Water and renal function in infants.
**Kidney still in development at birth.**

- The kidney plays a crucial role in regulating the body’s state of hydration.
- In humans, nephrogenesis is completed around the 35th week of pregnancy. Each kidney has between 850,000 and 1,200,000 nephrons. From the 35th week of pregnancy onwards, the kidney continues its morphological and functional maturation until normal (adult) renal function is reached around the age of 2 years.
- In newborns, glomerular filtration is low at birth: it is 12 ml/min/1.73 m², rising to 20-30 ml/min/1.73 m² after 2 weeks. It reaches the adult level (120 ml/min/1.73 m²) between 1 and 2 years.

  - The low filtration rate limits the volume of water that the kidney of a newborn is capable of eliminating.

- The urine concentration capacity of a newborn is immature, and the urinary osmolality is only 600 mOsm/kg compared with 1400 mOsm/kg in adults.
  - The reasons for this include anatomical and functional immaturity of the medullary system and the ascending limb of Henle, low medullary concentration of urea and sodium, poor tubular response to vasopressin, and high levels of prostaglandins. Urine concentration capacity will reach the adult values around the age of 1 year.

  - Infants are sensitive to an excessively high osmotic load.
  - Infants therefore require a larger volume of water to excrete a given osmotic load.

- In newborns, sodium excretion is higher at birth but rapidly settles to normal adult values. Newborns also have greater difficulties in eliminating a sodium load.

  - Newborns therefore have both higher salt needs and difficulties in eliminating any excess.

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**Premature infants**

- The fractional excretion of sodium is higher for a premature infant (5%) than for a full-term newborn (1%). This is because the greater degree of tubular immaturity entails a higher rate of urinary loss of salt.

- Premature infants have a relatively low capacity for sodium load excretion owing to the low rate of glomerular filtration, poor response to natriuretic hormones (ANF), high levels of aldosterone and above all angiotensin II, which stimulates sodium reabsorption via the AT1 receptors.

  - Premature infants find themselves in the difficult position of having both an increased need for salt and difficulties in eliminating any excess sodium.

  - The concentration capacity is 500 mOsm/kg in the premature infant.

  - The quantity of water will need to be determined on a case-by-case basis and very precisely for the premature infant.

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**Water and infants.**

- Proportionally, the body of an infant contains a larger volume of water than that of an adult. At birth, water represents 78% of its body weight. This percentage then falls until it reaches the adult level of 60% at the age of 1 year.

- In quantitative terms, the water intake must be sufficient to:
  - compensate for the losses incurred via the skin and the respiratory and digestive tracts
  - allow renal excretion of metabolic losses
  - meet the needs of growth

  - The daily water intake must be 10 to 15% of its body weight compared with 2 to 4% for adults.

  - The recommended water intake for infants* is as follows:

<table>
<thead>
<tr>
<th>Volume (ml/kg/day)</th>
<th>0-4 months</th>
<th>4-8 months</th>
<th>8-12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-100 ml/kg/day</td>
<td>150-150 ml/kg/day</td>
<td>130-120 ml/kg/day</td>
<td>110-100 ml/kg/day</td>
</tr>
</tbody>
</table>

* Nutritional recommendations for Belgium, CSH no. 7145-2 (version 112006)

- Renal losses are 50%, with the rest being eliminated through the faeces, skin and lungs.
- Water turnover is extremely rapid in newborns and infants, which are highly sensitive to dehydration.

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**Which water to recommend?**

- Whether it is to be used for preparing the feeding bottle or for drinking (between 2 feeds), the water must have a composition that satisfies precise criteria.

  - Any excess water intake from food (mineral salts, nitrogenous products, etc.) overloads the functioning of the kidneys. This can be avoided by regular consumption in sufficient quantities of a very low-mineralised natural mineral water, which allows elimination of metabolic waste without contributing any additional and possibly harmful elements.
  - The water must be pure and free from toxic substances.
  - An Italian study has shown that the osmolality of reconstituted infant formulas is lower when low-mineralised bottled water is used instead of tap water. The renal solute load potential and buffering power were also significantly lower in mixtures made using bottled water (p<0.01).
  - A low-mineralised bottled water is recommended for infants under the age of 2 years, in order to limit the osmolar load on immature kidneys.
  - Using a water rich in minerals presents a workload for the kidneys and runs the risk of diarrhoea associated with increased osmolality.

- Spa Reine is approved by the Superior Health Council and by the Belgian Public Service for Public Health. It is also recognised by the Belgian Royal of Medicine. Spa Reine benefits from the labels:
  - Natural mineral water with very low mineral content.
  - Suitable for preparing baby food.
  - Suitable for a low salt diet.

- Completely pure, very weakly mineralised, strictly controlled during all stages from the spring through to being bottled and guaranteed by a scientific committee, Spa Reine has exceptional guaranties of purity which makes it the first choice water for babies.
However thirsty you are
Spa Reine is sure to satisfy.