

cer, cardiovascular disease, immunosuppression, and disorders of the central nervous system. These derivatives can show an unusually high scavenging ability, which could prove efficacious in protecting living systems from radical-induced decay.

This technique could be used to protect healthy cells in a living biological system from the effects of radiation therapy. It could also be used as a prophylactic or antidote for radiation exposure due to accidental, terrorist, or wartime use of radiation-containing weapons; high-altitude or space travel (where radiation ex-

posure is generally higher than desired); or in any scenario where exposure to radiation is expected or anticipated.

This invention's ultimate use will be dependent on the utility in an overall biological system where many levels of toxicity have to be evaluated. This can only be assessed at a later stage. *In vitro* toxicity will first be assessed, followed by *in vivo* non-mammalian screening in zebra fish for toxicity and therapeutic efficacy.

This work was done by Jodie L. Conyers, Jr., Valerie C. Moore, and S. Ward Casscells of the University of Texas Health Science Center at Houston for Johnson Space Center. For fur-

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In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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Process to Selectively Distinguish Viable From Non-Viable Bacterial Cells

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The combination of ethidium monoazide (EMA) and post-fragmentation, randomly primed DNA amplification technologies will enhance the analytical capability to discern viable from non-viable bacterial cells in spacecraft-related samples. Intercalating agents have been widely used since the inception of molecular biology to stain and visualize nucleic acids. Only recently, intercalating agents such as EMA have been exploited to selectively distinguish viable from dead bacterial cells.

Intercalating dyes can only penetrate the membranes of dead cells. Once through the membrane and actually inside the cell, they intercalate DNA and, upon photolysis with visible light, produce stable DNA monoadducts. Once the DNA is crosslinked, it becomes insoluble and unable to be fragmented for post-fragmentation, randomly primed DNA library formation. Viable organisms' DNA remains unaffected by the intercalating agents, allowing for

amplification via post-fragmentation, randomly primed technologies. This results in the ability to carry out downstream nucleic acid-based analyses on viable microbes to the exclusion of all non-viable cells.

This work was done by Myron T. La Duc, James N. Benardini, and Christina N. Stam of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-47218