Viruses, Bacteria, and Parasites Associated with Increased Cancer Risk

by Wayne L. Sodano, DC, DABCI, DACBN, BCTN

Cell growth is needed for growth, development, procreation and tissue repair. Cancer is a disease of uncontrolled cell growth mediated by a complex signaling system by many innate processes. Cancer occurs when the controls on the processes that regulate the growth and death of cells (Apoptosis) within the cells are damaged.

“Cells can lose control in one of four main ways; growth is either promoted or simply not halted, or death is inhibited or simply not initiated.”

“Each cancer has a unique set of genetic and environmental factors that encourage this abnormal response in the body. Genetic vulnerability is coupled with environmental factors (Epigenetics) that give rise to conditions favorable to cancer growth.”
“Cancers originate as cells normal in structure and function that are subsequently transformed via a process called multistep carcinogenesis. Initiation of this event requires one or more alterations in cellular DNA, possibly mediated by viral, chemical, or physical events in the presence of tumor-promoting agents. Subsequent genetic alterations allow these transformed cells to escape from their usual pattern of differentiation and programmed cell death (Apoptosis).

Individual susceptibility to such transformation is influenced by additional genetic factors, variable expression of cellular oncogenes, or loss of tumor suppressor genes. Cancer caused by infections is thought to be the result of chronic inflammation, immune suppression and/or chronic stimulation. There are also some viruses, bacteria, and parasites linked with cancer. Viruses are made up of a number of genes in the form of DNA or RNA. The virus enters a living cell and ‘hijack’ the cell’s machinery in order to reproduce. Some viruses can insert their DNA or RNA into the host cell DNA. When the DNA or RNA affects the host cell’s genes, it can push the cell toward becoming cancerous.

The known or suspected mechanisms by which environmental toxins may increase cancer risk include: their affect on hormonal production and function; contribution to inflammation; oxidative stress and DNA damage; and genetic suppression or overexpression. Many substances affect the production and functions of hormones, which are crucial to normal growth and development, and to maintain the numerous biological processes. Toxins that interfere with hormone production and function are known as endocrine-disrupting chemicals (EDCs). Synthetic inhaled toxins such as tobacco smoke; asbestos and other particulate matter in the air can cause chronic inflammation in the lungs leading to lung cancer.
Many environmental toxins are known to cause oxidative stress leading to tissue damage and DNA damage. In addition, many environmental contaminants can damage immune system and other cells leading to an increased cancer risk. There’s also sufficient evidence that many medicinal agents are carcinogenic. “Chemical carcinogens, such as medications, may be classified by their genotoxicity. Genotoxic carcinogens interact with DNA and result in structural changes at the level of the gene. These carcinogens are usually unreactive with DNA in their original state but are converted to reactive intermediates (or ultimate carcinogens) in the body by P450-dependent monooxygenases (cytochrome P450 enzymes).”

