> <td> <p><b>ORAL CAVITY</b></p> <p>Alcoholic beverages Betel quid with tobacco Betel quid without tobacco Human papillomavirus type 16 Smokeless tobacco Tobacco smoking</p> </td> <td> <p><b>PHARYNX (ORO-, HYPO- AND/OR NOT OTHERWISE SPECIFIED)</b></p> <p>Alcoholic beverages Betel quid with tobacco Human papillomavirus type 16 Tobacco smoking</p> </td> </tr> <tr> <td> <p><b>TONSIL</b></p> <p>Human papillomavirus type 16</p> </td> <td> <p><b>NASOPHARYNX</b></p> <p>Epstein-Barr virus Formaldehyde Salted fish, Chinese-style Wood dust</p> </td> </tr> </table>		<p><b>ORAL CAVITY</b></p> <p>Alcoholic beverages Betel quid with tobacco Betel quid without tobacco Human papillomavirus type 16 Smokeless tobacco Tobacco smoking</p>	<p><b>PHARYNX (ORO-, HYPO- AND/OR NOT OTHERWISE SPECIFIED)</b></p> <p>Alcoholic beverages Betel quid with tobacco Human papillomavirus type 16 Tobacco smoking</p>	<p><b>TONSIL</b></p> <p>Human papillomavirus type 16</p>	<p><b>NASOPHARYNX</b></p> <p>Epstein-Barr virus Formaldehyde Salted fish, Chinese-style Wood dust</p>				
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## CARCINOGENIC AGENTS BY TARGET SITE\*



## ⑪ Urinary System

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\*Target sites are numbered by anatomic placement and not by number of carcinogens associated with the site or impact of carcinogens on disease burden.