

1. Prostate Cancer. 2011;2011:819010. doi: 10.1155/2011/819010. Epub 2011 Nov 30.

Environment as a potential key determinant of the continued increase of prostate cancer incidence in martinique.

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Prostate cancer incidence is steadily increasing in many developed countries. Because insular populations present unique ethnic, geographical, and environmental characteristics, we analyzed the evolution of prostate cancer age-adjusted world standardized incidence rates in Martinique in comparison with that of metropolitan France. We also compared prostate cancer incidence rates, and lifestyle-related and socioeconomic markers such as life expectancy, dietary energy, and fat supply and consumption, with those in other Caribbean islands, France, UK, Sweden, and USA. The incidence rate of prostate cancer in Martinique is one of the highest reported worldwide; it is continuously growing since 1985 in an exponential mode, and despite a similar screening detection process and lifestyle-related behaviour, it is constantly at a higher level than in metropolitan France. However, Caribbean populations that are genetically close to that of Martinique have generally much lower incidence of prostate cancer. We found no correlation between prostate cancer incidence rates, life expectancy, and diet westernization. Since the Caribbean African descent-associated genetic susceptibility factor would have remained constant during the 1980–2005, we suggest that in Martinique some environmental change including the intensive use of carcinogenic organochlorine pesticides might have occurred as key determinant of the persisting highly growing incidence of prostate cancer.

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PMID: 22191038 [PubMed]

2. Carcinogenesis. 2010 Feb;31(2):135-48. doi: 10.1093/carcin/bgp252. Epub 2009 Oct 25.

Basic properties and molecular mechanisms of exogenous chemical carcinogens.

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Exogenous chemical carcinogenesis is an extremely complex multifactorial process during which gene-environment interactions involving chronic exposure to exogenous chemical carcinogens (ECCs) and polymorphisms of cancer susceptibility genes add further complexity. We describe the properties and molecular mechanisms of ECCs that contribute to induce and generate cancer. A basic and specific property of many lipophilic organic ECCs including polycyclic aromatic hydrocarbons and polyhalogenated aromatic hydrocarbons is their ability to bioaccumulate in the adipose tissue from where they may be released in the blood circulation and target peripheral tissues for carcinogenesis. Many organic ECCs are procarcinogens and consequently need to be activated by the cytochrome P450 (CYP) system and/or other enzymes before they can adduct DNA and proteins. Because they contribute not only to the cocarcinogenic and promoting effects of many aromatic pollutants but also to their mutagenic effects, the aryl hydrocarbon receptor-activating and the inducible CYP systems are central to exogenous chemical carcinogenesis. Another basic property of ECCs is their ability to induce stable and bulky DNA adducts that cannot be simply repaired by the different repair systems. In addition, following ECC exposure, mutagenesis may also be caused indirectly by free-radical production and by epigenetic alterations. As a result of complex molecular interplays, direct and/or indirect mutagenesis may especially account for the carcinogenic effects of many exogenous metals and metalloids. Because of these molecular properties and action mechanisms, we conclude that ECCs could be major contributors to human cancer, with obviously great public health consequences.

PMID: 19858070 [PubMed - indexed for MEDLINE]

3. Biomed Pharmacother. 2009 Jul;63(6):383-95. doi: 10.1016/j.biopha.2009.04.043. Epub 2009 Jun 12.

Why pesticides could be a common cause of prostate and breast cancers in the French Caribbean Island, Martinique. An overview on key mechanisms of

pesticide-induced cancer.

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Prostate and breast cancers have become very frequent in Martinique. We previously conducted a multifactorial analysis in the French Caribbean Island, Martinique, in order to elucidate the aetiology of prostate cancer. Using a linear regression analysis, we found that the growth curves of incidence rates for Martinique and metropolitan France have been significantly diverging since 1983. Although a Caribbean genetic susceptibility factor may be involved in prostate carcinogenesis: this factor, because it could not have changed during the observation period, cannot per se account for the growing incidence of this cancer in the island. We therefore suggested that among possible environmental factors, the intensive and prolonged exposure to Carcinogenic, Mutagenic and/or Reprotoxic (CMR) or presumed CMR pesticides may account for the observed growing incidence of prostate cancer and thus may be involved in prostate carcinogenesis. In this study, we further attempt to show that due to their carcinogenic properties, pesticides and especially organochlorine pesticides may in fact be causally implicated in the growing incidence of prostate cancer in Martinique. Also, we suggest that CMR or presumed CMR pesticides may be causally involved in the growing incidence of breast cancer through a common endocrine disruption mechanism. We therefore propose that protective medical recommendations should be immediately set up and carried out by general practitioners, paediatricians, obstetricians, gynaecologists and urologists; and that public health measures of primary precaution and prevention should be urgently taken in close collaboration with health professionals in order to protect population, more especially pregnant women and children, with the final objective perhaps that these medical recommendations and public health measures will stop Martinique's cancer epidemic.

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4. Int J Oncol. 2009 Apr;34(4):1037-44.

Prostate cancer as an environmental disease: an ecological study in the French Caribbean islands, Martinique and Guadeloupe.

