The success of defibrillation is determined by trans-myocardial current. This current is inversely proportional to transthoracic impedance (TTI). We proposed that increasing lung volume using positive end-expiratory pressure (PEEP) would increase TTI.

12 healthy subjects aged 21 – 37 years (6 male) were recruited. TTI between self-adhesive defibrillation pads placed in the standard antero-apical position was measured at 30 kHz at end-expiration using Bodystat® MultiScan 5000 equipment. PEEP at 2.5, 5.0, 10.0, 20.0 and 40.0 cm H2O was generated using a standard continuous positive airways pressure (CPAP) circuit.

Data were analysed using linear regression and paired t-tests comparing baseline TTI with that at a given PEEP. Mean (±S.D.) baseline TTI was 65.7 ± 6.9 Ω. TTI increased linearly with increasing PEEP (r^2 = 0.99; P<0.001). Mean percentage increases in TTI were 0.6% at 2.5 cm H2O PEEP (P=0.05), 1.5% at 5.0 cm H2O PEEP (P<0.001), 3.1% at 10.0 cm H2O PEEP (P<0.001), 5.6% at 20.0 cm H2O PEEP (P<0.001) and 10.4% at 40.0 cm H2O PEEP (P<0.001).

PEEP increases TTI, proportionately reducing transthoracic current during defibrillation. Clinically, high levels of PEEP (20 – 40 cm H2O) may occur during ventilation of patients at cardiac arrest and in acute asthmatics. To maximize peak defibrillation current PEEP should either be minimized prior to defibrillation or consideration should be given to earlier use of high energy levels for defibrillation.