

Circumcision as a lifetime vaccination with many benefits

| Edgar J. Schoen

Think of newborn circumcision as a vaccination, a preventive health procedure which has lifetime benefits against not one, but many, medical disorders [1]. The most significant protective effect of circumcision is against HIV/AIDS, a modern day plague that has killed over 20 million people in the past 20 years, and is now being carried by over 40 million men, women and children worldwide. Since the late 1980s over 30 separate clinical research studies [1–4] have shown that circumcised men are significantly less likely to acquire HIV when exposed sexually to HIV-positive women than are men with intact foreskins. The evidence has become overwhelming since 2005 following the almost identical findings in three randomized clinical trials (RCTs) [5–7], the gold standard of clinical research. Circumcision was 60% effective in preventing heterosexual HIV infection, a value equivalent to the protection afforded by many vaccines. The results of the RCTs were so convincing that all 3 studies had to be terminated early when it became obvious that it was no longer ethical to withhold circumcision from the control group. The US National Institutes of Health (NIH) and the World Health Organization (WHO) now recognize the powerful protection offered by circumcision and the potential for saving millions of lives. Both the WHO and the United Nations (UNAIDS) have recently advised that circumcision be added to current interventions to reduce the spread of HIV.

In response to the evidence that circumcision acts as an HIV-protection procedure, African countries with a high prevalence of HIV (e.g. Swaziland) have endorsed adult male circumcision to combat the epidemic. Government clinics offering safe medical circumcision have

been inundated with patients and there are long waiting periods.

HIV/AIDS is not as great a threat in the US where the prevalence is low, transmission is largely among gay men and 80% of males are circumcised [8]. However, at a recent Center for Disease Control and Prevention (CDC) conference in the US, data were presented showing that adult circumcision for HIV prevention would have cost benefits even in this country [9]. Perhaps of even greater importance in the US are compelling studies finding that circumcision has many health advantages in addition to HIV protection (Table 1). These include prevention of other sexually transmitted infections (including human papilloma virus (HPV), syphilis, chancroid and *Chlamydia*) [10–12], severe infant urinary tract infection (UTIs) [13–15], penile cancer [16,17], cervical cancer in female partners [18,19], local foreskin infections [20], phimosis (inability to retract the foreskin) [21], and penile skin disorders [22]. Furthermore, genital hygiene is easier in circumcised males [23], an important factor in people who feel that cleanliness is next to godliness. Since bacteria grow easily in the warm moist area under the foreskin and ‘colonize’ the region they often pass into the urine [24]. The collection of a valid urine specimen, particularly in uncircumcised infant boys, entails an invasive procedure – either passing a tube through the urethra or putting a needle directly into the bladder. Neither is comfortable. Urine from a circumcised male on the other hand is sterile and a voided specimen is fine – no tubes necessary [25].

Although it has been claimed anecdotally that sex is better with a foreskin, a number of convincing studies published within the past 5

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Table 1 Circumcision health benefits versus risks (2007)

Evidence-based benefits	Evidence-based risks
<ul style="list-style-type: none"> • Penile cancer 	<ul style="list-style-type: none"> • Surgical complications rare (0.2–0.6%) and usually minor
<ul style="list-style-type: none"> • Balanoposthitis 	
<ul style="list-style-type: none"> • Phimosis/paraphimosis 	
<ul style="list-style-type: none"> • Genital hygiene 	
<ul style="list-style-type: none"> • Infant kidney infections (urinary tract infections, UTIs) 	
<ul style="list-style-type: none"> • Human papilloma virus (HPV) infections 	
<ul style="list-style-type: none"> • Human immunodeficiency virus (HIV) infections 	
<ul style="list-style-type: none"> • Cervical cancer 	
<ul style="list-style-type: none"> • Chlamydia infection 	
<ul style="list-style-type: none"> • Penile dermatoses 	
<ul style="list-style-type: none"> • Valid urine specimen 	

years have shown no significant difference in sexual pleasure or performance between circumcised and uncircumcised men [26–30]. Unlike conventional vaccines, which each protect against a single disease (polio, diphtheria, tetanus, measles), one procedure, newborn circumcision, protects against multiple disorders for a lifetime, while many vaccines wear off after a number of years and require booster immunizations.

