

be traversed to a number of selected positions at the outlet. The voltage output signal was filtered to produce (a) a steady component proportional to the mean velocity and (b) a fluctuating component which was measured using a true root mean square voltmeter. Turbulence was calculated in non-dimensional units for each annulus by multiplying root mean square voltage at its midpoint, representing the turbulence level, by its cross-sectional area. The value for the outer ring was obtained by averaging four readings because of a rapid decline towards the periphery where it

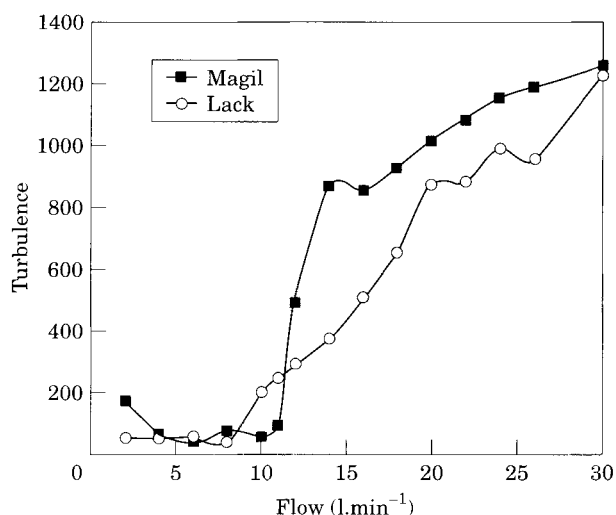


Fig. 1. Turbulence (see text) against air flow in the Magill and Lack breathing systems.

is zero. Total turbulence was obtained by adding the individual results for each annulus (Fig. 1).

What are the effects of corrugated tubing and expiratory valve position? A conventional Magill system includes corrugated hose and internal edges at a laterally placed valve opening. Between approximately 11 and 30 l.min⁻¹, turbulence reached a greater level than in the Lack system. Under clinical conditions, flows are near 'critical' velocities [1]. The gradual development and low levels of turbulence reached in a smooth-walled tube are shown by the Lack findings. In the Magill system, a jump in turbulence levels was observed. It has been suggested that the surface boundary layer follows the tubing contour until a velocity is reached where separation can occur at the peaks of the corrugations. This disturbance will become greater at every irregularity with a consequent steep increase in turbulence over a relatively small rise in flow. Furthermore, the exit gases change direction at the expiratory valve while the Lack connection only divides the gas stream and does not deflect it. Fully turbulent flow also depends on density and viscosity [2]. Co-axial geometry does not contribute to turbulence.

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Gelatin solutions

The Spongiform Encephalopathy Advisory Committee recently announced that the prion causing bovine spongiform encephalopathy (BSE) may also be responsible for a new variant of Creutzfeldt-Jacob disease. Transmission of 'mad-cow' disease to man would seem to occur. Due to the relatively high incidence of BSE in the UK, export of beef is currently prohibited under European Union law. However, following intense political pressure, various beef by-products, including gelatin, have been exempted from this ban and are once more commercially available.

As solutions of bovine gelatin are commonly used as plasma substitutes we were concerned to know whether infusion of these carried a risk of Creutzfeldt-Jacob disease and also whether any risk would be increased by the reappearance of UK gelatin. Such an assessment of risk is particularly important since administration is invariably without specific consent and alternatives are available. We therefore contacted the manufacturers of the two gelatin preparations currently available in the UK; Haemacel (Hoechst Marion Roussel) and Gelofusine (B. Braun Medical Ltd.). In written replies both companies stressed that they had never used any raw materials from British herds and that not a single case of BSE transmission from pharmaceutical gelatin preparations to man had ever been reported. In both cases gelatin production was said to be in

accordance with guidelines devised to prevent BSE contamination (Gelatin Manufacturers of Europe, July 1994). These specifically preclude the use of raw material obtained from the UK. The gelatin for Haemacel is sourced in the USA, which is regarded as BSE-free and that for Gelofusine is obtained from accredited 'BSE-free' French herds.

The approved production process involves exposure to hydrochloric acid (pH < 1.5) for several days, exposure to saturated calcium hydroxide (pH > 12) for several weeks and heating to at least 138°C. Several regulatory authorities including those from Germany (Federal Institute for Therapeutics and Medicinal products, BfArM) and Switzerland (Interkantonale Kontrollstelle für Heilmittel) have examined this technique and have concluded that the risk of prion contamination in the final product is immeasurably small. Amongst these bodies there appears to be unanimous agreement that no indication exists to either withdraw or restrict the use of these gelatin solutions.

Fears regarding prion contamination of gelatin-based plasma substitutes are therefore essentially unfounded and the renewed availability of UK gelatin will not change this; it will not be used.

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