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Importance of grape phenols in the human diet

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Introduction

- **Grape is the world's largest fruit crop and more than 80% of the worldwide grape production is used in winemaking**
- **They are important sources of antioxidants such as phenolic compounds**
 - **The types and concentrations of the phenolic compounds depend on a number of factors: grape variety and ripening stage, soil and climatic conditions, vine cultivation and the treatment to which it is subjected**



- **Red wines** are considered to have more protective effect than white and rosé wines, due to their **higher content in antioxidant substances** released from the **grape skin and seeds**



- **Polyphenols** contained in grapes and wine can in general be classified into two main groups:
flavonoid (anthocyanins, flavan-3-ols, proanthocyanidins and flavonols) and **non-flavonoid compounds** (phenolic acids and stilbenes)



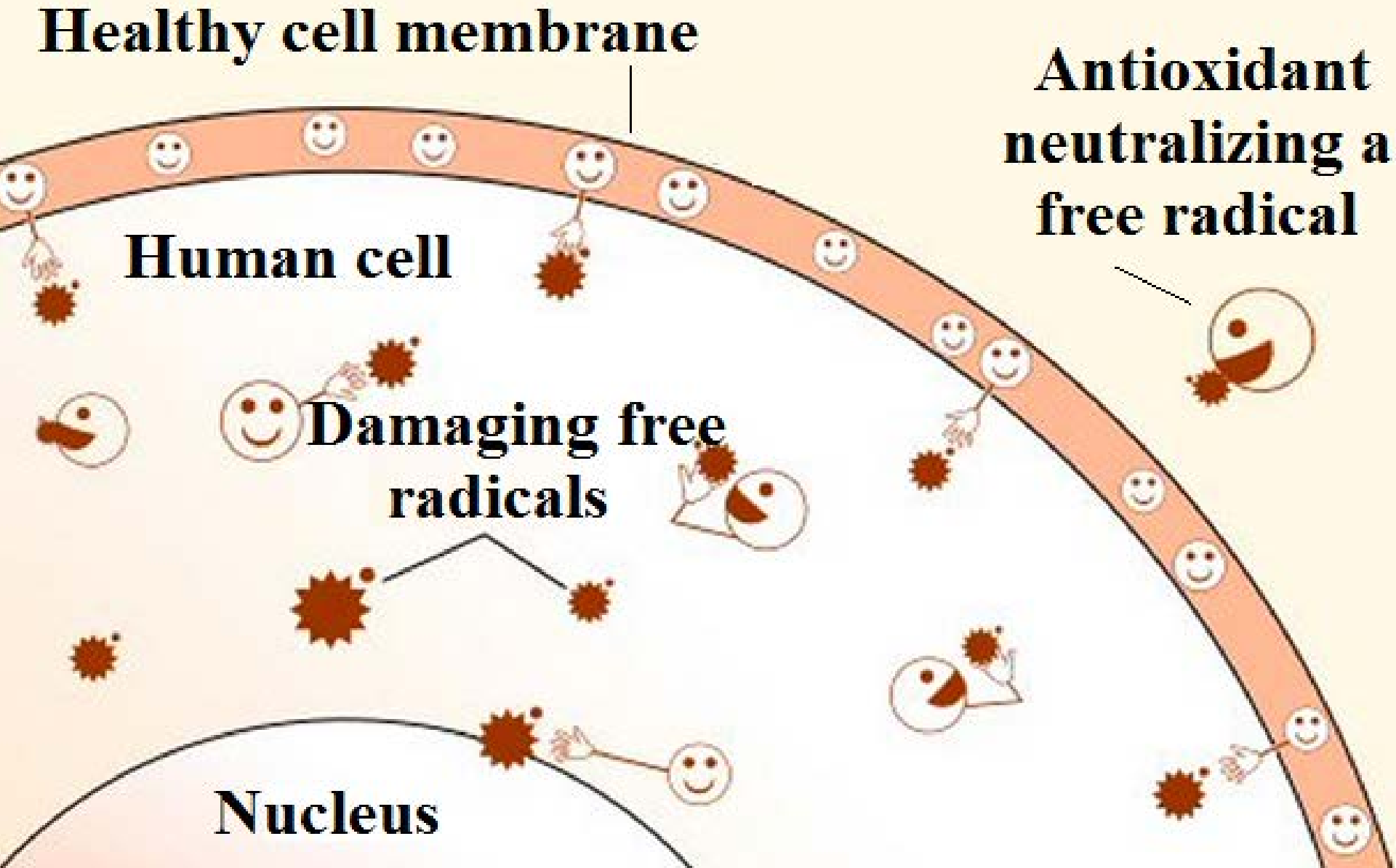
- **Proanthocyanidins** are transferred from the solid parts of the grape (skins, seeds, and stems) into the must during winemaking operations



