Puzzles in the causation and epidemiology of prostate cancer — a sombre outlook

Prostate cancer was apparently rare in the past, although reliable knowledge is very limited. Thus, for example, according to a 1918 report by the Medical Officer of Health, in Woolwich, London,[1] not one of 238 cancer patients admitted to the local hospital was found to have cancer of the prostate gland. Also in early times, both in the UK and in the USA, the proportion of cancers actually verified were minute. Thus, in a 1914 report by the US Bureau of Census[2] concerning a document claimed to be 'the most careful statistical study of cancer in the US which has ever been made', it was admitted that in 'an examination of about 2 000 death certificates from an estimated 50 000 deaths from cancer, it was found that in only 2% of the cases was the diagnosis confirmed by autopsy, and in only another 9% had an operation confirmed the clinical diagnosis'.

At present, prostate cancer is a very common malignancy in many countries. In the USA it accounts for almost one-third (31.2%) of all cancers, ranking second only to lung cancer as the underlying cause of death in men (11.7%).[3]

In 2000, the respective age standardised incidence rates for prostate cancer were very high in the US African American and white populations, namely 222.9 and 147.3 per 100 000.[4] The high rate for African American men, believed to have a measure of racial significance, is thought to be the highest in the world.[5] A point of major epidemiological importance concerns the differences in rates, as much as 90-fold, between populations.[6] For example, for the years 1993 - 1995 the standardised incidence rate in the American white population in Detroit was 108.2, almost double the rate in Louisiana of 64.8/100 000. Among African Americans the corresponding rates in the two cities were 141.5 and 80.2/100 000, respectively. Major regional differences also prevail in occurrence of the disease within some European countries, e.g. in 1993 - 1995 the rate in Raguza, Italy was 12.0, but in Trieste it was far higher at 48.8/100 000.[7]

Recent estimates of incidence rates vary enormously among black African populations. In the Gambia the rate in 1988 - 1997 was very low at 1.2/100 000.[8] It was subsequently found to be higher in Mali (6.3/100 000).[7] In South Africa the rate was (13.0/100 000),[9] but it was very much higher in Harare, Zimbabwe, at 29.2/100 000,[7] in Abidjan, Ivory Coast at 31.4/100 000,[10] and Kyadondo, Uganda at 39.2/100 000,[7] elevated rates that are difficult to explain. In comparison, in Europe the incidence rate in the UK was 28.0/100 000, while in Sweden it was higher at 55.3/100 000.[7] In making comparisons an important point to bear in mind with regard to developed and developing populations is the far higher rate of total cancers in whites compared with African populations. Thus in 1993 - 1995 the total rates in the UK and Sweden were 303 and 252/100 000 respectively,[7] whereas among black Africans in South Africa[9] and in Abidjan, Ivory Coast[10] rates were 93.9 and 87.5/100 000, respectively.

The proportion of cancer patients with prostate cancer in the UK and Sweden was found to be 12.0% and 10.5%, respectively.[7] Among black Africans in South Africa the proportion was 10.3%,[8] while in Abidjan it was higher at 15.3%.[10]

In series of prostate cancer patients in Canada and Sweden mean age at the time of diagnosis was reported to be 69.7 and 70.5 years, respectively.[11,12] In China the average age was 65 years,[13] while in Nairobi, East Africa[14] and Abidjan,[10] patients averaged 67.5 and 68.5 years, respectively. The mean ages of patients in the various settings are therefore roughly similar, despite the far younger age of African populations. Life expectancy in the latter African populations is not known. In 1987 life expectancy of South African blacks was 62 years.[15] Unfortunately, as with many other African populations, this figure has been greatly reduced by the advent of HIV/AIDS to 40 - 45 years.[16,17] In comparison life expectancy of white males in the UK and Sweden has been reported to be 75 and 72 years, respectively.[18]

With regard to the causation of prostate cancer, a recent major review[19] on the aetiology and occurrence of the disease greatly regretted that 'little specific insight has been gained into

identifying the aetiological factors, or the mechanisms involved'. It was stressed that almost 10-fold differences in the incidence and mortality rates for prostate cancer prevail between various geographical and ethnic populations. Apart from evidence of a familial component,[20] it was stated that 'although several dietary and lifestyle risk factors have been linked to the disease, there is still no consensus that these risk factors truly influence tumour development'.[21] There has been recent confirmation regarding how little is known about what causes the disease.[22]

With regard to the possibility of reducing morbidity/mortality by screening, a recent survey concluded that 'no conclusive direct evidence shows that screening reduces prostate cancer mortality'.[21] Furthermore, sadly, it has been stated that 'men with an expectancy of fewer than 10 years are unlikely to benefit from screening even under favourable conditions. Each treatment is associated with well-documented potential harms.'[22]

Here then, is a highly adverse epidemiological situation — malignancy of the prostate gland still virtually absent in numerous black African populations, particularly among rural dwellers, while at the other extreme African American men have the highest rate in the world.

