**Summary of “Exercise-induced hyponatremia: Causes, risks, prevention, and management”**

Here is the link to the article: <http://www.ccjm.org/content/73/Suppl_3/S13.long>

TAKE-HOME POINTS-

* Urgent intervention is indicated only in symptomatic patients. You do not need to treat asymptomatic hyponatremia after prolonged exercise
* Symptomatic hyponatremic patients typically present with values <125mEq
* The goal in correcting acute symptomatic hyponatremia is to increase serum sodium concentration by 2mEq/L/hour until they are no longer symptomatic.
* If a patient is actively seizing or in coma, 100mL of 3% NaCl can be administered and should increase serum sodium by 3-3.5mEq/L
* Over-hydration with water is the main contributing factor to hyponatremia in prolonged exercise
* If athletes participate in high-intensity endurance exercise for greater than one hour, they should rehydrate with solutions containing glucose and electrolytes
* Women, athletes with above or below average BMI, triathlon participants, and those that take longer to complete the event are at greater risk of symptomatic hyponatremia

More and more people are choosing to participate in “ultradistance sports”, including marathons and triathlons. Up to 10% of ultradistance athletes experience exercise-induced hyponatremia, defined as serum sodium less than 135mEq/L after an endurance exercise. Patients typically do not become symptomatic until the sodium level falls below 125mEq. In mild cases, the symptoms are non-specific and can include nausea, vomiting, fatigue, light-headedness, and dizziness. However, severe cases can be life-threatening. Patients may present with altered mental status, headache, incoordination, seizures, or in a coma. These neurologic effects occur because the sudden fluid shift from the hypotonic serum into the hypertonic cells can cause cerebral edema and may even lead to brainstem herniation.

While we may think of sweat as a salt-concentrated fluid, it is actually hypotonic to serum with only 25-75mEq of sodium. During intense exercise, up to 1.8L of sweat can be lost per hour depending on the humidity and temperature. Since sweat is a hypotonic substance, an athlete would become dehydrated and hypernatremic during intense exercise when they do not have any fluid intake. This is because free water loss would exceed sodium loss. People who participate in ultradistance sports can overcompensate for the fluid loss by overhydrating with water and therefore will have dilutional hyponatremia.

Studies have found that there are certain groups of people that are more at risk of becoming hyponatremic during these events:

-Triathlon participants are more at risk than marathon runners because the events take longer to complete.

-Women are more at risk because they have less total body water to begin with.

-Athletes that take longer to complete the event are more at risk, specifically if the race time exceeds four hours.

-People that are at the extremes of weight, either low or high BMI are also at higher risk.

-Athletes that consume >3L during the event (marathon runners) and/or are at a higher weight when they finish the race are at greater risk.

What should we advise our patients to do when they ask how to hydrate during these events? Fluid intake of 500mL/hour is recommended during prolonged exercise for non-competitive athletes. If athletes are competing in intense exercise for greater than one hour, beverages containing 4-8% carbohydrates with electrolytes (ie. Sports drinks) are recommended. One study found that educating triathlon participants about the appropriate rate of fluid intake and limiting the fluids available during the race reduced the percentage of athletes treated for hyponatremia from 22% to 3%.

Management of acute (<48 hours) and chronic hyponatremia differs. In chronic hyponatremia, a *slow* rate of correction is necessary to minimize the risk of central pontine myelinolysis. In acute hyponatremia, gradual correction is preferred to reduce likelihood of cerebral edema. In both instances, correction of sodium should not exceed 12mEq in first 24 hours.

So, when should you administer IV fluids? Assess the patient’s volume status first. Are they dehydrated? Do they appear euvolemic? Are they overloaded or edematous? Are they making urine? Oliguria (decreased urine output) can be expected within the first few hours after endurance events secondary to ADH secretion and water retention and does not necessarily indicate dehydration. In patients that are only mildly symptomatic, oral rehydration solutions with sodium should be considered. The goal in correcting acute symptomatic hyponatremia is to increase serum sodium concentration by 2mEq/L/hour until they are no longer symptomatic. If a patient has any signs of central dysfunction secondary to hyponatremia, you must consider giving hypertonic saline. For example, if you have a patient seizing after a marathon, you need to consider giving 3% sodium chloride solution. Administration of 100mL of 3%NaCl will increase serum sodium by ~3mEq. If the patient does not improve after the first 100mL, you can consider a second bolus. However, even 200mL can raise the serum sodium by 7-8mEq which quickly approaches the maximum suggested in 24 hours. Hypertonic saline should be used with caution and only when absolutely necessary.