

Editorial

Nucleic Acid Amplification Testing (NAT) in Promoting Safer Blood Transfusions

Blood safety depends on the distribution of transfusion transmissible infections (TTI) among donor population, blood donor education, quality donor selection, quality component preparation and its storage, and effective transportation of blood products. Hence blood safety involves a systematic rigorous quality process from donor selection to transfusion to the receiver. The conventional immunoassays performed on donor blood samples rely on the presence of antibodies to the infection. Nucleic acid amplification testing (NAT) is a sensitive test that can detect low levels of viral genetic materials in the samples. Some of the potential benefits of NAT include the ability to identify infections earlier thus narrowing the window period and to detect viral mutant and occult infections.

NAT is performed using various in-vitro nucleic acid amplification techniques, transcription mediated amplification (TMA), polymerase chain reaction (PCR), ligase chain reaction and nucleic acid sequence based amplification. Such techniques amplify the nucleic acid sequences specific to the microorganism and detect the pathogens in donor blood. This potentiates the sensitivity and specificity of NAT in comparison to the conventional antibody detection tests. Mini pool NAT (MP-NAT) is performed on pooled samples of donated blood. The pool sizes such as 8 or 16 makes MP-NAT cost effective compared to NAT done on individual donation (ID-NAT). Suppose a pool tests reactive, the whole pool requires resolution to identify the single positive unit.

There is mounting evidence among multi-transfused thalassemia patients acquiring TTIs in the window periods which are not detected by conventional tests. As a high proportion of the population in India are infected with HIV-5.7 million, HCV-12 million and HBV-40 million there is an immediate need to use

such tests that are effective in screening such potential infections in the blood banks. No doubt introducing screening of donor blood by NAT would significantly help in reducing TTIs in the country. However, it needs to be stressed that efforts should be made to introduce NAT in blood banks when satisfactory blood transfusion systems and process are in place. These include volunteer base for blood donation, provision of donor self-referral, donor notification and counselling along with quality assured sensitive serological methods for testing TTIs. More importantly introducing NAT in blood banks are technically highly demanding, requires dedicated infrastructure facility, and involves huge costs on equipments, consumables and technical expertise.

Nucleic acid amplification testing in blood donor screening has been implemented in many developed countries to reduce the risk of transfusion transmitted infections. NAT has the dynamic advantage of detecting pathogenic viruses in the window period and promotes safe blood for donation. The high prevalence of HBV, HCV and HIV in populous India creates a strong demand for introducing NAT in the centralized testing laboratory facilities.

References

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