Pediatric Dimensions

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A new therapeutic regimen on prevention of Bronchopulmonary Dysplasia (BPD) in preterm infant

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Although the advance of prematurity care and gentle ventilation have significantly improved the survival rate of very low birth weight infants, bronchopulmonary dysplasia (BPD) continuously to be the most common chronic lung disease [1,2] in infancy. Several antenatal, perinatal and postnatal factors may contribute to the development of BPD [3,4]. It is postulated that early lung injury, inflammation, immaturity and arrestment of lung development play an important role in the pathogenesis of BPD [5,6]. Various strategies, including vitamin A and caffeine has been shown beneficial for prevention or treatment for BPD [7,8]. However, none of these therapies can eliminate this complication. Postnatal corticosteroids therapies, in particular, dexamethasone has been used in infant with evolving BPD and in infant with difficult extubation. However, systemic dexamethasone therapy in premature infants is not generally recommended because of the long-term adverse neurodevelopmental outcomes [9,10]. Inhaled steroids refer to less complication than systemic steroids, but technically difficult and the effects are limited [11]. Our research showed that, by using surfactant as vehicle, intratracheal administration of surfactant/budesonide compared with surfactant alone significantly decreased the incidence of BPD or death without apparent immediate and long-term side effect [12]. This new therapeutic regimen is based on a physical phenomenon "Marangoni effect" that surfactant can be used as an effective vehicle to facilitate the delivery of a topical steroid, budesonide, to the lung periphery. Budesonide will remain in the lung [13] for some time and inhibit the lung inflammation. Pharmacokinetic study showed that more than 80% of budesonide remained in the lungs for up to 8 hours after intra-tracheal instillation of surfactant/budesonide [13]. With a proper concentration ratio between budesonide and surfactant (survanta/budesonide ≥50, or curosurf/budesonide ≥160), addition of budesonide to surfactant would not affect the biophysical and chemical stability of surfactant. Preliminary follow up study showed insignificant side effect.

Curosurf has a higher concentration of natural surfactants than that of Survanta, which exhibited a significantly higher Marangoni effect resulting in faster migration speed to the lung periphery [14]. Thus, based on this *in vitro* study [14], Curosurf is probably a better choice than other surfactants as a vehicle. A multicenter double-blind study is now ongoing. The preliminary result showed a decrease in incidence of BPD or BPD or death. However, we do not recommend routine therapy at the present until a long- term follow up study is complete and assure the safety of this new therapeutic regimen.

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