HIV/AIDS

Why have world health organizations and professional medical societies repeatedly ignored compelling evidence for over 20 years showing that circumcision offers protection against this epidemic? The answers are complex and the reasons are cultural, racial, and religious with disbelief that an ancient ritual could have major medical benefits. Anthropologists, not physicians, made the initial critical observations in Africa in the 1980s early in the HIV/AIDS outbreak [31]. They noticed that African tribes practicing ritual circumcision were much less likely to suffer from HIV than those left uncircumcised. Two classical, prospective, medical research studies appeared close together in 1988–1989, one in the *New England Journal of Medicine* and the other in the *Lancet* [32,33]. They both found that HIV-negative men sexually exposed to HIV-positive women were much more likely to acquire the virus and become HIV-positive if they were uncircumcised. Since then over 30 separate studies, most in Africa, have confirmed this finding [2–4]. For

almost two decades the ever-changing, mutating HIV virus has frustrated attempts to develop an effective vaccine. The virus is always one step ahead of the vaccine. With the three RCTs published since 2005 [5–7], the overwhelming evidence can no longer be denied. Circumcision is the equivalent of a vaccine that could prevent 60% of HIV cases, a protection greater than was originally expected for a successful HIV vaccine. The foreskin is a risk factor in two ways. Firstly, the delicate inner mucous membrane is easily torn during intercourse creating mini-abrasions through which the virus can enter. Secondly, it has been shown that special phagocytic cells in the foreskin, Langerhans cells, act as magnets to the virus which attaches to the cell but cannot be destroyed and thus enters the body [34,35].

Other sexually transmitted infections

Syphilis has been a known scourge for centuries and was known as the ‘White Plague’. It was the HIV of its day, killing millions, and it is still prevalent in undeveloped countries. It has long been known that Jews, Muslims and other circumcised groups were less likely to get syphilis than were uncircumcised men [1]. Following World War II, a Canadian army study showed increased risk of venereal disease in uncircumcised men [36], and in 1998 Stephen Moses et al reviewed 11 separate research series and found that in all of them the foreskin placed the men at greater risk for

syphilis as well as for other sexually transmitted infections (STIs) [37]. There are similar data showing that circumcision protects against chancroid. In 2002 in a multinational study reported in the *New England Journal of Medicine* it was found that human papilloma virus (HPV) is three times more likely to be found in uncircumcised than in circumcised men [18]. This finding is extremely important since HPV is an oncogenic virus implicated as the cause of both cervical and penile cancer. The study also found that cervical cancer was more prevalent in the female partners of uncircumcised men. As with HIV/AIDS, circumcision can be looked upon as a lifetime vaccine, with evidence indicating a 50% HPV protection rate. Analysis of the data from the same multinational study, published in 2005, found that circumcision also protects against *Chlamydia* [38], with female partners of uncircumcised men being twice as likely to have high antibody levels as those with circumcised male partners. *Chlamydia* is a major factor in causing female infertility. In the US, as well as in other developed countries where the prevalence of heterosexual HIV is low, the protection afforded by circumcision against other STIs may have a greater effect on public health than does the prevention of HIV acquisition. This is particularly true when one adds in the other medical benefits of circumcision including prevention of infant urinary tract infections (UTIs), genital cancer and local foreskin problems (Table 1).

Severe infant kidney infections

Unlike later in life, when UTIs are most likely to occur in females and may be mild bladder infections, during the first year of life UTIs are most likely to occur in boys and to involve the kidney (pyelonephritis) with later evidence of kidney damage, including scarring [13-15]. The younger the infant, the more severe the disease [13]. In the mid-1980s a young Army neonatologist, Tom Wiswell, used the large Armed Forces database to show that under the age of 1 year, uncircumcised boys were over 10 times as likely as were circumcised boys to get UTIs, with high fever and the chance of overwhelming infection [13]. In the ensuing 20 years multiple studies in the US and Europe have confirmed Wiswell's results. Our work at Kaiser Permanente, pub-

lished in 2000, found that out of 156 severe infant UTIs among 15,000 newborn boys, 134 occurred in uncircumcised boys, although this group only comprised about one third of the cohort [14]; this was a 10-fold increased risk. Large studies in the US, Sweden and the UK have found that 1-2% of uncircumcised boys will get a UTI by age 1 year. As with HIV, the mechanism of infection has been elucidated. The causative uropathic fecal bacteria, usually tentacled (fimbriated) *Escherichia coli*, stick to the most inner mucous membrane of the foreskin and ascend up the urinary tract to the kidney, where they do their damage [39].

Cervical cancer in female partners

Clinical observations for many years have associated cervical cancer with the foreskin [19,39]. The prevalence of cervical cancer is low where male circumcision is practiced, even in lower socioeconomic groups and in underdeveloped countries. In India, the prevalence of cervical (and penile) cancer is much lower in Muslims, who practice circumcision, than among Hindus who don't, even when both groups are living in poverty [40]. As noted above, the explanation comes from the increased prevalence of HPV on uncircumcised penises [18]. The combination of multiple uncircumcised sex partners and early onset of sexual activity can be deadly. Cervical cancer is common in prostitutes and almost unheard of in nuns. A famous example is the case of Eva Péron, who was a street waif and began sexual activity early in childhood. She had multiple sexual partners (men are uncircumcised in Argentina) as she worked her way up the military command. She died of cervical cancer at age 33. A combination of male circumcision and HPV vaccine would seem to be an ideal way of eliminating the disease.

