

document (the argument for more sensitivity to local need and diversity in primary health care; the provision of fixed term contracts in inner cities; the good practice allowance; the need to experiment with alternative arrangements; and the possibility of developing health care "shops") are all consonant with this model. The possible advantages and disadvantages are similar to those described above.

### What option?

All the options that we have described have appreciable costs and potential benefits. It seems unlikely that there will be major reforms which move the remuneration of general practitioners in the direction of pure capitation, fee for item of service, or salary. None of these systems seems capable of meeting the many objectives of the best of contemporary NHS general practice. The radical libertarian market option would be difficult to implement and sustain. In the long run the essence of the market approach, grafted onto the Health Service, could generate rising standards of health care and incentives for economy and achieve the distributive goals of the NHS. The opportunity exists to reform the present contract by adopting some variant of our own interpretation of the government's desire for a good practice allowance.

It is not impossible that a system similar to HMOs may become the pattern for a future national health service. Implementing a good practice allowance now would give us invaluable experience in

setting standards for primary health care, monitoring performance, and reviewing and maintaining progress. If this does not happen it is likely that some stronger and more radical medicine will be administered to the system of general practice in the UK.

The authors thank the many colleagues with whom they have discussed these issues over the past year. Our opinions are, of course, our own and do not necessarily reflect the policies of any of the professional organisations with which we may be associated.

### References

- 1 Secretaries of State for Government Services, Wales, Northern Ireland and Scotland. *Primary health care: an agenda for discussion*. London: HMSO, 1986. (Cmd 9771.)
- 2 Smith A. *An inquiry into the nature and causes of a wealth of nations*. Campbell and Skinner ed. Oxford: Oxford University Press, 1776, 1976.
- 3 Friedman M. *Capitalism and freedom*. Chicago: University of Chicago Press, 1962.
- 4 Green D. *Which doctor?* London: Institute of Economic Affairs, 1985. (Research Monograph 45.)
- 5 Enthoven AC. *Reflections on the management of the National Health Service*. London: Nuffield Provincial Hospitals Trust, 1985. (Occasional Paper 5.)
- 6 Maynard A. Performance incentives. In: Teeling Smith G, ed. *Health education and general practice*. London: Office of Health Economics, 1986.
- 7 Steinwachs DH, Weiner JP, Shapiro S, Batalden P, Coltin K, Wasserman F. A comparison of the requirements for primary care practitioners in HMOs with projection made by the GMENAC. *N Engl J Med* 1986;314:217-21.
- 8 Marinker M. Developments in primary care. In: *A new NHS Act for 1996?* London: Office of Health Economics, 1984.

This is the last of three articles.

## Research from the South

### Prevalence of hepatitis B virus infection among black children in Soweto

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#### Abstract

Roughly 15% of black children in rural areas of southern Africa are carriers of the hepatitis B virus. The purpose of the present study was to determine the prevalence of chronic hepatitis B virus infection among urban black children born and growing up in Soweto. A total of 2364 children were studied, ranging in age from 3 to 19 years, and of these, 1319 (56%) were girls. The children were drawn from the highest and the lowest socioeconomic classes. Serum samples were tested for all hepatitis B virus markers as well as IgG antibody against hepatitis A virus. HBsAg was detected in 23 (0.97%) of the children, anti-HBc and

anti-HBs together in 155 (6.6%), anti-HBc alone in 17 (0.7%), and anti-HBs alone in 72 (3%). Of the 2364 children, 2097 (88.5%) were negative for all hepatitis B virus markers. IgG antibody to hepatitis A virus was present in 175 (97%) of a sample of 179 children. There was no difference in prevalence of hepatitis B virus markers between children from the upper and lower socioeconomic classes. HBsAg was more common in boys (16 out of 1043 (1.5%)) than girls (seven out of 1321 (0.57%)), and the prevalence of all hepatitis B virus markers increased with age. The youngest carrier of hepatitis B virus was 7 years old.

The remarkable difference in the hepatitis B virus carrier rate between urban and rural black children offers a unique opportunity to investigate the favourable influences operating in an urban environment to limit the prevalence of hepatitis B virus infection.

#### Introduction

Around 15% of black children from rural areas in southern Africa are chronically infected with the hepatitis B virus.<sup>1,2</sup> The infection is almost always acquired in early childhood, predominantly as a result of horizontal transmission,<sup>1</sup> and carriers are predisposed to develop chronic hepatitis, cirrhosis, and hepatocellular carcinoma.<sup>3</sup> Epidemiological, serological, and molecular biological evidence suggests that hepatitis B virus infection acquired in early childhood

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may play a part in the aetiology of hepatocellular carcinoma in most blacks from rural areas of southern Africa with this tumour.<sup>1</sup> Subunit vaccines have recently been shown to be effective in preventing hepatitis B virus infection in babies,<sup>2</sup> and vaccination programmes are urgently needed in regions with a high incidence of the disease. The cost of vaccines necessitates that evidence should be gathered to allow appropriate targeting of vaccine to high risk groups. Whether black children in urban areas are a high priority cannot be assessed at present because neither the hepatitis B virus carrier rate nor the incidence of hepatocellular carcinoma or cirrhosis in these areas is known. The purpose of the present study was to ascertain the hepatitis B virus carrier rate and patterns of transmission in black children born and living in Soweto.

