

New technologies in enzyme-amplified detection techniques

Norman R. Wainwright, Marine Biological Laboratory, Woods Hole, MA 02543

The horseshoe crab, *Limulus polyphemus*, has been characterized as a "living fossil." Its powerful innate immune response is part of a successful survival strategy that has allowed it to thrive several hundred million years as a species. A defense mechanism triggered by microbial cell wall constituents, such as lipopolysaccharide and beta glucan, activates an enzyme cascade in the amebocyte blood cell that results in blood coagulation and release of antimicrobial compounds. The rapid distinction of self and non-self is integral to the speed and selectivity of the response. The *Limulus* Amebocyte Lysate (LAL) mechanism has been employed in the pharmaceutical and medical fields for over two decades to quantify the pyrogenic response and limit the exposure of patients to bacterial endotoxins from injectable drugs and medical devices. We are adapting this technology to detect microbial signals on the surfaces of spacecraft, water systems and other environments relevant to crew health, as well as planetary protection and life detection. Miniaturization of the test format as well as portability and automation of technique will be addressed. Preliminary results will be presented from laboratory and field experiments that demonstrate the universality and sensitivity of the method.