

Medical Science News

Surfactant suspension being tested in premature neonates

At Women's College Hospital in Toronto a natural surfactant preparation is being tested on neonates as part of a project to study prevention of respiratory distress syndrome (RDS) in premature newborn infants. Dr. Goran Enhorning, professor of obstetrics and gynecology at the University of Toronto, is the principal investigator in the project, which has been funded by the Medical Research Council of Canada.

Respiratory distress syndrome in premature newborn infants remains the single most important cause of disability and death in newborns. It is characterized by a failure in pulmonary gas exchange and progressive expiratory atelectasis; in the premature infant the atelectasis is usually the result of a deficiency of surfactant in the newborn's lungs. Surfactant consists of phospholipids produced in the lungs of the fetus that reach levels required for normal pulmonary function during the last 10% of gestation, or after 36 weeks; thus, infants born before this stage may have a deficiency of surfactant and be at risk for RDS.

Since the amount of surfactant present in an infant's airways at birth is an important determinant of whether RDS will develop, researchers have concluded that RDS could be prevented in premature infants by depositing surfactant into the upper airway before the newborn takes its first breath. As the initial breath is taken, the surfactant would be distributed throughout the lungs.

In the alveoli, surfactant forms a monomolecular layer at the air-liquid interface; one end of the molecule stays in liquid and the other in air. Surfactant's primary action in the neonate is twofold: facilitating air entrance and stabilizing the alveoli so that they will not collapse on expiration. During expiration sur-

face tension in the alveoli is reduced almost to zero, which makes possible their synchronous function.

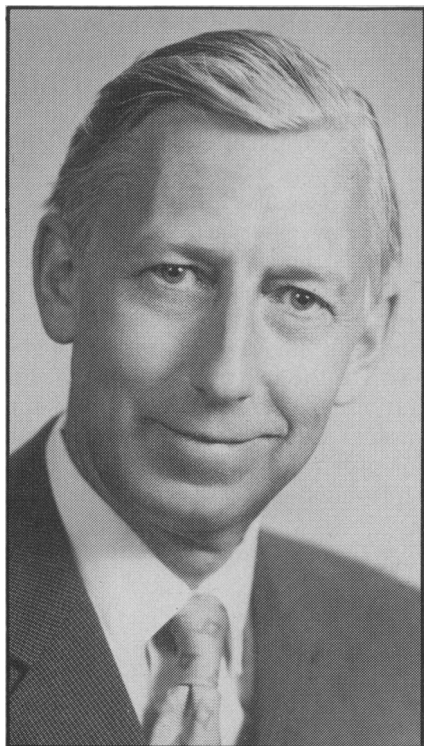
Many researchers have tried to prepare an artificial surfactant. The approach, Dr. Enhorning says, has been to formulate one that consists of the principal components of natural surfactant. The main phospholipid, dipalmitoylphosphatidylcholine, which was used unsuccessfully in clinical trials in Montreal more than 30 years ago, will not move alone to the air-liquid interface. An admixture of other phospholipids and possibly proteins is required.

Natural surfactants have proven effective in experiments with animals, and the clinical trial in Toronto will be using an extract of heterologous natural surfactant prepared from calf lung lavages. The trial is being conducted by Dr. Andy Shennon, pediatrician and neonatologist, and perinatologist Dr. John Milligan. A London, Ont. biochemist, Dr. Fred Possmayer, has prepared the surfactant as a water suspension.

Candidates for the trial are neonates who have a gestational age of less than 30 weeks (i.e., a probable birthweight of 1500 g or less). As of mid-March five babies had been entered into the study, Dr. Milligan told *CMAJ*, adding that Women's College Hospital sees about 150 such infants every year.

Dr. Enhorning, who has been studying the role of surfactant in respiratory distress syndrome for 20 years, hopes that prevention of RDS in premature neonates may soon be a reality. "The mortality rate in premature infants used to be about 50%, and, although it's about 10% now," he said, "we'd like to reduce that and the morbidity rate even further."

—Jane Wilson



Enhorning: prevention of respiratory distress syndrome may soon be a reality.