Despite strong efforts to promote the consumption of fruits and vegetables in Canada and globally, many Canadians do not meet Canada’s Food Guide recommended number of daily servings. Fruit and vegetable juices offer a convenient and nutritious option to increase fruit and vegetable servings. Juice offers a source of a variety of vitamins and minerals and contains phytochemicals that may play a role in the prevention of cardiovascular disease. The following review provides you with information on the nutritional composition of 100% fruit juices and emerging scientific evidence on the health benefits of consuming fruit and vegetable juices.

**Fruit and Vegetable Recommendations**

Fruits and vegetables play an important role in attaining and maintaining good health by providing important nutrients and phytochemicals to the diet. A healthy diet rich in a variety of vegetables and fruits may lower the risk of heart disease and also may help reduce the risk of certain cancers.¹

Eating Well with Canada’s Food Guide places a strong emphasis on vegetables and fruits. As a food group it makes up the largest proportion of the Food Guide servings in a healthy eating pattern. Table 1 details the recommended servings per day by age and sex.

While the Guide advises that whole vegetables and fruits should be chosen more often, it includes fruits and vegetables in many forms including 100% juice. According to the Guide, 125 mL of 100% juice equals one serving of fruit.¹

**Canadians are not getting enough fruits and vegetables**

While fruit and vegetable consumption is widely promoted, the 2004 Canadian Community Health Survey (CCHS) found that most Canadians eat fewer than 5 servings per day - the minimum as recommended by the 1992 Canada’s Food Guide. Adults had an average of 5.2 servings a day and children and adolescents have an average of 4.5 servings.²

Additionally, fruit juice intake only accounted for 1 serving of fruits and vegetables in adults aged 19-30 and decreased to two-thirds of a serving at age 70 years or older.³ In children and youth (ages 1-18 years old), fruit juice intake is equivalent to one and a half servings of fruits and vegetables for boys, and one and a quarter servings for girls.⁴

More recent survey data from Statistics Canada (CCHS 2010) indicates that 43% of Canadians over 12 years of age have self-reported intakes of less than 5 servings per day.⁵

The scientific literature documents a variety of barriers to fruit and vegetable consumption including perceptions of cost, lack of availability, poor quality, and taste preferences.⁶ Juices and juice-puree mixtures may help mitigate some of these barriers and increase fruit and vegetable intake, particularly in adults, because of their longer shelf life, convenience to consume and affordability.

**Table 1: Eating Well with Canada’s Food Guide: Recommended servings of Vegetables and Fruits per day by age and sex:**

<table>
<thead>
<tr>
<th>Age</th>
<th>CHILDREN</th>
<th>TEENS</th>
<th>ADULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Girls and Boys</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>2-3</td>
<td>4</td>
<td>7</td>
<td>7-8</td>
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<tr>
<td>4-8</td>
<td>5</td>
<td>8</td>
<td>8-10</td>
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<tr>
<td>9-13</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-18 Years</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-50 Years</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50+ Years</td>
<td>7</td>
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ושאן ZA YER 2 N하기의 LTR glyph: HEALTH WELLNESS FALL 2012 JUICY NEWS Reviewed by: Heidi Smith, RD. Health and Performance Centre, University of Guelph Caroline Saunders, PhD. Senior Scientist, Fruit and Vegetable Nutrition Innovation, PepsiCo.

Canadians are not getting enough fruits and vegetables

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</table>
According to the Codex Alimentarius Commission (Codex) standard for fruit juices, a fruit juice is obtained from the whole fruit (edible portion) and does not contain more sugar than the corresponding fruit. This standard states that “fruit juices have the essential physical, chemical, organoleptical, and nutritional characteristics of the fruit(s) from which it comes”.7

The Canadian Food and Drug Regulations8 and Processed Product Regulations9 also have clear standards of identity for fruit juices and fruit juice from concentrate, which are consistent with Codex.

