

**Use:**

Lack of surfactant is the commonest cause of death in the preterm baby. Synthetic products (q.v.) and products of animal origin both have the ability to reduce mortality by 40% in babies of less than 30 weeks gestation. Antenatal treatment with betamethasone (q.v.) is an even more cost effective way of reducing mortality. See the web site for a discussion of how to optimise the use of this expensive drug.

**Pharmacology**

Surfactant deficiency was first recognised to be the cause of the respiratory distress seen in preterm babies in the first 2–3 days of life in 1959, but replacement products of animal origin only became widely available for the first time in 1990. Poractant alfa (Curosurf<sup>®</sup>) is an extract of porcine lung, with polar phospholipids and some hydrophobic low molecular weight surfactant-associated proteins, while beractant (marketed as Survanta<sup>®</sup>) is a bovine extract containing phospholipids, neutral lipids, fatty acids and surfactant-associated proteins with added phosphatidylcholine, palmitic acid and tripalmitin. Another product of bovine origin, BLES<sup>®</sup>, or Bovine Lung Extract Surfactant, is available in Canada. Two commercial products obtained by bovine lung lavage are also in use: calfactant (Infasurf<sup>®</sup>) is currently only marketed in America, while bovactant (Alveofact<sup>®</sup>) is mainly marketed in Europe.

Natural surfactants have a rapid onset of action. Head-to-head trials of a natural surfactant (beractant or calfactant) and an artificial surfactant (colfosceril) in 2,500 preterm babies with established respiratory distress have shown that survival is marginally, but unequivocally, better with beractant. While beractant did not seem to reduce the risk of chronic lung damage, and was associated with a marginal increase in the incidence of all (but not of severe) intraventricular haemorrhage, pneumothorax was less common and there was slightly less retinopathy. Using beractant instead of colfosceril produced 2 more survivors for every 100 babies studied. The different natural surfactants may not have identical properties either – the porcine product seems to act more rapidly than the bovine product, and survival may be better (although direct comparison is made difficult by differing dosage regimens). New synthetic products containing surfactant proteins and peptides currently under development may, eventually, replace the present natural products.

Early use of constant positive airway pressure (nasal CPAP) to distend the lung decreased the number of babies with respiratory distress subsequently needing artificial ventilation in one recent trial, and the number of babies needing transfer to a tertiary centre in another. Use from birth instead of elective ventilation halved surfactant use in the 610 babies of 25–28 weeks gestation judged to need some support when 5 minutes old in the recent Australian COIN trial. A Dutch trial produced an even more clear cut outcome in 207 babies of 25–32 weeks gestation – attention to getting and keeping air in the alveoli from birth by focusing on initial lung *expansion* rather than early 'bag and mask' *ventilation* reduced the number of later ventilated, given more than one dose of surfactant, or judged to still need supplemental oxygen at 36 weeks postmenstrual age.

**Treatment**

**Poractant alfa:** Give 100 mg/kg (1.25 ml/kg) into the trachea as soon after birth as possible if surfactant deficiency seems likely, but be selective over the need for further doses. Some give a second dose after 12 hours if the base deficit was > 10 mmol/l at birth, if the baby continues to need ventilation with a mean airway pressure of > 7 cmH<sub>2</sub>O in  $\geq$  40% oxygen, or if there are signs of pneumonia. Consider giving a larger first dose if there is severe meconium aspiration, or if treatment is started late.

**Beractant:** Give 100 mg/kg (4ml/kg) in the same way as for Poractant alfa but in 2–3 aliquots. (The manufacturers say up to 3 further doses can be given, at least 6 hours apart, within the next 48 hours.)

**Administration**

Guidance on administration is given in the monograph on synthetic surfactant.

**Supply**

Poractant alfa comes in 1.5 ml and 3 ml ready-to-use vials containing 120 and 240 mg of phospholipid costing £380 and £760 each. Beractant comes in 4 ml and 8 ml vials containing 200 mg of phospholipid cost £310 each; 100 mg vials are also available in some countries. Store vials at 4°C, but warm to room temperature before use, and invert gently without shaking to re-suspend the material. Do not use, or return vials to the refrigerator, more than 8 hours after they reach room temperature.

**References**

See also the relevant Cochrane reviews ©

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