THE ASSESSMENT OF THE SURFACTANT QUALITY BY CAPILLARY SURFACTOMETER

Pulmonary surfactant is a complex of phospholipids and specific proteins (SP-A, B, C, D) covering the inner surface of the alveoli. Most important function of the surfactant is to stabilize alveoli and small airways and to prevent their collapse at the end of expiration, that results from the ability to decrease surface tension. Primary lack of pulmonary surfactant occurs in premature newborns and is accompanied by Respiratory Distress Syndrome (RDS). Secondary deficiency or inactivation of surfactant may be induced by the damage of alveolar-capillary membrane (plasma proteins) or by aspiration (acid gastric content, meconium, e.c). The possibility to test biophysical activity of surfactant *in vitro* is provided by surfactometers.

The aim of the practical is to demonstrate the properties of the surfactant preparations under physiological conditions and in presence of inhibitors.

Material

Capillary surfactometer CS-2005 (Calmia Medical, Toronto, Kanada) (Fig.1), surfactant preparations, inhibitors (plasma proteins, meconium).

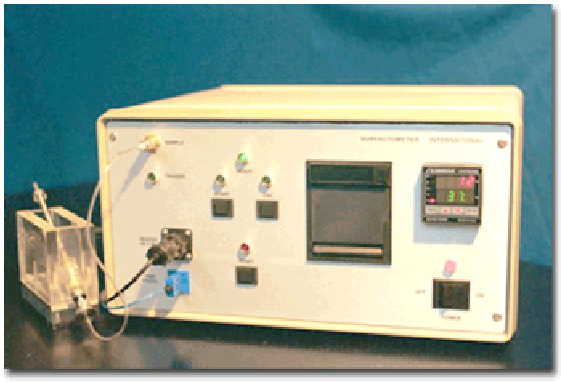

Fig.1 Capillary surfactometer

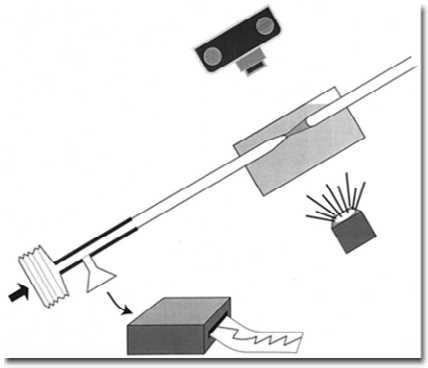

Fig.2 Detail of the capillary with the sample

Capillary surfactometer measures the activity of pulmonary surfactant in the thin capillary that mimicks the terminal airways. The measurement takes 120 seconds. The sample at a volume 0.5 µl is placed in to the narrow part of the glass capillary (ID=0.25 mm) that is equal to that of peripheral human airways. The air applied through one end of the capillary pushes up the sample through the narrow part out. The value of the pressure is recorded. The sample of active („good“) surfactant does not return back to the narrow part of the capillary, no resistance is met by the air flow and the pressure is equal to zero. The sample of inactive („bad“) surfactant returns back to narrow part and the pressure is repeatedly needed to push it away. The values of initial pressure (in cmH_2O) and capillary patency (in % of the 120 s period) are recorded and printed out.

Method

Heat up the water bath to 37 °C. Put the sample of surfactant into the capillary using a pipette (Fig.2) and insert the capillary into a stand. Immerse the capillary into a bath and press „START“.

Protocol: Write down the values measured by surfactometer and explain differences between the samples.