Fruit juices are nutrient-dense, which means that, per calorie, 100% juice is a source of a number of vitamins, minerals and phytochemicals. The nutritional profile of the juice depends on the nutritional composition of the fruit from which it was sourced. While the process of juicing (extraction and pasteurization) does result in some nutrient losses, Table 2 demonstrates that much of the nutritional composition is maintained.

Fruits, vegetables and 100% juices provide a wide range of vitamins and minerals to the diet and the health benefits of these essential nutrients are well established. However, emerging evidence suggests that the health benefits of a diet rich in fruits, vegetables and 100% juices may be attributed to the diverse array of phytochemicals they can provide.12 The term ‘phytochemical’ refers to plant chemicals and includes carotenoids, flavonoids and other phenolic compounds. Some of these phytochemicals contribute to the bright and vivid colours found in fruits and vegetables.

Table 2: Nutrient comparison of fruit juices and corresponding whole fruit (per 100g fresh weight of edible portion†) 10,11

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Orange Juice*</th>
<th>Orange</th>
<th>Apple Juice</th>
<th>Apple (includes skin)</th>
<th>Grapefruit Juice</th>
<th>Grapefruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>49</td>
<td>47</td>
<td>46</td>
<td>52</td>
<td>38</td>
<td>32</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>11.5</td>
<td>11.8</td>
<td>11.3</td>
<td>13.8</td>
<td>9.0</td>
<td>8.1</td>
</tr>
<tr>
<td>Fibre (g)</td>
<td>0.3</td>
<td>1.8</td>
<td>0.2</td>
<td>1.9</td>
<td>0.6</td>
<td>1.8</td>
</tr>
<tr>
<td>Sugars (g)</td>
<td>8.3</td>
<td>9.4</td>
<td>9.6</td>
<td>10.4</td>
<td>8.9</td>
<td>6.9</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>11</td>
<td>40</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>11</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td>178</td>
<td>181</td>
<td>101</td>
<td>107</td>
<td>153</td>
<td>139</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>19</td>
<td>30</td>
<td>0</td>
<td>2</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>34</td>
<td>53</td>
<td>41**</td>
<td>4.6</td>
<td>29</td>
<td>34</td>
</tr>
<tr>
<td>Quercetin (mg)</td>
<td>0.4</td>
<td>0.45</td>
<td>0.6</td>
<td>4.0</td>
<td>0.36</td>
<td>0.33</td>
</tr>
<tr>
<td>Hesperidin (mg)</td>
<td>16.4</td>
<td>27.2</td>
<td>0</td>
<td>0</td>
<td>0.81</td>
<td>0.35</td>
</tr>
<tr>
<td>Epicatechin (mg)</td>
<td>N/A</td>
<td>0</td>
<td>4.7</td>
<td>7.5</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Catechin (mg)</td>
<td>N/A</td>
<td>0</td>
<td>1.2</td>
<td>1.3</td>
<td>N/A</td>
<td>0</td>
</tr>
</tbody>
</table>

†Values for beverages adjusted by their respective specific gravities to convert them on weight basis (mg/100g).
*Chilled, includes from concentrate
**Vitamin C added

DID YOU KNOW?
The pasteurization process (heating of product) ensures product safety and maximizes stability throughout the shelf life of the product. Chilled juices (e.g., Tropicana) have a shelf life of ~2-3 months and shelf-stable juices (e.g., Dole and Ocean Spray) have a shelf life of ~6 months.

FRUIT JUICE VERSUS FRUIT

DID YOU KNOW?

JUICIES AND HEALTH
Flavonoids are the most diverse group of phytochemicals and the most abundant natural compounds occurring in the plant kingdom. The main flavonoid subclasses include anthocyanidins, flavones, flavonols, flavanones, flavonols and isoflavones. Flavonoids commonly found in juices include flavanones (hesperidin, naringenin), flavonols (quercetin), flavanols (epicatechin) and anthocyanidins (cyanidin, delphinidin). Flavonoids have important roles within the plant including regulation of growth, flower colouring and helping to protect the plant from Ultra Violet (UV) radiation.

