Maintenance fluids contain both water and electrolytes and can be estimated from the child's age, body weight, degree of activity, and body temperature. Basal metabolic rate (BMR) is derived from standard tables and adjusted for the child's activity, temperature, and disease state. For example, for afebrile patients at rest, the maintenance water requirement is approximately 100 ml for each 100 kcal expended. Children with fluid losses or other alterations require adjustment of these basic needs to accommodate abnormal losses of both water and electrolytes as a result of a disease state. For example, insensible losses increase when basal expenditure increases by fever or hypermetabolic states. Hypometabolic states, such as hypothyroidism and hypothermia, decrease the BMR.

The percentage of TBW varies among individuals and in adults and older children; it is related primarily to the amount of body fat. Consequently, females, who have more body fat than males, and obese people tend to have less water content in relation to weight.

Changes in Fluid Volume Related to Growth

The fetus is composed primarily of water with little tissue substance. As the organism grows and develops, a progressive decrease occurs in TBW, with the fastest rate of decline taking place during fetal life. The changes in water content and distribution that occur with age reflect the changes that take place in the relative amounts of bone, muscle, and fat making up the body. At maturity, the percentage of TBW is somewhat higher in the male than in the female and is probably a result of the differences in body composition, particularly fat and muscle content.

Another important aspect of growth change as it corresponds to water distribution is related to the ICF and ECF compartments. In the fetus and prematurely born infants, the largest proportion of body water is contained in the ECF compartment. As growth and development proceed, the proportion within the ECF compartment decreases as the ICF and cell solids increase. The ECF diminishes rapidly from approximately 40% of body weight at birth to less than 30% at 1 year of age. The different effects on males and females become apparent at puberty.

Water Balance in Infants