advocacy by comparison with other infectious diseases. The World Health Organization supports the development of national strategic approaches. The aim of this study was to provide evidence for developing coordinated policy responses by investigating the elements of the public policy response to chronic viral hepatitis in Taiwan to inform best practice.

Methods: The policy assessment reviewed literature and conducted semi-structured qualitative interviews with key participants and interested partners in the national response to chronic viral hepatitis in Taiwan. These participants ($n = 26$) included clinicians, government officials, advocates, representatives from non-governmental organisations, and pharmaceutical companies and were conducted in Taiwan in June, 2013.

Findings: Taiwan implemented a public policy response to viral hepatitis through a series of 5-year plans commencing from 1982. Initially, this response provided the framework for the world's first comprehensive hepatitis B vaccination programme, and over time incorporated interventions to improve access to clinical services and to reduce the burden related to hepatitis C infection.

Interpretation: Critical factors in Taiwan's response are an effective health-service delivery architecture, an acceptance of the need for disease prevention, government promotion and funding of science and technology, and a rigorous evidence base with sustained advocacy.

http://dx.doi.org/10.1016/j.jcv.2015.06.055

P0049

Anti-HBV immunity in mice and macaques and protective potency elicited by a novel protein and recombinant adenoviral-based HBV vaccine

X. Chuai [1,2], Hong Chen [1], Wen Wang [1], Yao Deng [1], Yang Yang [1], Li Ruan [1], Wenjie Tan [1,*]

[1] *National Institute for Viral Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China*
[2] *Department of Microbiology, Hebei Medical University, Shijiazhuang, Heibei Province, China*

Background: In this study, C57BL/6 mice and rhesus macaques were vaccinated with a novel hepatitis B virus (HBV) protein vaccination regimen, consisting of HBSS1 priming followed by recombinant adenovirus rAdSS1 boost.

Methods: Immune responses were evaluated by ELISA, ELISPOT, intracellular cytokine analyses, Luminex cytokine assays, and CD107a degranulation assays before challenge with hydrodynamic injection (HI) of pCS-HBV1.3.

Findings: This vaccination regime in mice and macaques induced high antibody (anti-preS1, anti-S antibody) titres and strong multi-antigen (PreS1, and S)-specific IFN-γ ELISPOT responses. Furthermore, vaccinated mice displayed vigorous functional $CD4^+$ and $CD8^+$ T-cell response, with high cytokine levels (both Th1 and Th2 types, especially Th1 types) as well as S-specific and preS1-specific cytotoxic T-cell responses. After challenge with HI of pCS-HBV1.3, HBV surface antigen (HBsAg) and DNA in peripheral blood were cleared, and HBeAg levels were decreased significantly in heterogeneous prime–boost immunised mice. The HBV S-specific and preS1-specific antibodies as well as Th1 and CTL responses each contributed to the clearance of HBV antigens (HBsAg and HBeAg) and DNA in the HBV mouse model.

Interpretation: Our novel heterogeneous prime–boost HBV vaccine regimen shows promise for viral clearance and might prove useful in the development of future human HBV vaccines.

http://dx.doi.org/10.1016/j.jcv.2015.06.056

P0050

Association of aplastic anaemia with positive viral hepatitis serology, and its outcome after immunosuppressive therapy

M. Idrees [1,*], S.A.R. Shah [2]

[1] *Centre of Excellence in Molecular Biology, University of the Punjab, Lahore, Pakistan*
[2] *Sheikh Zayed Medical Complex, Lahore, Pakistan*

Background: Hepatitis-associated aplastic anaemia (HAAA) is a variant of aplastic anaemia (AA) in which aplastic anaemia follows an acute attack of hepatitis. The aim of this study is to investigate the role of hepatitis viruses in the development of AA and to characterise the illness.

