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# Thermoregulation in premature infants: a mathematical model

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## Abstract

### PURPOSE:

In 2010, approximately 14.9 million babies (11.1%) were born preterm. Because preterm infants suffer from an immature thermoregulatory system they have difficulty maintaining their core body temperature at a constant level. Therefore, it is essential to maintain their temperature at, ideally, around 37 °C. For this, mathematical models can provide detailed insight into heat transfer processes and body-environment interactions for clinical applications.

### METHODS:

A new multi-node mathematical model of the thermoregulatory system of newborn infants is presented. It comprises seven compartments, one spherical and six cylindrical, which represent the head, thorax, abdomen, arms and legs, respectively. The model is customizable, i.e. it meets individual characteristics of the neonate (e.g. gestational age, postnatal age, weight and length) which play an important role in heat transfer mechanisms. The model was validated during thermal neutrality and in a transient thermal environment.

### RESULTS:

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