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Evidence for shifting hepatitis B virus population epidemiology after nearly two decades of universal hepatitis B vaccination in South Africa

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Background: The heptitis B vaccine has been part of the South African Expanded Programme on Immunization since April 1995 but its long-term impact remains unknown.

Methods & Materials: This study tested 1206 sera collected from patients aged 1 to 25 years from various health facilities across the country for HBV serological makers and HBV DNA. Based on the year the vaccine was introduced, samples were stratified by age into pre- and post-vaccine introduction populations, which were then compared for evidence of immunity and chronic carriage using the chi-square test. Where HIV status was known, subset analyses were performed.

Results: Immunity to HBV infection increased from 13.0% in the pre- to 57.0% in the post-vaccine introduction population ($p < 0.001$). This decreased with increasing age within the post-vaccine introduction population (76.1% for 1-5 year olds, 50.0% for 6-10 year olds and 46.3% for 11-16 year olds). In addition HBV chronic carriage was significantly ($p = 0.003$) reduced in the post-(1.4%) compared to the pre-vaccine introduction population (4.2%) but increased with increasing age (0.5% in 1-5 year olds, 1.3% in 6-10 year olds and 2.2% in 11-16 year olds). The difference in prevalence of active HBV infection in the serologically exposed pre- versus post-vaccine introduction populations was not statistically significant. Subset analyses showed that evidence of immunity was significantly ($p < 0.001$) higher in the HIV negative compared to the HIV positive subset in both populations.

Conclusion: Universal hepatitis B vaccination has been a remarkable success, with a significant increase in immunity to HBV infection. The observation that HBV chronic carriage increases as immunity wanes over time calls into question whether the time has come to consider a pre-adolescence vaccine booster dose policy.

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Virological profiles of hepatitis B virus (HBV)-infected African patients treated with tenofovir

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Background: There is an urgent need to screen, treat and clinically manage HBV infection in Africa, but standardized, reliable, low cost viral load (VL) assays are not readily available. Here we describe the implementation of an in-house VL assay in the current PROLIFICA (Prevention of Liver Fibrosis and Cancer in Africa) project, which aims at identifying and treating HBV-infected individuals to reduce the incidence of liver cancer in West Africa.

Methods & Materials: A quantitative-Polymerase Chain Reaction (PCR) assay was developed in INSERM, Lyon, France. Following training, technology was transferred to the Medical Research Council Unit in The Gambia. Viral DNA extracted was quantified using a quantitative real-time PCR assay with SYBR-Green signal detection and specific primers that amplify a 98 bp PCR fragment.

Results: Seven hundred and seventy four (774) patients diagnosed with chronic HBV were tested for HBV VL, 65% (486/ 774) showed detectable VL ranging from 5.0×10^1 – 2.0×10^{10} IU/ML. Using the EASL (European Association for Study of the Liver) guidelines, 30% (146/486) of patients had HBV VL > 2,000IU/ML and were eligible for treatment in conjunction with other clinical criterion. To date, 68 patients are on Tenofovir treatment of which 77% are male with a mean age of 38.0 +/- 12.6 years. Data shows decline in HBV viral load by a mean of 1.5 log IU/Ml (85% CI: 1.10-2.00) ($P < 0.001$) over an average of 3.4 months (+/- 3.0).

Conclusion: We have demonstrated the implementation of a reliable low cost in-house q-PCR assay that can be used to monitor the efficacy of HBV therapy and useful in understanding the natural history of HBV in an endemic area.

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