

PROTECTIVE EFFECTS OF FOAM AGAINST THE BIOLOGICAL EFFECTS OF SHOCK WAVES

BOBIN,L.;VASSOUT,P.;DANCER,A.

We have studied, on anesthetized swines, the protection afforded by two different kinds of foams against the biological effects of shock waves and we have attempted to characterize the physical parameters of the foams.

Swines are placed in the free field with their body axis perpendicular to the direction of the propagation of the blast wave. The first animal is non protected (control). The second is protected by a ten centimeters polyurethan foam layer applied directly on the chest and abdominal walls exposed to the blast. The third animal is protected in the same way by an aqueous shaving-foam. The peak pressures of the shock waves are 330 and 380 kPa (A-duration: $2.10 \cdot 10^{-3}$ s). After the exposure the animals are sacrificed and autopsied. The controls (non protected animals) show large hemorrhages of the lungs essentially on the exposed side. Animals protected by polyurethan foam show slightly less extended hemorrhagic areas than the controls. Animals protected by aqueous shaving-foam present much less hemorrhages than the controls or the animals protected by the polyurethan foam.

In a shock tube we measure the pressure and the velocity of shock waves (reflected and transmitted components) in the air and in the foam. The sound velocity is low in the shaving-foam (37.5 m/s) and the rise time is considerably larger than in the air; we have found slopes of about 3.7 kPa/ms for a 10 kPa pressure wave, and 80 kPa/ms for a 50 kPa pressure wave. This damping of the wave front is probably responsible for the reduction of the lesions (Richmond and al. 1957, 1974). We have also calculated the thermodynamical parameters of the medium in order to characterize physically the foams. Other kinds of foams will be tested using the same procedure and their protective effect will be evaluated on animals.