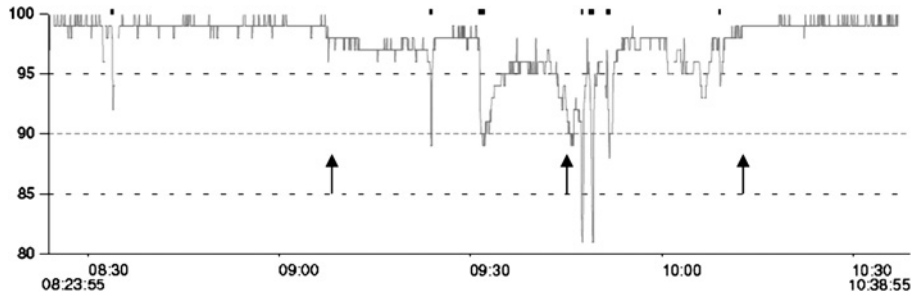

Figure 1 Changes in oxygen saturation with an oximeter (Wristox 3100, Nonin Medical, Plymouth, Minnesota, USA) of a woman with mitochondrial myopathy on continuous non-invasive ventilation during a flight from Porto to Barcelona. Baseline oxygen saturation (Sao_2) was 99%; after take-off (first arrow) there was a slight decrease to 97%. The first and second desaturation periods were due to eating and the third (second arrow) coincided with the disconnection of the ventilator (for battery change). At landing (third arrow) Sao_2 returned to baseline values.

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Lung alert

Longevity of alveolar macrophages allow sustained in vivo expression of the human α1-antitrypsin gene and amelioration of emphysema

This study describes the transduction of mouse pulmonary alveolar macrophages using an intratracheally instilled lentiviral vector. The transferred genes were expressed in vivo for the duration of the lifespan of the mouse. Labelling studies using bromodeoxyuridine (BrdU) revealed continued expression of the transgenes by alveolar macrophages present in the mouse lung at the time of infection, and not by those recruited after inoculation.

Using this method, a human α1-antitrypsin-expressing lentiviral vector (ET1αhAAT) was instilled into live immunocompetent mice. The result was stable and sustained secretion of human α1-antitrypsin protein primarily in the lung by alveolar macrophages augmenting murine α1-antitrypsin levels. A model of emphysema was induced in these mice and in a control group by intratracheal installation of porcine pancreatic elastase. The control group consisted of immunocompetent mice previously infected with a lentiviral-mediated reporter transgene (EF1αGDP). The effects of elastase on lung compliance, area-weighted mean alveolar diameter (an index of airspace enlargement in emphysema) and its heterogeneity were significantly less in the ET1αhAAT-expressing mice compared with the EF1αGDP group (all $p<0.05$).

This study demonstrates longevity of pulmonary alveolar macrophages in mice, and challenges previously held views that they are short lived. Lentiviral transduction to achieve prolonged therapeutic secretion of human α1-antitrypsin in vivo may make them a potential target cell population for application of gene therapy.

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