

Sosova A.P.

**PHARMACOLOGICAL PROPERTIES AND MEDICAL RELEVANCE OF BIOACTIVE
ANTHOCYANINS OF PLANT ORIGIN**

Tutor: senior lecturer Reshedko E.V.

*Linguistics Department
Smolensk State Medical University*

Anthocyanins are a class of plant pigments belonging to the flavonoid group of secondary metabolites. These pigments reside in the cell sap within plant vacuole membranes. Anthocyanins are glycosides with phenylchromene as the aglycone and mono- or disaccharides comprising the carbohydrate moiety. Anthocyanins are widely utilized in the production of medicinal preparations targeting various physiological systems, while also offering substantial potential for developing novel pharmaceutical therapies. Anthocyanin concentrations vary markedly: red currants contain approximately 7.5 mg/100 g fresh weight, whereas black chokeberry (*Aronia melanocarpa*) reaches up to 460 mg/100 g.

This research aimed to systematically review anthocyanin chemistry, extraction technologies, and therapeutic potential, with focus on black chokeberry extracts as candidates for pharmaceutical development, particularly in oncology and cardiovascular prophylaxis.

The study draws on literature from peer-reviewed databases (PubMed, Scopus, Web of Science) addressing anthocyanin structure, biosynthesis, biological activity, and extraction methods. Quantitative data on content (mg/100 g fresh weight) were derived from meta-analyses of multiple studies.

Anthocyanins mitigate oxidative stress via potent antioxidant activity, enabled by their structure—particularly hydroxyl groups—that facilitates free radical neutralization, safeguarding cell membranes, DNA, and proteins. Their mechanisms include:

1. Direct action: Scavenging reactive oxygen species through binding.
2. Indirect action: Enhancing endogenous antioxidant systems

Owing to their diverse biological activities, anthocyanins feature prominently in pharmaceuticals and nutraceuticals. Key medicinal properties include:

1. Antioxidant activity: Neutralization of free radicals, mitigating oxidative stress implicated in disease pathogenesis and senescence.
2. Anti-inflammatory activity: Suppression of inflammation at cellular and molecular levels.
3. Antimicrobial activity: Efficacy against diverse microbes, with greater potency against Gram-positive than Gram-negative bacteria.
4. Antitumor potential: Preclinical evidence suggests inhibition of cancer cell proliferation and reduced tumorigenesis risk; black chokeberry extracts show particular promise for oncology prevention and adjunctive therapy.
5. Cardioprotective effects: Normalization of blood pressure, amelioration of lipid profiles, and diminished diabetes risk.

In summary, anthocyanins constitute a singular class of bioactive natural products with profound pharmaceutical value. Advanced extraction and purification enable stable formulations harnessing their antioxidant, anti-inflammatory, antimicrobial, and antitumor properties. Concurrently, dietary integration offers an accessible prophylaxis against chronic diseases, promoting vitality and longevity. Ongoing research into novel delivery systems (e.g., nanocapsules) for these labile compounds promises expanded clinical utility.