Betaprone Sterilization of Hepatitis-infected Materials: Safety Precautions for Laboratory Workers

Gerald A. LoGrippo
Hajime Hayashi
Sheikh M. Saeed

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The risks of virus hepatitis to laboratory personnel handling HAA-positive serum prompts us to relate our experiences in this regard. The cold sterilization process using Betaprone (specially purified grade of betapropiolactone, BPL) with or without ultraviolet irradiation is advantageous over the heating procedure (60°C/10 hours) when heat labile serum components are essential for fractionation and purification studies.1-2

Virus hepatitis with jaundice and transient Australia antigenemia occurred in one of two technicians working for 18 months in the hospital blood donor station. The two technicians did not use BPL-treated materials in their daily screening tests for Australia antigenemia among blood donors. In contrast, hepatitis (icteric or anicteric by periodic laboratory tests of all personnel) has not occurred among the 17 technicians working in the Immunology and Virology Laboratory where they have been handling known and unknown hepatitis-infected sera screened for HAA and its antibody. Sera came from 407 known hepatitis patients with jaundice, 30,000 hospital admissions, and 205 HAA-positive sera for various studies. Since 1967, the virology and immunochemistry sections have handled large volumes of HAA-positive sera for fractionation, purification, and serologic studies. All materials used in this laboratory and known to be hepatitis-infected have been treated with BPL prior to handling.

Betaprone (0.35%) and ultraviolet irradiation process have been used for plasma3,4 and serum5 for intravenous administration in man without clinical icteric hepatitis. Virus-infected materials, treated by the combined procedure (BPL plus UV), is safe to handle and is hepatitis-free, as proven clinically in over 200,000 transfusions in man.2,3,5 When the combined procedure cannot be employed, Betaprone treatment of serum without ultraviolet irradiation is superior to no treatment in reducing the hepatitis risk for laboratory workers. Treatment of serum by Betaprone alone is a simpler procedure and is recommended in lieu of no treatment of infected materials. This simple procedure has been used in our Immunology and Virology Laboratory since 1967 without the occurrence of hepatitis among our 17 technicians.

The immunoelectrophoresis patterns in Figure 1 emphasize the importance of pH control of serum or plasma during the BPL treatment process.1,3,5 In Figure 1, both troughs contain anti-human whole serum. The middle immunoelectrophoretic patterns demonstrate the normal untreated serum...
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Figure 1


The initial addition of NaOH to serum (without pH control) followed by the desired amount of BPL will cause physical-chemical changes in the serum proteins that give altered electrophoretic mobility patterns.

Betaprone treatment of serum or plasma does not alter the HAA or its antibody for serologic tests (immunoprecipitation, counter-electrophoresis, or CF). Technical details are omitted here because they have been published elsewhere.

REFERENCES


