Caffeine and Dehydration

By G. Douglas Andersen, DC, DACBSP, CCN

In my previous article, "Caffeine and Athletic Performance" (July 29, 2008) three of the studies we reviewed also measured caffeine’s effect on hydration. In each case, the conclusion was that caffeinated fluids did not cause greater fluid loss through sweat or urine than non-caffeinated beverages. 1-3

Survey your family, friends, patients or colleagues to see who believes caffeinated beverages cause bathroom trips. Most people consider it a fact that caffeine dehydrates. Ask them what school they learned this in and you’ll get a puzzled look, followed by an answer such as, "I didn’t learn it in school. I learned it when I started drinking coffee." This entrenched belief causes a dilemma among athletes looking for an edge. On one hand, a growing number are aware (via popular press and the Internet) of the growing body of evidence that caffeine improves performance. Conversely, athletes know dehydration (depending on the degree) not only harms performance, but can stop it.

This month, let’s review a unique study on caffeine and dehydration. 4 Unlike most studies on this topic, this was not done for a few hours. Fifty-nine men (average age 21) were studied for a 13-day period. The protocol was as follows:

1. Prior to the intervention, no caffeine was consumed for 48 hours.
2. On days 1 through 6, all subjects ingested 3 mg of caffeine per kilogram of body weight (mg/kg/bw) prior to performing their normal workouts in a variety of sports.
3. On days 7 to 11, the subjects were divided into three blinded groups. They were either given a caffeine-free placebo (Group 1), 3 mg caffeine/kg/bw (Group 2), or 6 mg caffeine/kg/bw (Group 3). The mean level of caffeine ingested was 226 mg for the 3 mg/kg/bw group, and 452 mg for those who took 6 mg/kg/bw.
4. Blood and urine were tested on days 1, 3, 6, 9 and 12.
Urinary Excretion With Different Levels of Caffeine:

<table>
<thead>
<tr>
<th>Day</th>
<th>Group 1 (Caffeine mg/kg/bw)</th>
<th>Urine ml/24hr</th>
<th>Group 2 (Caffeine mg/kg/bw)</th>
<th>Urine ml/24hr</th>
<th>Group 3 (Caffeine mg/kg/bw)</th>
<th>Urine ml/24hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1465</td>
<td>0</td>
<td>1484</td>
<td>0</td>
<td>1593</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1626</td>
<td>3</td>
<td>1587</td>
<td>3</td>
<td>1487</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>1605</td>
<td>3</td>
<td>1347</td>
<td>3</td>
<td>1641</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>1303</td>
<td>3</td>
<td>1636</td>
<td>6</td>
<td>1446</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>1410</td>
<td>3</td>
<td>1371</td>
<td>6</td>
<td>1349</td>
</tr>
</tbody>
</table>

Reading the results in the table above, it’s clear that up to 6 mg/kg/bw (approximately 450 mg for a 165-lb. person) of caffeine did not have a diuretic effect or cause dehydration. Add the evidence from other recent trials\(^1-3\) we reviewed last month and one can safely say caffeine in doses less than 500 mg will not cause fluid loss during vigorous activity.

So, what about the evidence that supports caffeine’s effect as a diuretic? We will address that issue next time.

References


Click here for more information about G. Douglas Andersen, DC, DACBSP, CCN.