## Subjects and methods

Soweto, south west of Johannesburg, has a black population of over two million. Most of the older adults were born and grew up in rural districts of southern Africa but moved to the Johannesburg area as young adults; however, an ever increasing proportion of the adult residents and almost all of the children were born and grew up in Soweto.

We studied 2364 black children, ranging in age from 3 to 19 years. Of those studied, 1319 (55.8%) were girls. Three groups of children were studied, and all but 57 children (2.4%) were born in Soweto. The first group comprised 1057 children from a private, secular Sowetan school and represented the highest socioeconomic class in Soweto (56% of the children's homes had a telephone). The second group consisted of 1084 children from two state schools in the poorer area of Soweto. These children came from families of the lower socioeconomic class in Soweto (25% of the homes had a telephone). We obtained the population samples from the private and state schools by writing to the parents of all the children attending these schools explaining the purpose and nature of the investigation and obtaining signed consent (in Zulu or Sotho) for their children to take part. The refusal rate was low (less than 10%) and not significantly different in the private and state schools. The greater number of girls in the study directly reflects the sex distribution of the pupils at the schools participating. The final group comprised 223 children from the shanty town district of Soweto, very few of whom attended school and represented the lowest socioeconomic class in Soweto (none of the homes had a telephone). It was not possible to assess accurately the refusal rate among these children because the number of families actually receiving the letter could not be gauged.

Approval for the study was obtained from the ethics committee of the University of Witwatersrand. The parents of children found to be carriers of hepatitis B virus were informed of this and the implications discussed with them. Demographic details (age, sex, tribe, address, and number of years living in Soweto) were obtained. Samples of 5-10 ml of blood were taken and the serum tested for hepatitis B surface antigen (HBsAg) and antibody (anti-HBs), antibody to the hepatitis B core antigen (anti-HBc), and hepatitis B e antigen (HBeAg) and antibody (anti-HBe) by radioimmunoassay (Ausria II, Ausab, Corab, and HBeAg/anti-HBe, respectively, Abbott Laboratories). For comparison a randomly selected cohort of 179 children (aged 3-19) was tested for IgG antibody against the hepatitis A virus (IgG anti-HAV) by radioimmunoassay (Havab, Abbott Laboratories).

The data were analysed statistically using  $\chi^2$  test or Student's *t* test.

## Results

HBsAg was present in 23 of the 2364 children studied (0.97%), anti-HBc and anti-HBs together in 155 (6.6%), anti-HBc alone in 17 (0.7%), and anti-HBs alone in 72 (3%). Of the 2364 children, 2097 (89%) were negative for all hepatitis B virus markers. There was no difference in the prevalence of HBsAg among the three groups of children studied (table I). The prevalence of markers of past exposure was slightly greater among the children from the state schools than among those from the private school (95 out of 1057 (8.9%) v 135 out of 1084 (12.4%);  $p < 0.02$ ). More boys were positive for HBsAg (16 out of 1043 (1.5%) than girls (seven out of 1321 (0.57%);  $p < 0.001$ ). There was, however, no difference in the prevalence of all hepatitis B virus markers between the sexes. The prevalence of all hepatitis B virus markers increased with age, five of the 107 7 year olds having markers (4.6%) compared with 17 of the 71 19 year olds (23.9%;  $p < 0.001$ ). All but three of the children positive for HBsAg were aged 12 years or more; the youngest carrier was aged 7 (table II). Only 1 (0.8%) of the 116 children under 7 years of age had any markers.

