PROANTHOCYANIDINS, A CLASS OF DIETARY POLYPHENOLS: ASSESSMENT IN FECES AS POTENTIAL INTAKE BIOMARKER

Cristina Magdaleno-Tapia[1], Paola Quifer-Rada[2], Elena Rodríguez-Rodríguez[3], Rocío Estévez-Santiago[1], Andrew L. Waterhouse[3], Rosa M. Lamuela-Reventós[5], Begoña Olmedilla-Alonso[1], Jara Pérez-Jiménez[1*]

*[1]Dpt. Metabolism and Nutrition, Institute of Food Science, Technology and Nutrition, (ICTAN-CSIC), Madrid, Spain. [2] Dpt. Endocrinology and Nutrition. CIBER of Diabetes and Associated Metabolic Diseases, Biomedical Research Institute Sant Pau, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain. [3] Dpt. Chemistry in Pharmaceutical Sciences, Complutense University of Madrid (UCM), Madrid, Spain. [4] Dpt. Viticulture and Enology, University of California, Davis, CA, USA.[5] Dpt. Nutrition, Food Sciences and Gastronomy, XaRTA, INSA-UB, School of Pharmacy and Food Sciences. University of Barcelona, Barcelona. Spain; CIBER Physiopathology of Obesity and Nutrition (CIBER-OBN), Instituto de Salud Carlos III, Madrid, Spain. *jara.perez@ictan.csic.es*

Introduction

Proanthocyanidins (PAs), a type of dietary polyphenols. are formed by oligomers and/or polymers of flavan-3-ols. They are found in various kinds of fruits, nuts, legumbs, wine and cocoa.

Their study is important because the PAs exert beneficial effects on the health through theirs metabolites (prevention of cardiovascular diseases, different types of cancers and type 2 diabetes). Therefore, it is important improve the knowledge about their metabolic fate as well as on the relationship between the intake, metabolism and excretion of PAs.

Objetive

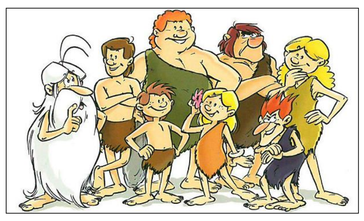
To evaluate whether total PAs content in feces may be used as a biomarker intake

Materials and methods

The PAs content in feces were measured by the adaptation to feces of the spectrophotometric Porter´s method. The feces came from two previous diferents studies, one of supplementation on pigs, and an observational one on humans.

.

In the supplementation study, the pigs were fed with a control diet without PAs during days 0, 1 and 2 of the study. Then, since the day 3 until the 8 day (supplementation period) the control diet was supplemented with 1% of grape seed extract. Finally they were fed with the control diet during 2 days (since day 9 until day 10).



In the observational study, the subjects (n= 100) were women or men aged 45-65. They must fulfill certain inclusion criteria (levels of cholesterol, weight,etc.). Each subject completed three 24 h dietary recalls (including a non-working day) and provided a feces sample according to certain guidelines.

Results

1. Significant association between intake and excretion of PAs

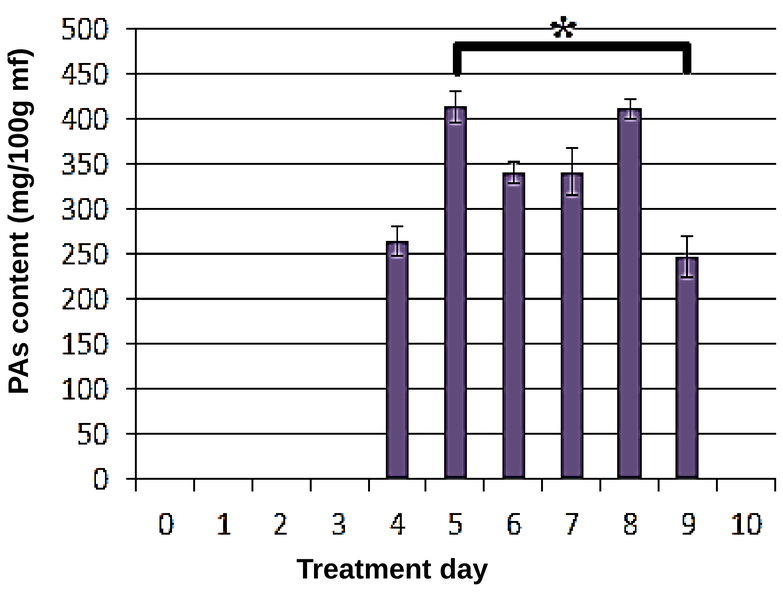


Figure 1. PAs in feces (mg polymers equivalents/100g mf) after supplementing pigs with grape seed extract (GSE).

