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Novel disposable cell culture systems for microbial growth in metal-regulated environments

"The growth of Escherichia coli in the novel cell culture system in a defined minimal medium is comparable with growth in traditional glass vessels; this opens up a new market opportunity for this system as cell culture chambers for microbiology." **Kelly Davidge, Kirkstall**

Robert Poole, University of Sheffield; Kelly Davidge, Kirkstall

OUTCOMES: First, we showed that a standard laboratory strain of *E. coli* was able to grow in three different types of novel cell culture vessels; this is the first demonstration of miniaturised bacterial growth capability in the novel cell culture chambers. Second, we showed that the chambers do not leach significant amounts of metals into the bacterial growth medium. This applies even when the culture medium has been treated to deplete selected metals, thus providing a potential concentration gradient between the culture chamber materials (silicone and acrylic) and the medium. We conclude that these vessels are suitable for bacterial growths involving metal-controlled conditions.

The Quasi Vivo® QV500 chamber is made from polydimethylsiloxane and allows for submerged cell culture

INITIAL AIMS: Growing cells and tissues for biotechnology uses requires a well-defined growth environment, which must provide all nutrient — including metals — in biologically accessible forms, but not in excess. Most growth vessels are metal or glass, but these can leach or adsorb metal ions. Synthetic materials, however, may be biologically inert and interact little with dissolved metals. This project will test the suitability of miniaturised growth chambers (known as Quasi Vivo®, developed by Kirkstall, originally for culturing mammalian cells) for microbial growth. These chambers are made from biocompatible materials and, under flow conditions, mimic conditions in the body. We will grow bacteria in such chambers and test their ability to provide environments in which the metal concentrations available for growth will be varied from trace levels to toxic levels. The work has potential for developing improved methods of cell culture in industrial biotechnology.

- Relevant to future development of a gut model incorporating both mammalian and microbial cells in metal-controlled conditions
- Potential new market opportunities for the Kirkstall cell culture chambers

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