Penile cancer

Invasive penile cancer is much less common than cervical cancer, with about 1200 cases occurring annually in the US [1]. It is a devastating disease - the treatment is usually penectomy and the 5-year survival rate is much worse than in breast cancer. Essentially all cases are in uncircumcised males [1]. In the 1930s, 120 cases of penile cancer were reported

from Sloan Kettering Hospital in New York [16]. None were in circumcised men, although most New Yorkers were circumcised at the time. Subsequent series had similar findings. In 1973, Dagher stated, after reporting on 150 men with penile cancer, all uncircumcised: 'Despite overwhelming evidence from urologic surgeons that neoplasm of the penis is a lethal disease that can be prevented by removal of the foreskin, some physicians continue to argue against routine newborn circumcision in a highly emotional and aggressive fashion' [41]. They still do, 34 years later, the compelling evidence notwithstanding. The celebrity example of penile cancer was the famous Mexican muralist, Diego Rivera. Like Eva Peron he had multiple sexual partners over many years in a country where men are uncircumcised. Rivera refused penectomy, instead going to the Soviet Union for radiation treatment (he was a dedicated Communist), following which he died a painful death from the disease and the effects of therapy.

Local penile problems

Local foreskin infections and mechanical problems with retraction can be important complications of an intact foreskin throughout childhood, adolescence and adulthood [1]. Phimosis is a condition in which the end of the foreskin is only pinpoint in size. It permits the escape of urine but the foreskin cannot be retracted over the glans to permit adequate cleaning. About 0.5–1% of boys are born with phimosis and will have to be circumcised at a later date when the procedure is more complicated, risky and expensive than in the newborn period. Phimosis permits the accumulation of bacteria under the foreskin, which can lead to an unpleasant infection of the foreskin and glans called balanoposthitis. The entire front end of the penis becomes red, painful and swollen and there is often a smelly discharge of pus. Warm soaks and antibiotics are used for treatment, but the condition may recur. A British study found that about 4% of uncircumcised boys will develop balanoposthitis at some time, and the infection is most common between the ages of 3 and 5 years [20]. In childhood, balanoposthitis is related to phimosis and also to the fact that the foreskin may not separate from the glans for 3–4 years so that it cannot be com-

pletely pulled back and cleaned during this time. In adults foreskin infections are related to poor genital hygiene. This was vividly demonstrated in American soldiers during the World War II North African invasion. The fighting was in the desert where it was hot and sandy with little water to maintain genital hygiene. Almost 150,000 US troops had to be treated for foreskin infections, phimosis and other local penile conditions, almost all of them among the uncircumcised men [42]. Army urologists, commenting on the loss to active duty caused by local foreskin problems in uncircumcised men stated: 'Had these patients been circumcised before induction this total would have been close to zero'. The main reasons for the high circumcision rate in the US, beginning early in the 20th century, were genital cleanliness and local foreskin problems.

It is interesting to note that most reports on local foreskin problems come from Europe where males are not circumcised. In a private British boarding school it was found that 80% of the uncircumcised boys had poor genital hygiene [23], and a Danish study showed a 4% rate of phimosis and 33% rate of adherent foreskins [21]. In a 2000 UK report, dermatologic disorders were found to be twice as high among uncircumcised compared to circumcised males [22].

Sexual function

Anti-circumcision groups, using anecdotes, claim that the foreskin is necessary for normal sexual function, but recent objective studies have shown no significant difference in sexual function between circumcised and uncircumcised men [26–30]. Indeed, circumcised men have been found to have more varied sexual activity [26] and the circumcised penis has been shown to be preferred by women in a study in Middle America [30].

Summary and conclusions

On the basis of compelling published evidence, particularly during the past 20 years, the proven lifetime medical benefits of circumcision far outweigh the minor risks of the procedure, when it is performed by experienced operators. These advantages include prevention of

certain sexually transmitted infections (especially HIV/AIDS), genital cancer (cervical and penile), and local penile disorders. Three recent randomized clinical trials (RCTs) showed a 60% protective effect of circumcision against HIV, a finding equivalent to the protective effect of many vaccines, and one that could save millions of lives. Controlled studies

show no difference in sexual function between circumcised and uncircumcised man. If anything, improved genital hygiene favors more varied sexual activity in circumcised men. The newborn period is the ideal time to circumcise due to ease of operation, rapid healing and the greater ability of the newborn to respond to stress; local anesthesia should always be used.

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