* indicates significants differents (p< 0,05)

2. Significant association between metabolites in feces measured by HPLC techniques and total excretion PAs excretion measured by the adaptation of Porter´s method (Table 1 and Figure 2)

	Correlation coefficient	Bilateral significance
PAs in feces	1	
Catequine	0,598	0,002
Epicatequine	0,607	0,002
Syringic acid	-0,407	0,048
3OH-phenilvaleric	0,626	0,001
4-hidroxihippuric	-0,396	0,056
Dimers	0,599	0,004
Trimers	0,599	0,004
Tetramers	0,706	0,001
Pentamers	0,712	0,000

Table 1. Corelation between metabolites in feces mesaured by HPLC and total PAs excretion mesaured by the adaptation Porter´s method, in pigs supplemented with grape seed extract.

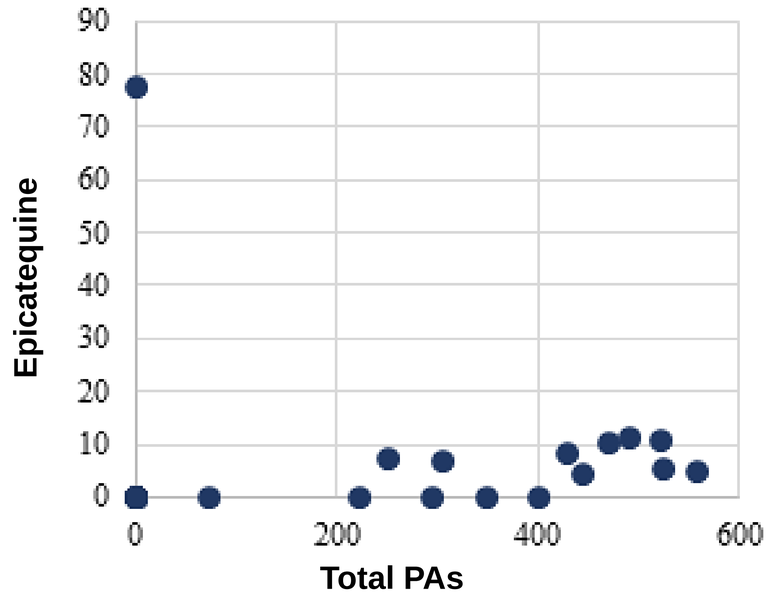
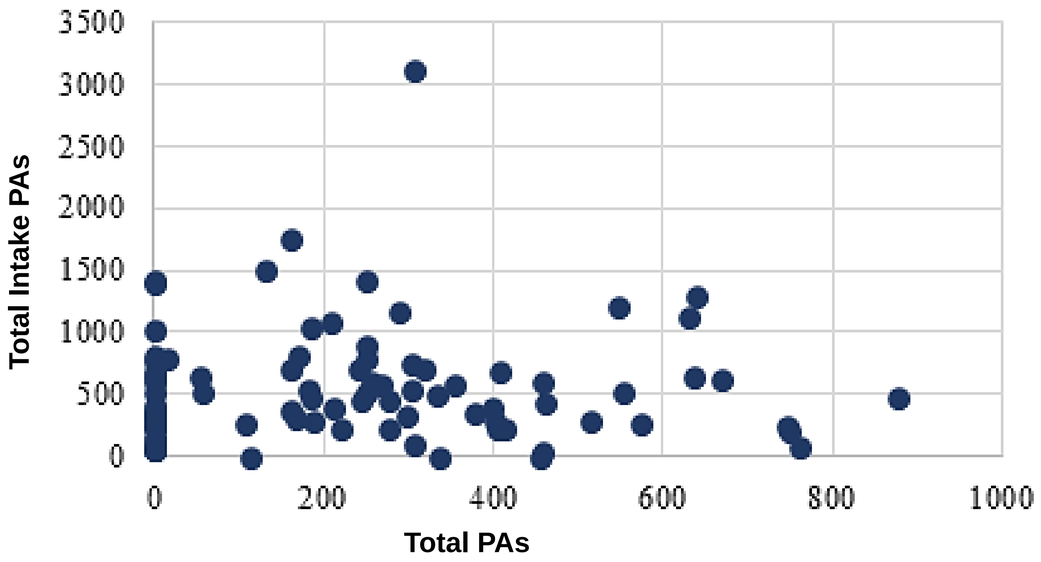


Figure 2. Example of the correlation between metabolites in feces mesaured by HPLC and total PAs mesaured by the adaptation Porter´s method, in supplemented pigs with grape seed extract..

3. No relationship between total PAs excretion and total PAs intake by the subjects belonging to the observational study.



Fgure 4. Correlation between total PAs excreted vs total PAs intake by the subjects beloging to observational study.

Conclusions

1. Complex HPLC techniques for the analysis of total PAs on biologic samples may be replaced by the spectrophotometric method of Porter adapted to feces.

2. Total PAs measurement in feces with spectrophotometric assessment may be used as compliance measurement in supplementation studies with these compounds, but not as intake biomarker in free-living populations.