Of the 23 children positive for HBsAg, 7 (30%) were positive for HBeAg and 12 (52%) were positive for anti-HBe (the remaining children

TABLE I—Prevalence of hepatitis B virus markers among black Sowetan children. Figures are numbers (%) of children

	Children from private schools (n = 1057)	Children from state schools (n = 1084)	Children from shanty district (n = 223)	Total (n = 2364)
HBsAg	10 (0.94)	12 (1.1)	1 (0.4)	23 (0.97)
Anti-HBc and anti-HBs	61 (5.8)	83 (7.6)	11 (4.9)	155 (6.6)
Anti-HBc	9 (0.8)	6 (0.5)	2 (0.8)	17 (0.7)
Anti-HBs	25 (2.4)	46 (4.2)	1 (0.4)	72 (3.0)

TABLE II—Prevalence by age of HBsAg and all hepatitis B virus markers as a group among 2346 black schoolchildren in Soweto

Age (years)	Total No of children	No (%) with HBsAg	No (%) with any hepatitis B virus markers
1-5	39	0	0
6	77	0	1 (1.3)
7	107	1 (0.9)	5 (4.7)
8	173	0	6 (3.5)
9	175	2 (1.1)	11 (6.3)
10	153	0	8 (5.2)
11	128	1 (0.8)	12 (9.4)
12	134	2 (1.5)	8 (6.0)
13	184	2 (1.1)	17 (9.2)
14	238	3 (1.3)	34 (14.3)
15	269	4 (1.5)	47 (17.5)
16	299	1 (0.3)	40 (13.4)
17	185	5 (2.7)	40 (21.6)
18	132	1 (0.8)	21 (15.9)
19	71	1 (1.4)	17 (23.9)

were non-reactive for both HBeAg and anti-HBe). The mean age of the children positive for HBsAg was 11.7 years compared with 15.7 years for the children negative for HBsAg ( $p < 0.05$ ).

IgG anti-HAV was present in 175 (97%) of the 179 children tested.

## Discussion

This study showed that the HBsAg carrier rate and exposure to hepatitis B virus among urban Sowetan children are considerably less than those found recently among rural black children.<sup>1,2</sup> In a study of 1338 well black babies and children in Ovamboland, Namibia, the HBsAg carrier rate increased sharply towards the end of the first year of life, reached 15% at age 4, and thereafter remained about the same.<sup>1</sup> Anti-HBs was present in 34% of the children by the age of 13. In a second study of 502 well black babies and children living in Kangwane in South Africa the HBsAg carrier rate again increased after the first year of life, reaching 10% at age 3 and 12% at age 5.<sup>2</sup> By the age of 15, 54% of the children showed markers of current or past hepatitis B virus. The assays for hepatitis B virus markers used in these two surveys were the same as those used in our study. Importantly, the difference between the HBsAg carrier rate among rural and urban children existed before introduction of vaccination against hepatitis B virus.

The reason for the remarkable difference in the HBsAg carrier rate between urban and rural black children is not known. The low carrier rate in urban areas applied equally to children from the lowest and the highest socioeconomic groups in Soweto. Exposure to hepatitis B virus was slightly higher, however, among children from lower socioeconomic groups. Although a detailed comparison between living conditions in the rural districts, in which hepatitis B virus carrier rates of 15% exist, and those in the poorer parts of Soweto has not yet been undertaken, overcrowding, inadequacy of ablution and toilet facilities, and living standards in the two areas are not obviously different. Indeed, our data clearly show that hepatitis A virus infection remains uniformly high in both rural and urban children. These observations suggest that factors in addition to socioeconomic group are important determinants of the high rate of horizontal infection during early childhood among rural blacks. The higher prevalence of hepatitis B virus markers among older children may reflect either a higher frequency of exposure that occurred 15 years or more previously, or a higher rate of attacks

through sexual exposure in sexually active, susceptible young adults.<sup>6</sup> Because the risk of developing chronic hepatitis B virus infection is inversely related to age, the relatively low persistence rate of HBsAg favours the second explanation.<sup>7,8</sup>

Just how rapid the transition has been from a very high rural to a low urban carrier rate is not yet known. Because many of today's Sowetan children belong to the first generation born in Soweto, the transition has been relatively abrupt. Numerous cultural and educational changes have accompanied the process of urbanisation and "westernisation." These changes have generally signalled a departure from traditional practices prevalent in rural regions, including ritual or witch doctor scarification and ritual operations, and this may have reduced the parenteral dissemination of hepatitis B virus infection. The spread of the virus by bloodsucking vectors may also be less likely in urban populations.<sup>9</sup>

In addition to decreased parenteral spread of the infection, a lower infectivity of HBsAg carriers has probably contributed to the decline in exposure to hepatitis B virus. A high proportion of urban black carriers are positive for anti-HBe.<sup>10</sup> This has led to a marked decline in the infectivity of childbearing women and has effectively halted the cycle of transmission from mothers to children, as shown by our data. The decline in perinatal infection has profoundly reduced the pool of infectious children from whom secondary dissemination is possible. The relative decline in infectivity of young carriers remains unexplained. Improved nutrition and reduction in secondary diseases, such as malaria, tuberculosis, and schistosomiasis, may have enhanced seroconversion from HBeAg to anti-HBe and consequently curtailed infectivity.<sup>11,12</sup> Other influences that have been invoked elsewhere, such as BCG vaccination, may have played a part in improving host responsiveness to HBsAg.<sup>13,14</sup> Similarly, the incidence of viral reactivation may have decreased, and the declining number of carriers positive for HBsAg has reduced the possibility of reinfection.<sup>15</sup>

Our data clearly establish guidelines for optimal targeting of hepatitis B virus vaccine in this region. Moreover, the changing epidemiological pattern offers a unique opportunity to investigate

the favourable influences operating in an urban as opposed to a rural environment to limit the prevalence of hepatitis B virus infection.

