In Vitro Total Potassium-Binding Capacity of Patiromer When Mixed With Apple or Cranberry Juice

Jeannene Fogli, Martha R. Mayo, John Miyawa, Reyon Ono, Coleman Gross
Relypsy, Inc., a Vifor Pharma Group Company, Redwood City, CA

Background on Patiromer
- Nonabsorbed potassium (K⁺)-binding polymer consisting of uniform, spherical beads of approximately 100 µm (Figure 1), which maintain their structure during passage through the gastrointestinal system.
- Uses calcium (Ca²⁺) as the counterion for exchange with K⁺.
- Approved for treatment of hyperkalemia in the United States, the European Union, Switzerland, and Australia.
- In clinical trials, patiromer has been shown to:
  - Reduce elevated serum K⁺ without or with food.
  - Facilitate continued use of renin-angiotensin-aldosterone system (RAAS) inhibitors.
  - Maintain mean serum K⁺ in the normal range for up to 52 weeks.
  - Be supplied as a powder for oral suspension (Figure 2).
- United States prescribing information indicates that apple juice or cranberry juice can be used instead of water to prepare the suspension.

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OBJECTIVES
- In a palatability study in healthy volunteers, 90% of subjects reported positive palatability experiences with patiromer in terms of odor or taste.
- However, palatability of patiromer may be a more important factor in clinical practice, as patients with chronic kidney disease (CKD) have altered taste function. CKD patients are at higher risk of hyperkalemia, and may require chronic use of patiromer.
- In addition, patients and healthcare providers commonly request information on the use of alternatives to water for mixing patiromer.

METHODS
- The in vitro K⁺-binding effects of mixing patiromer with apple juice and cranberry juice cocktail were assessed at two dilution ratios to evaluate a range of concentrations at clinically relevant patiromer doses:
  - 2.1 g patiromer suspended in 40 mL of juice (high dilution, low concentration).
  - 6.3 g patiromer suspended in 20 mL of juice (low dilution, high concentration).

METHODS (CONT’D)
- We selected apple juice and cranberry juice cocktail for evaluation because they are relatively low in K⁺ compared to other juices (Table 1).
- After suspension of patiromer in juice, samples were vortexed for 5 minutes before and after a 45-minute waiting period; samples were then centrifuged for 5 minutes to separate the supernatant from the polymer.
- The polymer was then vacuum filtered, washed, dried, and analyzed for total K⁺-binding capacity (mEq/g).
- Samples were prepared in triplicate for both juices at each dilution. Results in the normal range for up to 52 weeks.

RESULTS
- The mean total K⁺-binding capacity (potency) of patiromer suspended in apple juice was 8.8 mEq/g at both high and low dilutions. For cranberry juice cocktail, the values were 8.8 and 8.6 mEq/g, respectively. The mean result for control (water) was 9.1 mEq/g (Table 2).
- The differences are not considered clinically relevant.

RESULTS (CONT’D)

Table 1. K⁺ content of commonly available juices

<table>
<thead>
<tr>
<th>Type of juice</th>
<th>USDA standard (Release 28) reference number</th>
<th>K⁺ content mg (mEq) per 1 cup (approximately 240 mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>90926</td>
<td>496 (12.7)</td>
</tr>
<tr>
<td>Tomato-vegetable, low sodium</td>
<td>43365</td>
<td>467 (11.9)</td>
</tr>
<tr>
<td>Apple</td>
<td>90916</td>
<td>250 (6.4)</td>
</tr>
<tr>
<td>Cranberry cocktail</td>
<td>14242</td>
<td>35 (0.9)</td>
</tr>
</tbody>
</table>

Table 2. Total K⁺-binding capacity (potency) of patiromer suspended in apple or cranberry juice vs water

<table>
<thead>
<tr>
<th>Type of juice</th>
<th>K⁺-binding capacity (mEq/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High dilution, low concentration</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>8.8</td>
</tr>
<tr>
<td>Cranberry cocktail</td>
<td>8.8</td>
</tr>
<tr>
<td>Water</td>
<td>9.1</td>
</tr>
</tbody>
</table>

Clinical Implications and Conclusions
- Patiromer is a once-daily K⁺ binder for the treatment of hyperkalemia, a chronic medical condition that commonly affects patients with CKD.
- Patiromer (8.4–25.2 g once daily) is supplied as a powder, and the United States prescribing information recommends mixing patiromer with ¾ cup water (~80 mL).
- Adherence to prescribed therapies may be a challenge for some patients with CKD, owing to multi-pharmacological treatment and high pill burden.
- Providing alternatives to water for patients to mix patiromer may increase palatability and reduce the risk of nonadherence.
- In conclusion, there was no adverse impact on in vitro total K⁺-binding capacity when patiromer was mixed with apple juice or cranberry juice cocktail.

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