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Using a transdisciplinary methodological approach we have conducted a multifactorial analysis in Martinique and Guadeloupe in order to elucidate the aetiology of prostate cancer. In 2002, world age standardized rates of prostate cancer were 152 new cases per 100,000 person-years in the two islands; one of the highest worldwide rates and much higher than those reported for other Caribbean islands and metropolitan France. Using a linear regression analysis, we found that the growth curves of incidence rates for Martinique and metropolitan France have been significantly diverging since 1983. That these curves are not parallel suggests that although a Caribbean genetic susceptibility factor may be involved in carcinogenesis, this factor cannot per se account for the observed growing incidence. On the basis of mapping analysis of soil pollution, we further showed that water contamination by pesticides originates from banana plantations. Moreover, we have established retrospectively that general population subjects investigated in 1972 in Martinique for the presence of organochlorinated pesticides in their adipose tissue had been contaminated by extremely high levels of DDT, DDE, alpha, beta and gammaHCH, aldrin and dieldrin. Our study leads to the conclusion that the growing incidence of prostate cancer cannot be related either to a modification of ethnographic factors nor to a change in lifestyle and therefore suggests that environmental factors such as the intensive and prolonged exposure to carcinogenic, mutagenic and reproductive toxin pesticides may cause prostate cancer.

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5. Biomed Pharmacother. 2007 Dec;61(10):640-58. Epub 2007 Nov 20.

Lifestyle-related factors and environmental agents causing cancer: an overview.

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The increasing incidence of a variety of cancers after the Second World War confronts scientists with the question of their origin. In Western countries, expansion and ageing of the population as well as progress in cancer detection using new diagnostic and screening tests cannot fully account for the observed growing incidence of cancer. Our hypothesis is that environmental factors play a more important role in cancer genesis than it is usually agreed. (1) Over the last 2-3 decades, alcohol consumption and tobacco smoking in men have significantly decreased in Western Europe and North America. (2) Obesity is increasing in many countries, but the growing incidence of cancer also concerns cancers not related to obesity nor to other known lifestyle-related factors. (3) There is evidence that the environment has changed over the time period preceding the recent rise in cancer incidence, and that this change, still continuing, included the accumulation of many new carcinogenic factors in the environment. (4) Genetic susceptibility to cancer due to genetic polymorphism cannot have changed over one generation and actually favours the role of exogenous factors through gene-environment interactions. (5) Age is not the unique factor to be considered since the rising incidence of cancers is seen across all age categories, including children, and adolescents. (6) The fetus is specifically vulnerable to exogenous factors. A fetal exposure during a critical time window may explain why current epidemiological studies may still be negative in adults. We therefore propose that the involuntary exposure to many carcinogens in the environment, including microorganisms (viruses, bacteria and parasites), radiations (radioactivity, UV and pulsed electromagnetic fields) and many xenochemicals, may account for the recent growing incidence of cancer and therefore that the risk attributable to environmental carcinogen may be far higher than it is usually agreed. Of major concern are: outdoor air pollution by carbon particles associated with polycyclic aromatic hydrocarbons; indoor air pollution by environmental tobacco smoke, formaldehyde and volatile organic compounds such as benzene and 1,3 butadiene, which may particularly affect children and food contamination by food additives and by carcinogenic contaminants such as nitrates, pesticides, dioxins and other organochlorines. In addition, carcinogenic metals and metalloids, pharmaceutical medicines and some ingredients and contaminants in cosmetics may be involved. Although the risk fraction attributable to environmental factors is still unknown, this long list of carcinogenic and especially mutagenic factors supports our working hypothesis according to which numerous cancers may in fact be caused by the recent modification of our environment.

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6. Environ Res. 2007 Nov;105(3):414-29. Epub 2007 Aug 9.

The multitude and diversity of environmental carcinogens.

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We have recently proposed that lifestyle-related factors, screening and aging cannot fully account for the present overall growing incidence of cancer. In order to propose the concept that in addition to lifestyle related factors, exogenous environmental factors may play a more important role in carcinogenesis than it is expected, and may therefore account for the growing incidence of cancer, we overview herein environmental factors, rated as certainly or potentially carcinogenic by the International Agency for Research on Cancer (IARC). We thus analyze the carcinogenic effect of microorganisms (including viruses), radiations (including radioactivity, UV and pulsed electromagnetic fields) and xenochemicals. Chemicals related to environmental pollution appear to be of critical importance, since they can induce occupational cancers as well as other cancers. Of major concerns are: outdoor air pollution by carbon particles associated with polycyclic aromatic hydrocarbons; indoor air pollution by environmental tobacco smoke, formaldehyde and volatile organic compounds such as benzene and 1,3 butadiene, which may particularly affect children, and food pollution by food additives and by carcinogenic contaminants such as nitrates,

pesticides, dioxins and other organochlorines. In addition, carcinogenic metals and metalloids, pharmaceutical medicines and cosmetics may be involved. Although the risk fraction attributable to environmental factors is still unknown, this long list of carcinogenic and especially mutagenic factors supports our working hypothesis according to which numerous cancers may in fact be caused by the recent modification of our environment.

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