**CARDIOVASCULAR DISEASE**

The area of cardiovascular disease appears to show the most convincing evidence from epidemiological and clinical studies for the beneficial effects of fruits and vegetables and their juices. A number of probable mechanisms have been proposed, including a reduction in postprandial inflammation and oxidative stress and by improvement in vascular function.

Morand et al. (2011) found that acute and moderate term orange juice consumption led to beneficial effects on vascular function. Postprandially, orange juice consumption (500mL) improved vascular function and after 4 weeks of consumption, improvements in diastolic blood pressure (6.5% decrease) were observed. The study demonstrated that the flavonoid hesperidin could be the bioactive in orange juice responsible for the observed effects.

These observations have been supported by a study by Milenkovic et al (2011). They showed that both orange juice and the isolated flavonoid, hesperidin, were also able to change the expression of a number of genes relating to cardiovascular disease. Interestingly, the effects of orange juice were greater than hesperidin alone which suggests a synergistic effect between other components of orange juice and hesperidin.

Another study examining six months of citrus juice consumption (300 mL/day), demonstrated an improvement in markers of cardiovascular disease such as oxidized LDL, C-Reactive Protein, and Homocysteine in individuals with Metabolic Syndrome.

Health Canada currently permits the use of a health claim related to fruit and vegetable consumption and cancer risk reduction.

“A healthy diet rich in a variety of vegetables and fruit may help reduce the risk of some types of cancer.”

The claim can be made for a fruit, vegetable or juice product or a combination food. The claim cannot be made for potatoes, yams, cassava, plantain, corn, mushrooms, mature legumes and their juices, vegetables or fruit used as condiments, garnishes or flavourings, jams or similar products, olives, or powdered vegetables or fruit.

**BODY WEIGHT**

The consumption of fruits and vegetables has been shown to be correlated with a reduced risk of becoming overweight or obese. Similarly there is evidence that 100% fruit juice intake is also associated with a healthy body weight. Akhtar-Danesh and Dehghan (2010) examined the CCHS 3.1 (2007) to understand the association between fruit juice consumption and self-reported body mass index (BMI) among adult Canadians. They found that a higher 100% juice consumption was correlated with a lower BMI after adjusting for a variety of factors such as age and activity level.

Pereira et al. (2010) analyzed data from the National Health and Nutrition Examination Survey (NHANES) 1999–2004 to examine the association between 100% fruit juice consumption and the odds of obesity (BMI > 30) in adults. Fruit juice consumption was associated with lower body weight, BMI, and waist circumference. These findings are consistent to other longitudinal studies conducted among children.
PepsiCo Canada offers a variety of juice products that can meet individual needs for achieving a healthy, balanced diet. Incorporating 100% juice into your diet is a convenient way to boost daily fruit and vegetable intake.

**REFERENCES**


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**FOR YOUR PRACTICE**

Canada’s Food Guide recommends up to 10 servings of vegetables and fruit per day depending on age and sex, however many Canadians consume less than half of their recommended servings. When you are helping your client with meal planning and making healthy choices, remind them that one cup (250 mL) of juice is equal to 2 servings of fruits or vegetables. This is one way to help them reach their daily recommended intake.

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**THE BOTTOM LINE**

Fruit and vegetable juices contribute to a healthy diet by providing many beneficial nutrients and bioactive compounds in similar quantities to those found in whole fruits and vegetables. While there are some losses with processing, much of the nutritional composition is maintained. Emerging evidence suggests that the beneficial health effects of consuming fruits, vegetables, and 100% juices may be due to the range of phytochemicals they contain, not just their vitamin and mineral content. For example, phytochemicals may be responsible for the improvement in indicators of cardiovascular disease observed with juice consumption.

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**IN THE MARKETPLACE**

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**Brought to you by the Nutrition Professionals at PepsiCo Canada.**

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