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Routine male neonatal circumcision and risk of infection with HIV-1 and other sexually transmitted diseases

Routine neonatal male circumcision as policy excites strong medical opinions both for and against. In the USA over 70% of all males have been circumcised¹ while the UK's national survey of sexual attitudes and lifestyles found in 1990/1 that 21% of adult males (aged 16–59 years) reported having been circumcised.² The percentage was 13% among those aged 16–24 years but 32% for those 45–59 years indicating that British rates have declined recently,² as they may also have done in the USA.³ Circumcision rates are intermediate in Canada¹ but very low in the Nordic countries.⁴ These large intercountry differences are not explicable on religious grounds.^{1,2} They are best explained on grounds of medico/social culture and fashion, as is the case for some other elective surgical procedures of uncertain effectiveness.^{1,5}

The case for routine male circumcision has rested most firmly on the observation that rates of infant urinary tract infection and adult penile cancer are lower in circumcised males.⁶ However when weighed against the irreducible complication rates and costs of the procedure, these are thought insufficient grounds to recommend routine circumcision.^{1,3,7} Recently added is the observation that circumcised males seem less likely to acquire infection with HIV-1, or other sexually transmitted diseases (STDs).⁸ Four explanations have been suggested⁹: firstly that the exposed glans penis may develop a protective layer of keratin (sometimes referred to as a 'natural condom'); secondly that the foreskin may be especially susceptible to minor balanitis and trauma during intercourse, allowing movement of HIV-1 through the dermatological barrier; thirdly that the warm microclimate under the foreskin may permit

micro-organism survival increasing exposure to potential infections; and fourthly that lack of circumcision may predispose to a coinfection with other STDs that are known to facilitate heterosexual HIV-1 transmission.¹⁰

Many observational studies provide data relevant to the relationship of HIV-1 infection and circumcision, and these have been the subject of two reviews and one meta-analysis of multiple studies within one region of an African country.^{9,11,12} The studies have been of types described as cross sectional or retrospective (observing the relative risk of being HIV-1 infected in circumcised and uncircumcised men, or their female partners), prospective observational (observing the risk of becoming HIV-1 infected among circumcised and uncircumcised men), and ecological (comparing the association between circumcision status and prevalence of HIV-1 in different populations). Heterosexual partnership studies have also looked at sexual partners of men or women diagnosed HIV-1 infected in relation to the male's circumcision status. The reviews note the data's limitations.^{9,11,12} Most were gathered in African or other developing countries where incidence and prevalence of HIV-1 was sufficiently high to investigate possible effects of circumcision. None of the studies was experimental (no-one has dared 'trial' circumcision), nor were they primarily designed to investigate the HIV-1 and circumcision relationship. Therefore most are subject to confounding factors and many lack optimal statistical power. That said most, but not all, the African studies found the risk of HIV-1 infection was reduced among circumcised men.^{9,11,12} The reductions were modified by location, social status, religion, and background HIV-1

prevalence, but did not disappear when these factors were allowed for. Hence all three publications concluded that on balance the data supported a modestly reduced risk of becoming HIV infected among circumcised compared with uncircumcised men in areas where HIV infection was highly prevalent (over 1%) and mostly acquired heterosexually.^{9 11 12} The degree of protection varied but a commonly stated risk reduction was a halving for circumcised men, with a few studies finding greater protection. However a protective effect was not consistent across all studies.^{9 11 12} Whether circumcision makes the HIV positive male more infectious to women has been investigated in a single study when circumcised and uncircumcised HIV infected Brazilian men were found to be equally infectious to their female partners.¹³

Both reviews noted the potential risk of young men misunderstanding their circumcisions as bestowing a license for risky sexual behaviour.^{9 11} Continuing unsafe sex by circumcised males would still result in a steadily rising cumulative risk of individuals becoming infected and it is noticeable that being heavily circumcised has not prevented the USA from becoming the industrialised country most burdened with HIV,¹⁴ while the opposite is true for the UK.^{2 14}

It will be impossible to deliver safe neonatal male circumcision on a population basis in developing countries¹¹ and no society has yet shown willingness to precipitously introduce male circumcision on a mass scale. The relevance of the modest protection found in observational studies of heterosexuals in Africa for policy elsewhere is unclear, especially for the USA and Europe where homosexual transmission is relatively more important.¹⁵ There are seemingly few data on risk of HIV-1 among circumcised compared with uncircumcised homosexual men.^{9 11} Studies of heterosexuals in the USA have often failed to replicate the African findings or to allow for confounding and no European studies were listed in the reviews.^{9 11} It is unclear whether circumcision protects against other STDs as data are conflicting according to which STD and the population under study.^{1 16 17} The UK national survey found no difference in rates of STD clinic attendance among circumcised and uncircumcised men.² This suggests that any protective effect against HIV-1 in industrialised countries is small and many circumcisions would be needed to prevent a single HIV infection in an American or European setting.

Cost-benefit analyses for non-HIV and STD benefits have concluded routine circumcision would be uneconomic.^{1 18} Cadman *et al* calculated that the cost of circumcising 100 000 male infants would be £1.74 million

at 1983 prices in Canada.¹⁸ Projecting this to the UK in 1997 (375 000 male births annually) with 4% annual medical inflation¹⁹ and assuming 13% of male babies will already be circumcised² this would translate to an additional annual cost of £9.83 million at Canadian prices. Given that it would require at least 15 years of investment before any benefit it seems unlikely that prevention of HIV and other STDs is going to change the economic balance towards a pro-circumcision policy.

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