With regard to causation, some evidence suggests that prostate cancer is associated with a high intake of fat, meat, and dairy produce.[6] Other factors such as smoking, alcohol consumption, vasectomy and physical activity have been investigated, but the overall conclusion is that they do not affect the risk of prostate cancer.[6]

While lack of information on the cause and development of prostate cancer is very disappointing, a crucial question is whether if more information were available it would be adopted and practised sufficiently, through significant lifestyle change to avoid the disease. Unfortunately, the answer seems negative. In the USA and doubtless in other developed countries there is a high level of knowledge of general health needs, but in the case of most individuals healthy changes in behaviour are not sustained. For example, the US population is now deemed 'the fattest nation in the world'.[23] Yet in that country the cost of the treatment of overweight and obesity was estimated to have been US$117 billion in 2000, nearly 10% of the US health care expenditure.[24] Furthermore, notwithstanding the well-known health benefits of physical exercise it has been reported that only 15% of adults now engage in regular vigorous physical activity, while 60% report no regular or sustained leisuretime exertion.[25] The rate of smoking has fallen among adult men; however, in 2000, 23.3% of men were still smokers,[26] and smoking frequency is rising among the young.[27] In brief, even were practicable preventive information to become available on the possible avoidance of prostate cancer, the likelihood of the requisite measures being significantly applied, in the long term, is remote. Accordingly, a worsening situation with regard to prostate cancer occurrence seems inevitable in the USA, doubtless in other developed countries, and among urban dwellers in certain developing countries.

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1. Davies S. Report of the Medical Officer of Health of Woolwich. *Lancet* 1918; **ii:** 495-496.
2. Rush JE. Cancer statistics. *Lancet* 1925; *ii:* 1036-1037.
3. Max W, Rice DP, Sung HY, Michel M, Breuer W, Zhang X. The economic burden of prostate cancer, California, 1998. *Cancer* 2002; **94:** 2906-2913.
4. Ruchlin HS, Pellissier JM. An economic overview of prostate carcinoma. *Cancer* 2001; **92:** 2796-2810.
5. Bostwick DG. What is the significance of race to prostate carcinoma? *Cancer* 1999; **86:** 735-737.
6. Gronberg H. Prostate cancer epidemiology. *Lancet* 2003; **361:** 859-864.
7. Parkin DM, Parkin SL, Whelan J, Ferlay J, Raymond L, Young J. *Cancer Incidence in Five Countries*. Vol VII. Lyon, France: IARC Publications, 1997.
8. Bah E, Parkin DM, Hall AJ, Jack AD, Whittle H. Cancer in the Gambia: 1988 - 97. *Br J Cancer* 2001; **84:** 1207-1214.
9. Sitas F, Madhoo J, Wessie J. *Cancer in South Africa 1993 - 1995*. Johannesburg: National Cancer Registry of South Africa, South African Institute for Medical Research, 1998.
10. Echimane AK, Ahnoux AA, Adoubi I, Hien S, M'Bra K. Cancer incidence in Abidjan, Ivory Coast. *Cancer* 2000; **89:** 653-663.
11. Kim DJ, Gallagher RP, Hislop G, *et al*. Premorbid diet in relation to survival from prostate cancer (Canada). *Cancer Causes Control* 2000; **11:** 65-77.
12. Chan JM, Giovannucci E, Andersson S-O, Yen J, Adami H-O, Wolk A. Dairy products, calcium, phosphorus, vitamin D, and risk of prostate cancer (Sweden). *Cancer Causes Control* 1998; **9:** 559-566.
13. Lee MM, Wand R-T, Hsing AW, Gu F-L, Wang T, Spitz M. Case-control study of diet and prostate cancer in China. *Cancer Causes Control* 1998; **9:** 545-552.
14. Magoha GAO. Management and survival in advanced prostate cancer in Nairobi. *East Afr Med J* 2000; **77:** 260-263.
15. Kale R. Impressions of health in the new South Africa: a period of convalescence. *BMJ* 1995; **310:** 1119-1122.
16. Logie S. AIDS cuts the life expectancy in sub-Saharan Africa by a quarter. *BMJ* 1999; **319:** 806.
17. Ncayiyana DJ. The MRC HIV/AIDS mortality report — South Africa's 'Apocalypse Now' (Mini-editorial). *S Afr Med J* 2002; **92:** 90.
18. World Health Organisation. *World Health Report 2000*. Geneva: WHO, 2000.
19. Coffey DS. New insights and methodologies are needed to solve the many epidemiological enigmas of prostate cancer. *Epidemiol Rev* 2001; **23:** 1.
20. Matikainen MP, Pukkala E, Schleutker J, *et al*. Relatives of prostate patients have increased risk of prostate and stomach cancers: a population-based, cancer registry study in Finland. *Cancer Causes Control* 2001; **12:** 223-230.
21. Hsing AW, Devesa SS. Trends and patterns of prostate cancer: what do they suggest? *Epidemiol Rev* 2001; **23:** 2-13.
22. Harris R, Lohr H. Screening for prostate cancer: An update of the evidence for the US Preventive Services Task Force. *Ann Intern Med* 2002; **137:** 917-919.
23. Critser G. *Fat Land: How Americans Became the Fattest People in the World*. New York: Houghton Mifflin, 2002: 232.
24. Blumenthal SJ. A public health approach to decreasing obesity. *JAMA* 2002; **288:** 2178.
25. Wee CC. Physical activity counselling in primary care. *JAMA* 2001; **286:** 717-719.
26. Cigarette smoking among adults — United States, 2000. *Morbid Mortal Wkly Rep* 2002; **51:** 642.
27. Trends in cigarette smoking among high school students — United States, 1991 - 2001. *Morbid Mortal Wkly Rep* 2002; **51:** 409-411.