In human studies, the most notable medicinal carcinogens are immunosuppressive drugs and antineoplastics drugs. In animal studies, the major classes of drugs, which include antibacterial, antineoplastic, antifungal, antiprotozoal, anti parasitic, thyroid drugs, and immunosuppresses, have sufficient evidence of carcinogenicity. “Sex steroid hormones (e.g. hormone replacement therapy and oral contraceptive) cause or contribute to the pathogenesis of reproductive organ cancers putatively through mitogenic and mutagenic effects. By augmenting cell proliferation rates, steroid hormones stimulate clonal expansion of mutated stem cells and enhance tumorgenesis.”
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<thead>
<tr>
<th></th>
<th>Virus/Bacteria/Parasite</th>
<th>Associated Cancer Risk</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Human Papilloma Viruses</td>
<td>Cervical cancer (Some HPV have been linked to cancer of the penis, vagina, anus, vulva, mouth and throat).</td>
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<td>2</td>
<td>Epstein-Barr Virus</td>
<td>EBV infects and stays in the B-lymphocytes. Increased risk of nasopharyngeal cancer and certain fast-growing lymphomas (e.g., Burkitt lymphoma). Possible link to Hodgkin lymphoma and stomach cancer.</td>
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<tr>
<td>3</td>
<td>Hepatitis B and C Viruses</td>
<td>Liver cancer.</td>
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<td>4</td>
<td>Human Immunodeficiency Virus</td>
<td>Does not appear to cause cancer directly, but increases a susceptibility to certain types of cancer, such as Kaposi sarcoma, cervical cancer and non-Hodgkin lymphoma.</td>
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<tr>
<td>5</td>
<td>Human Herpes Virus  8</td>
<td>Kaposi Sarcoma</td>
</tr>
<tr>
<td>6</td>
<td>Human T-lymphotropic Virus-1</td>
<td>Lymphocytic leukemia, non-Hodgkin lymphoma</td>
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<td>7</td>
<td>Merkel Cell Polyomavirus</td>
<td>Skin cancer</td>
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<tr>
<td>8</td>
<td>Helicobacter Pylori (Bacteria)</td>
<td>Stomach cancer</td>
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<tr>
<td>9</td>
<td>Chlamydia Trachomatis (Bacteria)</td>
<td>Greater risk of cervical cancer</td>
</tr>
<tr>
<td>10</td>
<td>Parasites</td>
<td>Opisthorchis Viverrini and Clonorchis (Liver flukes) linked to cancer of the bile ducts (Found in raw or uncooked fish) Schistosoma haematobium linked to bladder cancer.</td>
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<tr>
<td>Cancer Type</td>
<td>Substances that Increase Risk</td>
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<tr>
<td><strong>Bladder</strong></td>
<td>• Cigarette smoke&lt;br&gt;• Artificial sweeteners&lt;br&gt;• Alcohol&lt;br&gt;• Arylamines&lt;br&gt;• Chlorinated drinking water&lt;br&gt;• Arsenic</td>
<td></td>
</tr>
<tr>
<td><strong>Brain</strong></td>
<td>• Radiation and electromagnetic fields&lt;br&gt;• Chemicals (Polymers, iron, chromium compounds, lead, cadmium, aromatic hydrocarbon compounds, arsenic, mercury and petroleum products.</td>
<td></td>
</tr>
<tr>
<td><strong>Breast</strong></td>
<td>• Hormonal factors (Hormone replacement therapy, oral contraceptives)&lt;br&gt;• Toxic chemicals (Pesticides, heavy metals, organochlorines (DDT, hexachlorobenzene, dioxins) and air pollution&lt;br&gt;• Alcohol and poor diet&lt;br&gt;• Smoking and secondhand smoke</td>
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<td><strong>Kidney</strong></td>
<td>• Organic solvents such as trichloroethylene; pesticides and herbicides&lt;br&gt;• Chemicals such as copper, sulfates, benzene, benzidine, creosol, coal tar, soot and pitch&lt;br&gt;• Mustard gas, vinyl chloride, and DBT (Dinitrotoluene)&lt;br&gt;• Cutting or lubricating oil</td>
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<tr>
<td><strong>Lung</strong></td>
<td>• Chemicals such as dioxins, benzene, and DDT&lt;br&gt;• Air pollution; carbon monoxide, hydrocarbons, particulate matter, sulfur dioxide&lt;br&gt;• Asbestos&lt;br&gt;• Cigarette smoke&lt;br&gt;• Radon</td>
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| **Leukemias** | - Chemicals such as dioxins, benzene, and DDT  
- Diagnostic radiation  
- Air pollution; carbon monoxide, hydrocarbons, particulate matter, sulfur dioxide  
- Asbestos  
- Nitrous oxide gas (And other anesthetic gases)  
- Industrial solvents  
- Aromatic hydrocarbons  
- Benzene and trichloroethylene  
- Cigarette smoke  
- Radon |
| **Lymphomas** | - POPs (persistent organic pollutants)  
- Phenoxy herbicides (such as agent orange)  
- Chlorophenols  
- Dioxins, organic solvents, chlordane, PCBs |
| **Myeloma** | - Ionizing radiation  
- Dark-colored hair dye  
- Agricultural and industrial chemicals: paints, petroleum, industrial solvents, pesticides  
- POPs |
| **Prostate** | - Synthetic estrogens or estrogen-like compounds  
- Alkylphenols  
- Pesticides, insecticides, and herbicides  
- PCBs  
- Electromagnetic fields  
- Lead and cadmium  
- Bisphenol A |
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| **Skin (Melanoma)** | • Sun exposure (harmful UV rays)  
  • CFCs (chlorofluorocarbons) and PAHs (polycyclic aromatic hydrocarbons)  
  • Solvents and other hazardous organic compounds such as benzene  
  • Electromagnetic fields  
  • Phenoxy herbicides (such as agent orange) |
| **Testicular** | • Hormone-disrupting chemicals present in pants, pesticides, detergents, hair spray, perfume, car seats, vinyl flooring, wallpaper and elsewhere  
  • Xenoestrogens chemicals: organochlorines, PCBs  
  • Phthalates |

### References


ii. Ibid.


vi. Ibid. 491.


viii. www.cancer.or/cancer/cancercauses/othercarcinogens/infectiuosagentsandcanc

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