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Personalized traditional Chinese medicine plus nucleoside analogues of anti-HBV infection therapy and simulations

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Statement of the Problem: An estimated 257 million people are living with hepatitis B virus (HBV) infection. In most people, the treatment does not cure hepatitis B infection, but only suppresses the replication of the virus. Therefore, most people who start hepatitis B treatment must continue it for life. Evidences show that traditional Chinese medicine (TCM) may regulate chronic hepatitis B (CHB) patients' immune functions, which is particularly available for personalized antiviral therapy. Mathematical modeling anti-HBV infection therapy can help the medical doctor better to follow the dynamic of viral infection, and understand drug functions.

Methodology & Theoretical Orientation: A 57-year-old CHB patient received TCM and nucleoside analogues (NA) combination treatment: TCM, TCM+adefovior dipvoxl (ADV), TCM+ entecavir (ENT), TCM+ADV+ENT, ENT. The TCM consists of main description (about 17 herb ingredients) and sub description (selected from other 17 herb ingredients). The patient's baseline HBV DNA: 2.7e7 cps/mL, ALT: 45.7 U/L, HBeAg 450.57S/CO. After about 1200 day's therapy, the patient's HBV DNA: less 20IU/mL, (the lowest limit of detection), ALT: 43.6 U/L, HBeAg 0.505/CO. Then stopping treatment for about 6 months, and patient's HBV DNA: 359IU/mL, ALT: 33.8 U/L, HBeAg 0.79/CO. After one month's ENT monotone therapy, the patient's HBV DNA: less 20IU/mL, ALT: 30.7 U/L, HBeAg 0.620/CO. A mathematical model has been proposed to describe the dynamics of the anti-HBV infection treatments.

Conclusion & Significance: Both test and simulation evidences show that the TCM plus NA anti-HBV infection therapy may not only suppress chronic HBV patients' serum HBV-DNA level but also regulate patients' specific immune functions, which clear HBV directly and almost do not damage patients' hepatocytes. After stopping the treatments, the activated patient's specific immune function may be kept. TCM + NA combination treatment may be efficient for CHB patients with almost normal ALT.

Biography

Lequan Min was the Professor and PhD supervisor with the School of Mathematics and Physics /School of Automation at the University of Science and Technology, Beijing before he retired. His research interests include modeling and simulations of the dynamics of HBV /HIV infection and anti-HBV/HIV infection treatments; the robust designs of the cellular neural network and image processing; synchronization theories of complex networks with applications. He has co-authored to have proposed the assumption that four classifications for HBV/ HIV infected people. He has been the chief director of four National Natural Science Foundations of China and participated the 11th 5-Year Plan Key Research Project of China: Major infectious diseases AIDS and Viral Hepatitis special. He is the author or co-author of over 300 scientific journal and conference papers. He has taught over ten undergraduates and graduate courses, and supervised 27 PhD student and 55 Master students.

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