- These compounds have many **favourable effects** on **human health** such as the **reduction of cancer** and **cardiovascular diseases**



Antioxidants doing their job



➤ Besides the free radical scavenging and antioxidant activity, the phenolic compounds such as **proanthocyanidins or flavanols** exhibit **vasodilatory, anti-allergic, anti-inflammatory, antibacterial, immune-stimulating, anti-viral and estrogenic activities**





Protection of central nervous system



Protection of cardiovascular system



Hepatoprotective action



Protection of gastric mucose



Protection of gastrointestinal tract



Wine

Raisins

Grape Juice



Grape seed extracts

Grape skin extracts

Pomace

Aims

➤ **The aim** of this study was to examine the **skins and seeds phenolic composition** of three autochthonous wine grape varieties (**Fetească albă, Fetească regală and Fetească neagră**) from different growing zones of **Romania**



➤ **These varieties were compared** to one of the most widely grown and recognized varieties, **Pinot noir**



Material and methods

Fetească albă
Fetească regală
Fetească neagră
Pinot noir

Grape samples



Harvested in 2011, commercial vineyards from
Transylvania (Cluj, Batoș, Mica), **technological**
maturity

Chemical analysis

Spectrophotometric methods were used to evaluate the absorbance at 280 nm, flavanols and the proanthocyanidin indices in the skin and seed extracts



UV - 1800
Spectrophotometer



Statistical Analysis

- Statistical analyses were performed using the **SPSS** Statistics software package, version 19.0
- The **Tukey-b test** was used in order to establish significant differences by one-way analysis of variance (ANOVA)



Results and discussion



Table 1. Skin and seed phenolic composition of white wine grape varieties

Variety	Growing zone	Abs280 index (A/kg berries)	Proanthocyanidin assay (mg/kg berries)		Flavanols (mg/kg berries)	
		skins	skins	seeds	skins	seeds
Fetească albă	Mica	21.6 ± 1.8	1218 ± 104	1657 ± 60	794 ± 87	996 ± 40
Fetească regală	Batoș	16.9 ± 1.3	1178 ± 96	1090 ± 139	850 ± 84	712 ± 74
Fetească regală	Cluj	19.3 ± 2.5	1382 ± 156	1170 ± 31	946 ± 118	737 ± 25
Fetească regală	Mica	26.8 ± 2.8	1991 ± 283	1060 ± 75	1387 ± 181	736 ± 56
	<i>Sign.^a</i>	**	**	ns	**	ns
	<i>Sign.^b</i>	ns	*	***	**	*

Sign.^a - differences among different growing zones for the same variety

Sign.^b - differences between Fetească albă and Fetească regală varieties grown in the zone of Mica



Table 2. Skin and seed phenolic composition of black wine grape varieties

Variety	Growing zone	Abs280 index (A/kg berries)	Proanthocyanidin assay (mg/kg berries)		Flavanols (mg/kg berries)	
		skins	skins	seeds	skins	seeds
Fetească neagră	Cluj	51.9 ± 1.8	1368 ± 24	1834 ± 201	381 ± 47	1573 ± 95
Fetească neagră	Mica	47.2 ± 1.7	1336 ± 90	626 ± 80	467 ± 78	434 ± 43
	<i>Sign.^a</i>	*	ns	***	ns	***
Pinot noir	Cluj	41.6 ± 2.8	2063 ± 60	2386 ± 523	771 ± 179	3864 ± 241
Pinot noir	Mica	42.8 ± 2.9	2468 ± 153	1856 ± 93	934 ± 149	2183 ± 276
	<i>Sign.^a</i>	ns	*	ns	ns	**
	<i>Sign.^b</i>	** , *	*** , ***	ns , ***	* , **	*** , ***

Sign.^a - differences among different growing zones for the same variety

Sign.^b - differences between Fetească neagră and Pinot noir varieties grown in the zones of Cluj and Mica





Conclusions

- The skins and seeds of **white grape** varieties present a **similar qualitative and quantitative composition** to that of **red grape** varieties in terms of A_{280} , **proanthocyanidins** and **flavanols**
- Romanian white and red grape varieties must therefore be considered a **good source of phenols** or **natural antioxidant** compounds of growing industrial importance
- This study has also shown that **Fetească regală** and **Fetească neagră** grape **skins** and **seeds** have a very **unique polyphenolic profile**, with relatively **high concentrations of proanthocyanidins** and **flavanols**, particularly for those grown in **Mica** zone

Thank you for your attention!

