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## Pesticide Use And Prostate Cancer

Pesticides are substances used to eradicate, control, inhibit or repel harmful or otherwise undesirable living organisms. Pesticides have a wide range of intended uses including prevention of crop damage, material preservation, and insect repellent. Its use can be widely seen across many sectors including agriculture, forestry, and industry. The three main types commonly used in agriculture are insecticides (insects), herbicides (plants and weeds) and fungicides (fungi). Pesticide intake may occur through dietary sources as pesticides are primarily used in agriculture to protect crops and livestock. In occupational settings such as agriculture and forestry, exposure may occur while handling or applying pesticides. According to Health Canada's Pest Management Regulatory Agency (PMRA), pesticide sales (based on weight of active ingredients) increased by 13.9% between 2008 and 2010. The primary reason for increase in pesticide use in Canada over the past 30 years is due to the agricultural industries shift away from livestock – cattle in particular – towards food crops, which require more inputs. As pesticides use become more prevalent among agricultural workers there is an increasing need to highlight long-term consequence of exposure. One of the areas examine by epidemiological research has been the exposure relationship to prostate cancer.

Prostate cancer is the second most common cancer in men and is rank sixth as a cause of cancer mortality worldwide. In Canada and the United States, it is the most common non-skin cancer and a significant cause of cancer related death. According to Health Canada it is estimated that 1 in 9 men in Canada will develop prostate cancer during their lifetime. Despite the common occurrence of this malignancy, its etiology remains largely unknown in the medical literature, however, increasing age, race/ethnicity, positive family history and high consumption of animal fat and red meat have been consistently reported as risk factors. In the United States the highest rates have been observed in black Americans suggesting a link to racial or genetic risk factors. There has also been observed increased risk with different occupations and most consistently with farming. Farming related potential risk factors include the exposure to fertilizers, insecticides, herbicides and a range of other chemicals.

The epidemiological research evidence to support an exposure response relationship between prostate cancer and pesticides exposures have been overwhelming. In an occupational epidemiological review of 103 studies, Alavanji and Bonner (2012) concluded that the epidemiologic evidence from a number of different studies convincingly shows that prostate cancer is related to pesticide use. Alavanja et al., (2003) reported a significant excess risk of prostate cancer observed in the U.S. Agricultural Health Study (AHS) which was attributed to be due in part to pesticide use. A study by Dich and Wiklund (1998) showed a statistically significant increased risk of prostate cancer among pesticide applicators. This group is more exposed to pesticide than famers in general. A study among British Columbia farmers by Brand et al., (2010) concluded that a significant association existed between prostate cancer risk and exposure to specific types of pesticides. A Canadian study showed a relation between prostate cancer and number of acres sprayed with herbicides [Buxton JA, Gallagher RP, Le ND, Band PR, Bert JL. Occupational risk factors for prostate cancer mortality in British Columbia, Canada. *Am J Ind Med* 1999; 35: 82–6.]. The International Agency for Research on Cancer (IARC) classifies a small number of pesticides as known carcinogens and a few others as possible carcinogens. Despite these findings and conclusions, some reviews have questioned the

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existing evidence and pointed out that they do not satisfy widely used guideline for establishing causation.

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