Summary 26

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Title: **"Consumer labels can convey polyphenolic content: Implications for public health"**

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Recent studies have suggested the benefits of polyphenols in the diet. The author proposes to include polyphenol information on food consumer labels and, given the wide chemical complexity of this group of compounds, discusses here a possible way to go about this task.

• First, the author reviews the classification of this complex group of compounds. Polyphenols can be generally divided into 1) non-flavonoid and 2) flavonoid types.

• Whithin the *non-flavonoids*, we have several sub-types: 1) hydroxycinnamates, like caftaric acid, 2) stilbenes, like resveratrol, which have been shown to have beneficial properties against cancer, and 3) benzoic acid derivatives, like gallic acid, which are abundant in aged red wine.

• Within the *flavonoids*, we have three major classes: 1) flavonols, 2) anthocyanins, and 3) flavan-3-ols. **Flavonols** –like quercetin- are found in the berry skin, mostly attached to sugars (glycosides). These sugars get hydrolyzed during winemaking and aging. Flavonols appear to be produced in the presence of sunlight, and since quality grapes require sunlight, flavonols have been proposed as an indirect marker of red wine quality. **Anthocyanins** tend to gradually react with tannins to give pigmented tannins (also called polymeric pigments). By the time the wine is 3 yrs old, all the monomeric anthocyanins are gone and color is due solely to pigmented tannins. **Flavan-3-ols** –like catechin, epicatechin- are the most abundant type of polyphenols in wine (50%). Their sizes vary widely depending on the number of flavan-3-ol units –or the degree of polymerization-, which can range from 2 to greater than 15 units.

• Polyphenolics in wines originate mostly from the grape. Most of the above classes derive, more specifically, from the grape skins and seeds, and therefore are mainly present in red wines. The one exception is hydroxcinnamates, which are present in the juice itself, and so exist in both white and red wines.

• There are currently several chromatographic methods available to separate all of these compounds, mostly based on size or degree of polymerization. This provides a "snap shot" of phenolic compounds.

• But the main challenge when measuring phenolic compounds is the fact that they are a extremely dynamic population of compounds. In fact, polyphenols in foods are known to change during 1) fruit ripening, 2) processing and 3) aging, giving rise to yet more diverse –and sometimes poorly characterized- forms. To give a couple of examples, 1) during ripening, the flavan-3-ols (also called proanthocyanidins) in the grape seeds get oxidized, which causes them to cross-link, giving rise to very large tannin molecules. 2) Similar oxidations take place during winemaking, where oxygen is introduced during racking operations and through micro-oxygenation.

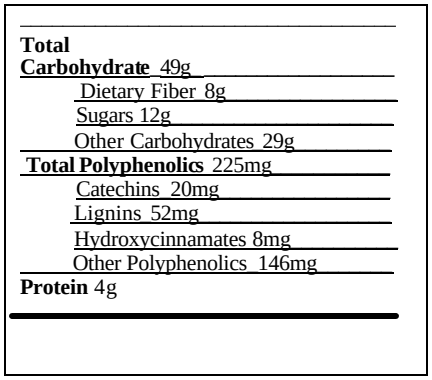
• The result is that, even though we start with a fresh product whose polyphenolic composition is well understood, processing can introduce a diversity of products (almost always involving oxidation-initiated bonds) whose composition we might not know. Yet, just because they are not well characterized, it doesn't mean that they do not have important health benefits. In fact, since they are a diverse set of high-molecular weight substances, they are expected to cover a wide range of functions involved in intestinal protection (like being potent enzyme inhibitors, complexing metals effectively, or trapping reactive oxygen radicals). As the author points out, we cannot afford to ignore this class of substances, so they will have to be grouped into one large category.

• So how can food be labeled for polyphenols? As a starting point, the author proposes **8 major phenolic categories** in a food label: 1) hydroxycinnamates, 2) flavan-3-ols (or even better, catechins, to avoid confusion with a name so similar to flavonols, 3) anthocyanins, 4) flavonols, 5) flavanones (these are similar to flavonols but lack a hydroxyl group in the main ring), 6) tannin oligomers, 7) lignins, and 8) other polyphenolics (comprising all material resulting from processing and that is difficult to characterize). Even though the author acknowledges these groups seem like a lot, most foods will have just one or two classes present, which will greatly simplify the label.

• There are, of course, issues with creating these large groupings. For example, within a group, some species have more potent anti-oxidant activity than others, so the percentages by weight will lose meaning from a "health" perspective. An alternative solution would be to use "equivalent values" (express every substance in terms of the strength of a reference one). But this, the author points out, would skew the market to prefer the highest potency substance, ignoring the others.

In summary, if polyphenols play key roles in reducing the incidence of chronic disease, it would seem important to provide consumers with information regarding their content in foods. The author expects this to have two positive effects: 1) to motivate consumers to purchase foods that contain these substances, and 2) to motivate food processors to retain these substances. Even though the proposed label is not perfect, the author suggests that doing nothing may be even riskier for the consumer.

The author includes in the article the following food label example.



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