Determination of polyphenols bioaccessibility by *in vitro* gastrointestinal digestion of apple peel

Jozo Ištuk[1*]; Lidija Jakobek[1]

[1]Prehambeno-tehnološki fakultet, Franje Kuhača 20, Osijek, Republika Hrvatska
[*]jozo.istuk@ptfos.hr

Bioaccessible polyphenols represent polyphenols that are released from the food matrix during digestion and become available for absorption. This work aimed to determine the bioaccessible polyphenols from the peel of commercial apple variety 'Idared' throughout oral, gastric, and intestinal simulated digestion. Polyphenols were extracted by the means of chemical and enzymatic extraction. In vitro gastrointestinal digestion of the peel of apples was conducted. Polyphenols present in the extracts and oral, gastric, and intestinal digest were identified and quantified with the use of high-performance liquid chromatography. The amount of polyphenols released during the simulated digestion was lower than the one present in the extracts. Polyphenols bioaccessibility, expressed as a percentage of initial polyphenol concentrations, was 29%, 43%, and 23% for oral, gastric, and intestinal phases, respectively. Flavonols (FVO) showed to be the most stable group with an intestinal recovery of 38%, followed by phenolic acids (PA) (11%) and dihydrochalcones (DHC) (8%). Flavan-3-ols (F3O) and anthocyanins (AC) were not found in the intestinal phase. These results suggest that polyphenols are released from the peel of apples during digestion and that the amount decreases in the intestines.

Before digestion

Apple peel

Rich in polyphenols, but what percentage is **bioaccessibile**?

Chemical extraction

80 % methanol

Ultrasonification

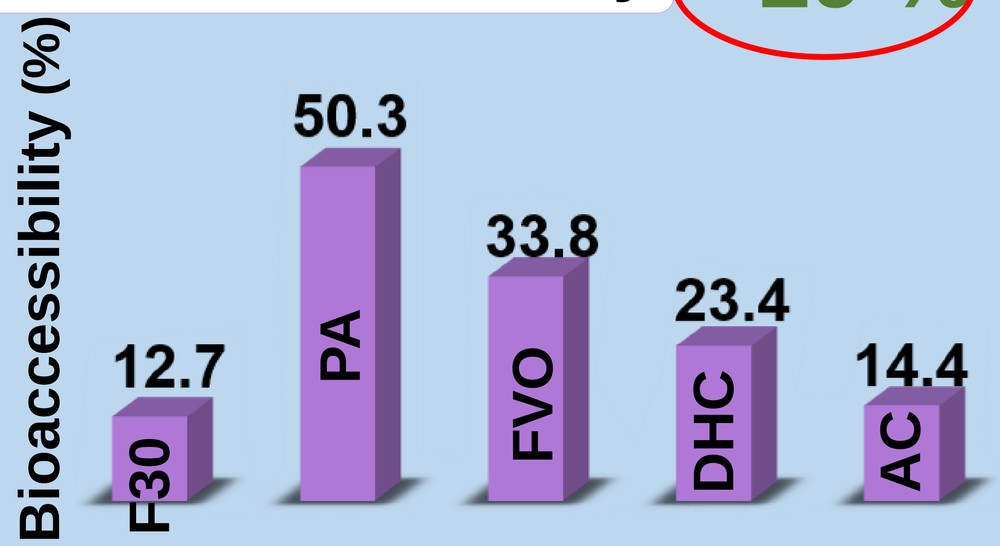
Enzymatic extraction

α-amylase

Pepsin

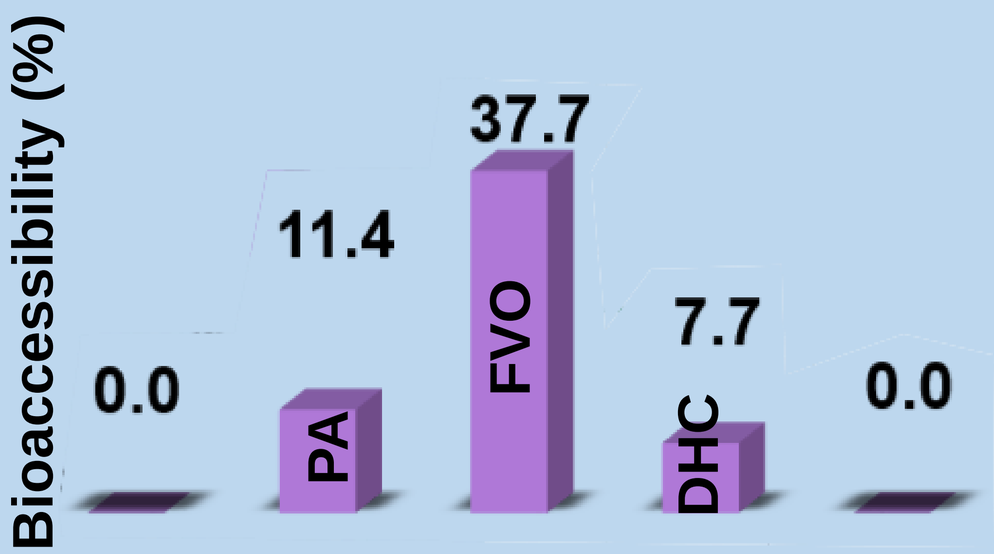
Pancreatin

Oral bioaccessibility = 29 %

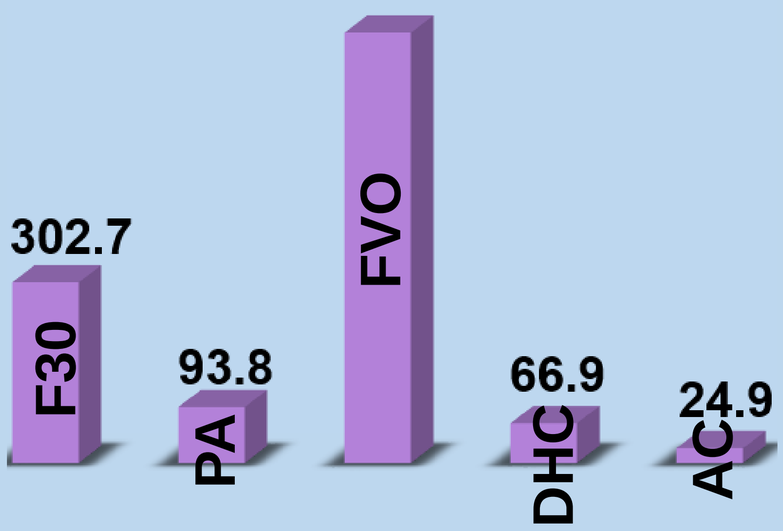


Gastric bioaccesibility = 43 %

Intestinal bioaccessibility = 23 %



Polyphenol content (mg/kg of peel)



Total polyphenols: 1209 mg/ kg of peel

Conclusion

- Polyphenols are released from the peel of the apples during digestion
- Gastric bioaccessibility is highest, followed by oral and intestinal
- Flavonols are the most stable polyphenol group
- Anthocyanins and flavn-3-ols were not present in the intestine

This work has benn fully supported by Croatian Science foundation under the project number IP 2016-06-6777.
The work of J.I. was financed by European social fund, Operational Program 2014–2020, aim 10.II.3