Methods: Serum of 93 patients with AA was assayed for antibodies, antigens (ELISA), and nucleic acid testing (real-time PCR) related to hepatitis A, B, C, delta, E, G, parvovirus B19, herpes simplex virus (HSV) I and II, cytomegalovirus (CMV), and torque teno virus (TTV). Genotyping of hepatitis C virus (HCV) was carried out using chain termination sequencing method (ABI Genetic Analyser).

Findings: Of 93 cases of AA, six cases were established as HAAA during the course of the current study. Of these, three were infected with HCV, one was infected with hepatitis B virus (HBV) and HCV (dual infection), one was infected with HEV, and one with HGV. Four were men and two were women. The mean age of HAAA patients was 24.67 ± 10 years. Among HCV HAAA cases, three had HCV genotype 3a and one had HCV genotype 1a. Only 33% of HAAA patients responded to immunosuppressive therapy.

Interpretation: HAAA is an uncommon but severe condition, which may occur following idiopathic cases of acute hepatitis. HCV showed the highest association (50%) with AA. In patients presenting with pancytopenia after an episode of acute hepatitis, the diagnosis should be considered and confirmed by PCR, real-time PCR and, if possible, by bone marrow biopsy. Although bone marrow or stem cell transplantation is the gold standard, it is very expensive; therefore, in developing countries such as Pakistan, immunosuppressive therapy remains the gold standard for patients who cannot afford bone marrow or stem cell transplantation.

http://dx.doi.org/10.1016/j.jcv.2015.06.057

P0051

Effects of oral levamisole as an adjuvant to hepatitis B vaccine in health-care workers non-responders to previous vaccinations: A randomised controlled trial

B. Sayad [*], A. Vazirian, S. Vaziri, F. Mansouri, M. Afsharian, A. Janbakhsh

Kermanshah University of Medical Sciences, Kermanshah, Iran

Background: Health-care workers are at increased risk of hepatitis B virus (HBV) infection. HBV vaccination results in decreased occupational hazard of HBV. The aim of this study was to evaluate the effectiveness of oral levamisole as an adjuvant to HBV vaccine compared with the re-vaccination alone, in previously non-responder health-care workers.

Methods: We did a parallel randomised controlled, double blind, trial. Randomisation and allocation to trial group were carried out with a central computer system. 28 health-care workers, without any seromarkers of HBV infection and who remained non-responders after at least three doses of HBV vaccine, were randomly

allocated into experimental and control groups. HBV vaccination was done using the Hepavax-Gene TF vaccine, 40 μg three times at intervals of zero, one, and two months. Levamisole 50 mg twice a day or a placebo was administered to the experimental and control groups, respectively, for a period of six days before and six days after the vaccination. Immune response was evaluated by measuring HBV surface antibodies concurrently with the second vaccine administration and again one month later, at the conclusion of the vaccination programme. We used a chi-squared test and two independent sample t-tests to compare the level of immune response and antibody titre, respectively.

Findings: 22 individuals finished the trial (11 in each group). The immune response following the three vaccinations was similar and high (90.9%) in both groups. Mean antibody titre following the repeated vaccination in the experimental group showed a higher increase than in the control group (318 vs 286 IU/mL), but with no significant difference ($p = 0.87$).

Interpretation: Revaccination can increase the immune response in health-care workers more than levamisole adjuvant, although mean antibody titre may be higher with levamisole adjuvant.

http://dx.doi.org/10.1016/j.jcv.2015.06.058

P0052

Applying non-invasive assessment of liver fibrosis in chronic hepatitis B patients with equivocal indication for antiviral therapy

Y.C. Hsu [1,*], J.T. Lin [2], C.Y. Chang [1], C.Y. Wu [3]

[1] *I-Shou University, Kaohsiung, Taiwan*
[2] *Fu Jen Catholic University, Taipei, Taiwan*
[3] *Taichung Veterans General Hospital, Taichung, Taiwan*

Background: Current guidelines suggest liver biopsy to guide therapeutic decision for chronic hepatitis B (CHB) patients with equivocal indication for antiviral therapy. The aim of this study was to evaluate whether biopsy could be substituted by blood-based biomarkers and acoustic radiation force impulse (ARFI) imaging in this setting. We did a cross-sectional analysis of prospectively collected biochemical, sonographical, and histological data.

