

Patho-Biotechnology – Making New Friends of Old Foes

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LETTER TO THE EDITOR

Although first described over a century ago, scientists and clinicians have only recently begun to realize the significant medical opportunities presented by probiotic bacteria [1, 2].

However, the most beneficial probiotics often prove to be the most physiologically fragile; a significant limitation in clinical applications [3, 4]. The 'Patho-biotechnology' concept promotes the exploitation of pathogen derived stress survival strategies for the design of more technologically robust probiotic cultures with improved biotechnological and clinical applications [5, 6].

The rationale for choosing pathogens over commensal species as a source of potential stress survival mechanisms is based on a number of factors; not least of which is the fact that certain pathogenic bacteria, with lifecycles bridging the host and external milieu, have evolved sophisticated stress management strategies enabling them to succeed in more diverse ecological niches than those normally occupied by most non-pathogenic species [7]. Pathogens thus represent a rich source of genes which could potentially improve the physiological vigor of less versatile probiotic strains, both external to and within the host.

The advantages of such a strategy are obvious; improving storage, delivery and clinical efficacy of probiotic cultures [3, 4, 8]. In addition, such 'bioengineered probiotics' may ultimately provide a safer alternative to attenuated pathogens as vaccine delivery platforms or be employed as novel drug delivery vehicles; directed against emerging antibiotic resistant pathogens such as *Clostridium difficile* [9, 10].

However, while the potential of the patho-biotechnology approach is obvious; so too are the limitations. Consumer and regulatory acceptance of genetically modified probiotics

expressing pathogen derived genes, is one of the major obstacles to the continued development of the field. While the use of genetically modified organisms raises legitimate concerns about the dissemination of antibiotic markers or other genetic modifications to neighbouring microbes in the environment, I feel that proper adherence to biological containment (both active and passive [11]) will help to ease these concerns and facilitate safe and continued innovation in the sector: eventually promoting patho-biotechnology as a new and exciting paradigm in probiotic research.

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