

Case Study: Pre-mature infant with infant respiratory distress syndrome (IRDS)

Baby Jalene arrived early at approximately 30 weeks gestational age. Full term gestation is 40 weeks. Baby Jalene was breathing rapidly with her nostrils flaring at each inspiration. She was making abnormal grunting sounds and her chest was pulling in sharply with each breath. The neonatologist diagnosed Baby Jalene with respiratory distress syndrome and immediately prescribed a course of surfactant. The infant was given further breathing support from nCPAP (nasal continuous positive airway pressure). Additionally, the infant was placed in a warming isolette with additional monitors for heart rate, respiration rate, and blood gas levels. Baby Jalene was fed via intravenous nutrition. Fluid intake and output was closely monitored in case fluid began accumulating in her lungs. Three weeks later Baby Jalene was breathing and eating on her own and was sent home with her parents.

Unfortunately, the lungs are not considered fully mature until the 36th week of gestation. Babies born pre-term often have immature lungs. The lungs are composed of millions of tiny sacs called alveoli. Gas exchange between the blood and the environment occurs in these alveoli (singular is alveolus). The internal surface of the alveolus is covered in a thin layer of fluid (water). The alveoli in pre-term infants can collapse because of cohesion and adhesion of the water in this fluid. Think about what happens if a thin layer of water coats the inner surface of a balloon or baggy. The cohesive forces cause the sides of the balloon or baggy to stick together. In a baggy or balloon this isn't a real problem however in the alveoli of the lungs it is a big problem. Gasses do not enter collapsed alveoli. Gas exchange cannot occur in collapsed alveoli which means the body does not receive enough oxygen or get rid of the waste product carbon dioxide. Collapsing of the alveoli leads to respiratory distress syndrome. In full-term infants (and others with mature lungs) the alveoli do not collapse because of surfactant. Surfactant is a lipid protein molecule secreted into the alveoli. Surfactant decreases surface tension and permits the full expansion of the alveoli.

Today respiratory distress syndrome can be easily treated. That has not always been the case. The son of President John Kennedy and Jacqueline Kennedy, Patrick Kennedy, died from IRDS. Patrick was born almost 6 weeks early and weighed less than 5 pounds. He survived for 2 days before succumbing to IRDS. The inability of physicians to successfully treat Patrick Kennedy and his death raised public awareness of IRDS (then called hyaline membrane disease) and led to increased funding for research for IRDS.