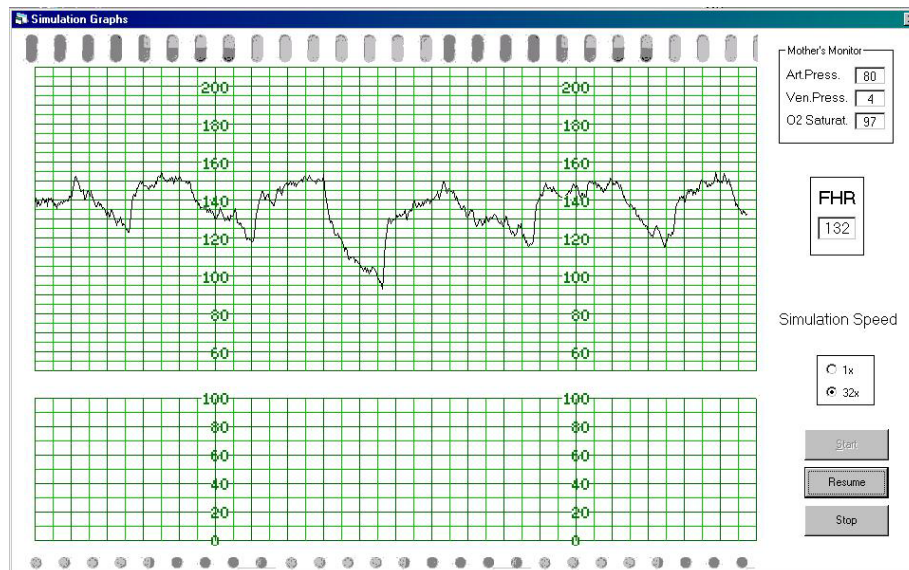## FDS – Fetal Distress Simulator

Objective:
Development of a software tool for simulation of CTG signals (FHR-foetal heart rate; UC- uterine contractions) depending in a realistic way on the main physiological and pharmacological patient variables. An important objective for this CTG simulator is integration in the Human Patient Simulator(TM), developed at the University of Florida, and commercialised by Medical Education Technologies, Inc.

Introduction:

Maternal hypotension following epidural anesthesia or cardiac arrest, maternal hypoxia associated with ventilatory complications, and fetal asphyxia caused by compression of the umbilical cord are examples of critical situations in obstetrics and in anesthesia of the pregnant woman. These incidents are relatively rare and often associated with a high risk to the woman and fetus involved. Therefore, simulation is a valuable tool in teaching the diagnostic and therapeutic skills in this context.

Methods and Results:

In the paper "Mathematical Model for Educational Simulation of the Oxygen Delivery to the Fetus", we describe the construction and validation of a mathematical model for educational simulation of the oxygen delivery to the fetus. The next step was to construct a relationship that represents the influence of the lack of oxygen in the baseline of FHR (chemoreflex model). Another two distinct FHR aspects have to be simulated: a) the large time scale heart rate features such as baseline, accelerations; b) the small time scale features known as short and long term variability (STV, LTV). Both aspects depend on underlying physiological and pharmacological variables. FHR baseline and accelerations have been simulated under the influence of gestational age and foetus behavioural state. Work on uterine contractions simulation and on their influence on FHR baseline is in progress. The simulation of the fractal behaviour of FHR signals, responsible for their short and long term variability, is the object of the companion project B.2.

Graphical output of the FDS, showing an umbilical chord scenario. The uterine monitor is in current development.

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Financing Institutions: INEB, METI.
Duration: 2 years (October 2000/ October 2002).