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## References

- Botha JF, Ritchie MJ, Dusheiko GM, Mouton HWK, Kew MC. Hepatitis B virus carrier state in black children in Ovamboland: role of perinatal and horizontal infection. *Lancet* 1984;i:1210-2.
- Prozesky OW, Szmunn W, Stevens CE, et al. Baseline epidemiological studies for a hepatitis B vaccine trial in KwaZulu. *S Afr Med J* 1983;64:891-3.
- Beasley RP, Hwang L-Y. Hepatocellular carcinoma and hepatitis B virus. *Semin Liver Dis* 1984;4:113-21.
- Kew MC. The possible etiologic role of the hepatitis B virus in hepatocellular carcinoma: evidence from southern Africa. In: Chisari FV, ed. *Advances in hepatitis research*. New York: Masson, 1984:203-22.
- Prozesky OW, Stevens CE, Szmunn W, et al. Immune response to hepatitis B vaccine in newborns. *Journal of Infection* 1983;7 (suppl 1):53-5.
- Francis DP, Favero MS, Maynard JE. Transmission of hepatitis B virus. *Semin Liver Dis* 1981;1:27-32.
- Szmunn W, Prince AM. The epidemiology of serum hepatitis (SH) infections: a controlled study in two closed institutions. *Am J Epidemiol* 1971;94:585-95.
- Beasley RP, Hwang L-Y, Lin C-C, et al. Incidence of hepatitis B virus infections in preschool children in Taiwan. *J Infect Dis* 1982;146:198-204.
- Brotman B, Prince AM, Godfrey AR. Role of arthropods in transmission of hepatitis B virus in the tropics. *Lancet* 1973;ii:1305-8.
- Dusheiko GM, Bowyer SM, Sjogren MH, Ritchie MJ, Santos AP, Kew MC. Replication of hepatitis B virus in adult carriers in an endemic area. *J Infect Dis* 1985;152:566-71.
- Hoofnagle JH, Dusheiko GM, Seeff LB, Lones EA, Waggoner JG, Bales ZB. Seroconversion from hepatitis B e antigen to antibody in chronic type B hepatitis. *Ann Intern Med* 1981;94:744-8.
- Lyra LG, Reboucas G, Andrade ZA. Hepatitis B surface antigen carrier state in hepatosplenic schistosomiasis. *Gastroenterology* 1976;71:641-5.
- Minuk GY, Ling N, Postl P, Waggoner JG, Nicolle LE, Hoofnagle JH. The changing epidemiology of hepatitis B virus infection in the Canadian North. *Am J Epidemiol* 1985;121:598-604.
- McGlynn KA, Lustbader ED, Lorden WT. Immune responses to hepatitis B virus and tuberculous infections in South East Asian refugees. *Am J Epidemiol* 1985;122:1032-6.
- Davis GL, Hoofnagle JH, Waggoner JG. Spontaneous reactivation of chronic hepatitis B virus infection. *Gastroenterology* 1984;86:230-5.

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# My Student Elective

## On being a masseuse in Thailand

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Returning from my elective in Thailand a qualified masseuse caused a few raised eyebrows and required a little explaining. While it is true that many of the massage parlours, tea houses, night clubs, and barber shop cum massage parlours of Bangkok are nothing more than disguised brothels<sup>1</sup>—prostitution being illegal in Thailand—there is also an old art of Thai massage backed up by traditional medical science and believed to have considerable therapeutic value. It is the latter skill I hasten to add that I acquired.

Among the Thais the practical side of traditional massage seems to be widely known, since it was not an uncommon pastime for

someone to "go for a massage." What he would receive would be a dry massage, fully clothed. This entails tortuous manipulations, which may test the individual's endurance. It requires as much agility on the part of the masseuse as it does the "victim," and all parts of the masseuse's body are used in the procedure, from hands and elbows to knees and feet. This all contrasts markedly with the common view that we have of massage.

With the popularity and demand for massage in Thailand, many people practise with no formal training relating to the medical science behind the art and have acquired their skill by example from those with years of experience.

## Mixture of yoga and acupuncture

The medical science of Thai massage is not Indian yoga nor is it Chinese acupuncture, but it is thought to have gained something from both<sup>2</sup>. The theoretical basis is that there are 10 executive lines

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