



Investigation of Antioxidative and Cell Signaling Properties of Bioactive Compounds from Aromatic Herbs

Mladen Miloš

University of Split, Faculty of Chemistry and Technology, Teslina 10/V, Split Croatia

Reactive oxidizing species (ROS), which are generated during the natural process of aerobic metabolism in living cells, can significantly damage the vital macromolecules and change their functions. As a result of oxidative stress and inhibition of certain enzyme activities, may occur the chronic diseases such as cancers, atherosclerosis, rheumatic and neurodegenerative diseases, diabetes, etc. Today, it is suggested that the control of harmful oxidation processes in living organisms is possible by preventive consumption of different antioxidant compounds through diet. Therefore, there is great interest in the study of biologically active compounds derived from food.

The goal of such research is the isolation, fractionation and identification of chemical compounds and testing their biological activity such as antioxidant effect and inhibition of the enzyme activity of the selected enzyme (acetylcholinesterase, catalase, tyrosinase, superoxide dismutase, protein tyrosine kinase, etc.).

In order to achieve this specific objective the conventional extraction methods were used. Separation of the active components is done by fractionation using chromatographic techniques. The chemical composition and the content of the fractions were carried out by chromatography and mass spectrometry and spectroscopy (GC / MS, HPLC / MS, UV / VIS). Antioxidant activity was examined using standard methods: DPPH (free radical scavenging), FRAP (ferric reducing ability of plasma), TBARS (thiobarbituric acid method), etc. The inhibition of enzyme activity was examined by corresponding UV / VIS spectrophotometric methods . Enzyme kinetics are mainly studied by Michaelis - Menten model.

Since many types of chronic illnesses are a result of disruption of signaling pathways which control the normal cell function, the investigation of biologically active compounds derived from food can be very interesting from several aspects. The possible identification of new antioxidant and inhibitor of the enzyme activities of selected enzymes could find application in the food and the pharmaceutical industry for the preparation of healthy food and natural remedies.

Reaktivni oksidacijski spojevi, koji se generiraju tijekom prirodnih procesa u metabolizmu aerobnih živih stanica, mogu znatno oštetiti vitalne makromolekule i promijeniti njihove funkcije. Kao posljedica oksidacijskog stresa i inhibicije određenih enzimskih aktivnosti, javljaju se kronične bolesti poput kancerogenih oboljenja, arteroskleroze, reumatskih i neurodegenerativnih oboljenja, diabetesa itd. Danas se sugerira da je kontrola štetnih oksidacijskih procesa u živim organizmima moguća preventivnim konzumiranjem različitih antioksidacijskih spojeva putem prehrane. Stoga postoji veliki interes za istraživanjem biološki aktivnih spojeva porijeklom iz hrane koja se konzumira. Cilj takvih istraživanja je izoliranje, frakcioniranje i identifikacija kemijskih sastojaka i ispitivanje njihove biološke aktivnosti poput antioksidacijskog učinka i

inhibicije enzimske aktivnosti odabranih enzima (kolinesteraze, katalaza, tirozinaza, superoksid dismutaza, protein tirozin kinaza i sl.).

U svrhu postizanja ovog specifičnog cilja koriste se konvencionalne metode ekstrakcije. Odvajanje aktivnih komponenti se vrši frakcioniranjem kromatografskim tehnikama, a određivanje kemijskog sastava i sadržaja u frakcijama provodi se kromatografijom i spektrometrijom masa i spektrofotometrijom (GC/MS, HPLC/MS, UV/VIS). Antioksidacijska aktivnost se ispituje standardnim metodama: DPPH (free radical scavenging), FRAP (ferric reducing ability of plasma), TBARS (metoda s tiobarbiturnom kiselinom) i sl., a inhibicija enzimskih aktivnosti se ispituje odgovarajućim UV/VIS spektrofotometrijskim metodama. Enzimska kinetika se uglavnom proučava prema Michaelis-Mentenovom modelu.

Budući da su brojne vrste kroničnih oboljenja posljedica prekidanja signalnih putova koji nadziru normalan rad žive stanice, rezultati istraživanja biološki aktivnih spojeva porijeklom iz hrane mogu biti vrlo interesantni s više aspekata, a identifikacija novih antioksidansa i inhibitora enzimskih aktivnosti odabranih enzima mogla bi naći primjenu u prehrambenoj i farmaceutskoj industriji za pripravu zdrave hrane i prirodnih lijekova.