



# The quantity of anthocyanins in blueberry fruit based dietary products and juices

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## BACKGROUND

Anthocyanins are a group of blue, purple and dark red pigments that are part of a larger group of substances called flavonoids. They give plants color and protect them from high temperatures. Fruits especially rich in anthocyanins are blueberries, blackberries, raspberries, aronia, grapes, cranberries. In phytomedicine, they are considered to have a role in the prevention and treatment of many health conditions, primarily colds and flu, eye diseases (diabetic retinopathy, glaucoma), urinary tract infections, high blood pressure, Alzheimer's disease, prevention of some types of cancer. As strong antioxidants, anthocyanins neutralize and scavenge free radicals - natural products of metabolism that damage our cells and cause many diseases.

## PURPOSE

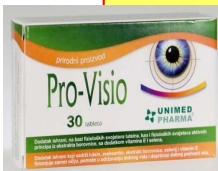
Determination of the amount of anthocyanins in dietary supplements, intended to improve vision and registered in the Republic of Serbia and juices based on blueberries.

## RESULTS

- Retin activ<sup>®</sup> (ESI srl, Italy) a dietary product with a special medical purpose, contains vitamins A, C, E, 15 mg of dry blueberry extract standardized at 25% anthocyanosides, lutein and zeaxanthin. The advice of the manufacturer for use is one capsule a day. Our analysis have shown that Retin activ<sup>®</sup> in one capsule contain  $8.35 \pm 0.17$  mg of anthocyanins, calculated as cyanidin 3-O-glucoside chloride.



- Pro-Visio tablets (United Pharma, Bratislava, Slovakia), a food supplement with lutein, zeaxanthin, 20 mg of blueberry extract, vitamin E and selenium, contained  $5.14 \pm 0.18$  mg of anthocyanins, calculated as cyanidin 3-O-glucoside chloride in one tablet. The advice of the manufacturer for use is one capsule a day.



- Visionace PLUS<sup>®</sup> tablets (Vitabiotics, London, UK) contain 23 components including blueberry extract (60 mg) and  $0.02 \pm 0.0089$  mg of anthocyanins per tablet.

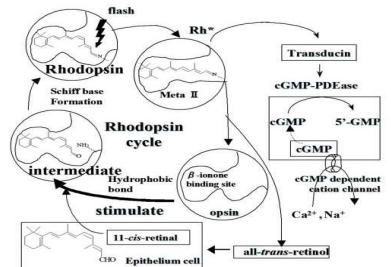


- The juices, Bravo - blueberry (RAUCH SERBIA DOO) and Nectar - apple, aronia, blueberry and grape (Nectar DOO, Serbia), contained  $42.57 \pm 2.66$  mg/L and  $31.80 \pm 0.01$  mg/L of anthocyanins, respectively.



|                           |   |  | Night vision   |   |   |   |
|---------------------------|---|--|--|---|---|---|
| Vannini 1986              | Non randomized, placebo controlled, double blind study subjects | Bilberry fruit extract (BEM)   | BEM (240 mg)   | Improved pupillary photo motor response, most evident 2 hours after administration.   | Not specified                           | Significant improvement of the pupillary muscle contraction in reduced light conditions in healthy young subjects.                            |
|                           | Duration-2 hours  | Contain 36% anthocyanins (equivalent to 25% by weight of anthocyanidins) | No. of patients enrolled: 40<br>No. of patients completed the trial: 40<br>Age=mean 25.5 years | Decreased total pupillary contraction time (p<0.05)   |   |   |
|                           | Acute treatment   | Single dose  | Inclusion criteria: healthy subjects<br>Exclusion criteria: not known                          | Increased pupillary contraction (p<0.05)  |   |   |
| Sala <i>et al.</i> , 1979 | Non Randomised, double blind, controlled placebo.               | Anthocyanosides  | Anthocyanosides  | Dark-adaptation curve (ERG), initial and final thresholds were reduced after treatment at 2 and 7 days (p<0.05). Time to point: non-significant | Information not available) ANOVA p<0.05 | In night time working railway workers the dark-adaptation was significantly improved after 3 and 7 days of administration of anthocyanosides. |
|                           | Duration: Information not available)                            |  | Daily dose: 300 mg/day   | Mesopic light threshold: non-significant  |   |   |
|                           | Dark adaptation   |  | No. of patients enrolled: 40<br>No. of patients completed the trial: 40                        | Recovery speed after dazzling: non-significant  |   |   |
|                           | Mesopic light threshold   |  | Inclusion criteria: Healthy subjects. Railway night workers with normal vision.                | Recovery speed after dazzling: non-significant  |   |   |
|                           | Recovery speed after dazzling                                   |  | Ultram: 3 days (N=24)<br>Ultram: 7 days (N=20)<br>Placebo: n=20                                | Photochromatic interval for violet: lowered   |   |   |
|                           | Photochromatic interval for violet                              |  |  | Photochromatic threshold for violet light: lowered  |   |   |
|                           | Photochromatic threshold for violet light                       |  |  | Significance (information not available)  |   |   |

The dose of 50 mg of anthocyanins of black current concentrate have shown positive effect after 30 min of dark adaptation compared before and 2 h after intake of test drink in 12 healthy subjects (Nomi *et al.*, 2019).



Schematic diagram of rhodopsin regeneration by anthocyanin

## METHODS

- According to Ph. Eur. 10, colorimetric method was used for determination of anthocyanins, which was given in the monograph of *Myrthilli fructus recens*.
- For comparing, the content of anthocyanins in two juices with blueberry fruit and other fruits with anthocyanins (aronia, grape) was analysed using an AOAC colorimetric method given by Lee *et al.* (2005).

## CONCLUSION

Our results suggest that the best option for better eye health is to use products with concentrated blueberry fruit extracts instead of juices, but the intake of at least 50 mg of anthocyanins per day should be ensured.



## References

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- Vannini L., Samuelli R., Coffano M., Tibaldi L. Bollett Ocul, 65 (6):569-577, 1986
- Nomi Y, Iwasaki-Kurashige K, Matsumoto H, Molecules, 24(18): 3311, 2019