Methods: This study enrolled 101 CHB patients with serum viral DNA greater than 2000 IU/mL, but with alanine aminotransferase mildly elevated between 1 and 2 fold above the upper normal limit. Patients with cirrhosis, hepatic decompensation, and malignant disease were excluded. All participants underwent liver biopsy and ARFI on the same day. Aspartate aminotransferase to platelet ratio index (APRI) and fibrosis-4 (FIB-4) score were calculated from blood tests. The performance of ARFI, APRI, and FIB-4 to identify patients with significant liver fibrosis was analysed.

Findings: According to histopathology, liver fibrosis was METAVIR F0 in 2 (2.0%) patients, F1 in 43 (42.6%) patients, F2 in 34 (33.7%) patients, F3 in 16 (15.8%) patients, and F4 in 6 (5.9%) patients. The fibrosis stage correlated significantly with ARFI (Spearman's ρ, 0.38; $p = 0.0001$), APRI (ρ, 0.25; $p = 0.012$), and FIB-4 (ρ, 0.28; $p = 0.004$). The C statistics of ARFI, APRI, and FIB-4 for fibrosis stage ≥ 2 were 0.70 (95% confidence interval [CI] 0.59–0.80), 0.62 (95% CI 0.51–0.73), and 0.64 (95% CI 0.53–0.75), respectively. Cut-off values for 95% sensitivity and 95% specificity to predict significant liver fibrosis were 0.97 m/sec and 1.36 m/sec for ARFI, 0.36 and 1.0 for APRI, and 0.63 and 2.22 for FIB-4. Combination of these cut-off points could spare a total of 44 patients (43.6%) from liver biopsy.

Interpretation: Combination of ARFI, APRI, and FIB-4 can spare liver biopsy in approximately 40% of non-cirrhotic CHB patients with equivocal indication for antiviral treatment.

http://dx.doi.org/10.1016/j.jcv.2015.06.059

P0053

Factors influencing hepatitis B vaccine immunisation of infants born to HBsAg-negative mothers: A cross-sectional survey

W.L. Zhang [1,*], Z. Guo [2], L. Zhang [1], R. Xu [1], Z. Shao [1]

[1] *Department of Epidemiology, School of Public Health, The Fourth Military Medical University, Xi'an, China*
[2] *451 Hospital of PLA, Xi'an, China*

Background: After the basic immunisation programme of a three-dose series of hepatitis B vaccine, there are still 5% or more infants whose antibodies to hepatitis B (anti-HBs) do not reach protection level. The aim of this research was to analyse the factors that influence hepatitis B vaccine immunisation of infants born to HBsAg-negative mothers.

Methods: 293 infants born to HBsAg-negative mothers were enrolled from May, 2010, to July, 2011, in Wuwei, Gansu province. A standard questionnaire was used by trained investigators to collect information through face-to-face interviews with the parents of infants. Then blood samples of these infants and their mothers were withdrawn for detection of HBsAg and anti-HBs.

Findings: The enrolled infants were aged 8–50 months (average 29 ± 11 months). 69.6% (204/293) of infants and 47.1% (138/293) of mothers were anti-HBs-positive. The multiple factors logistic models showed that the strongest influences on anti-HBs titres of infants was anti-HBs-positive mothers (OR = 2.164, 95%CI 1.246–3.759), the age of infants $\leq$24 months (OR = 0.370, 95%CI 0.207–0.663), and breast-feeding (OR = 1.348, 95%CI 1.043–1.743).

Interpretation: The titres of anti-HBs of the infants were related to the status of anti-HBs of their mothers and breast-feeding. Therefore, we should pay more attention to immunisation of HBsAg-negative women of childbearing age and promote breast-feeding to improve the level of immunity against hepatitis B virus of their infants.

http://dx.doi.org/10.1016/j.jcv.2015.06.060