



Improved Whole-Blood-Staining Device

Additional applications have been identified.

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Dramatic improvements have been made in NASA's Whole Blood Staining Device (WBSD) since it was last described in "Whole-Blood-Staining Device," *NASA Tech Briefs*, Vol. 23, No. 10 (October 1999), page 64. The new system has a longer shelf life, a simpler and more effective operational procedure, improved interface with instrumentation, and shorter processing time. More specifically, the improvements have targeted bag and locking clip materials, sampling ports, and air pocket prevention.

The WBSD stains whole blood collected during spaceflight for subsequent flow cytometric analysis. In short, the main device stains white blood cells by use of monoclonal antibodies conjugated to various fluorochromes, followed by lysing and fixing of the cells by use of a commercial reagent that has been diluted according to NASA safety standards. This system is compact, robust, and does not require electric power, precise mixing, or precise incubation times.

Figure 1 depicts the present improved version for staining applications, which is a poly(tetrafluoroethylene) bag with a Luer-lock port and plastic locking clips. An InterLink® (or equivalent) intravenous-injection port screws into the Luer-lock port. The inflatable/collapsible nature of the bag facilitates loading and helps to minimize the amount of air trapped in the fully loaded bag.

Some additional uses have been identified for the device beyond whole blood

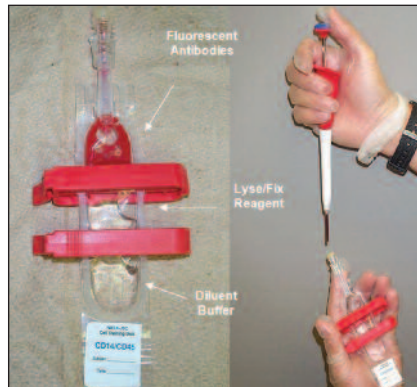


Figure 1. Photo of the Improved Version for staining applications.

staining. The WBSD has been configured for functional assays that require culture of live cells by housing sterile culture media, mitogens, and fixatives prior to use [Figure 2(a)]. Simple injection of whole blood allows cell-stimulation culture to be performed in reduced gravity conditions, and product stabilization prior to storage, while protecting astronauts from liquid biohazardous materials. Also, the improved WBSD has reconstituted powdered injectable antibiotics by mixing them with diluent liquids [Figure 2(b)]. Although such mixing can readily be performed on Earth by shaking in glass vials, it cannot readily be performed this way in outer space without entraining air bubbles. The present device can be preloaded with the powder and diluent(s) in separate

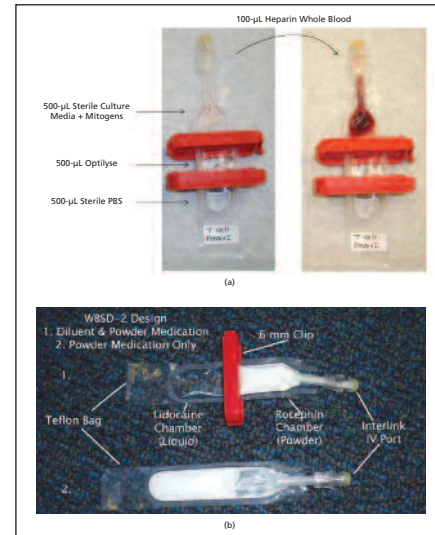


Figure 2. WBSD Configurations: (a) for functional assays, and (b) for powdered injectable antibiotics.

compartments. The powder and diluent(s) can be mixed, without introducing air bubbles, by removing the clip(s), then shaking. This use of the device could also be advantageous in terrestrial applications because it maintains the isolation of the constituents until the time of use.

This work was done by Clarence F. Sams of Johnson Space Center and Brian Crucian, Bonnie Paul, Shannon Melton, and Terry Guess of Wyle Laboratories. Further information is contained in a TSP (see page 1). MSC-24176-1/7-1/8-1

Monitoring Location and Angular Orientation of a Pill

System is part of targeted drug delivery.

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A mobile pill transmitter system moves through, or adjacent to, one or more organs in an animal or human body, while transmitting signals from its present location and/or present angular orientation. The system also provides signals from which the present roll angle of the pill,

about a selected axis, can be determined. When the location coordinates angular orientation and the roll angle of the pill are within selected ranges, an aperture on the pill container releases a selected chemical into, or onto, the body. Optionally, the pill, as it moves, provides a se-

quence of visually perceptible images. The times for image formation may correspond to times at which the pill transmitter system location or image satisfies one of at least four criteria.

This invention provides and supplies an algorithm for exact determination of