

ELEKTROFORETIČKA ANALIZA DENTINSKOG EKSTRACELULARNOG Matriksa (KISELIH FOSFOPROTEINA, PROTEOGLIKANA I GAMAKARBOKSIGLUTAMAT PROTEINA)

ELECTROPHORETIC ANALYSIS OF DENTIN EXTRA CELLULAR MATRIX (ACID PHOSPHOPROTEINS, PROTEOGLYCAN AND GAMMA-CARBOXY-GLUTAMATE OF PROTEINS)

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Kratak sadržaj

Dentin, kao specifično tvrdo zubno tkivo, bogato je organskim materijama koje čine oko 20% njegove težine i 33% zapremine. Bazična organska komponenta dentina je kolagen. Međutim, nekolageni organski sastav dentina nedovoljno je proučen. Dentin i njegova složena ultrastruktura, molekularni satav i biohemski procesi koji se u ovom tkivu odigravaju još uvek su nedovoljno razjašnjeni, pa samim tim predstavljaju i izazov za istraživače.

Autori su postavili cilj da, primenom savremene elektroforetičke analize frakciju dentina, analiziraju sastav ekstracelularnog matriksa dentina i dobijene rezultate dovedu u korelaciju sa podacima iz literature.

Izdvajanje proteinâ u dentinu izvedeno je tehnikom natrijum dodecil sulfatne poliakrilamidne gel elektroforeze (SDS PAGE elektroforeze) kojom se vrši separacija polipeptida na osnovu razlike u njihovim molekularnim masama. Elektroforetična analiza proteina je veoma značajna u bazičnim istraživanjima grupa (familija) proteina koji čine organsku osnovu dentinskog tkiva.

Rezultati SDS poliakrilamidne gel elektroforeze frakcija dentina pokazuju veliku koncentraciju proteina i proteinskih familija. Sa obzirom na veliku koncentraciju proteina kao i rasprostranjenost u većem broju frakcija dentina na mestima različitih molekularnih masa, izvodi se zaključak da se radi o porodici fosfoproteina čija se masa kreće u intervalu od 35 do 158 kDa. SDS PAGE analiza tri uzorka sa visokim koncentracijama frakcije broj 20 dentina potvrđuje prisustvo proteoglikana u nekolagenom sastavu dentina. Njihova masa je oko 75 kDa. Takođe je dokazano i prisustvo gama karboksigtamat proteina (Gla proteini), čija karboksilna grupa omogućava njihov afinitet prema jonima kalcijuma.

Ključne reči: SDS PAGE elektroforeza, fosfoproteini, proteoglikani, Gla proteini, mineralizacija dentina

Abstract

Being a specific hard dental tissue, dentin is rich in organic matter which comprises about 20% of its weight and 33% of its volume. Basic organic component of dentin is collagen. However, non-collagen organic structure of dentin has not been sufficiently studied. Dentin and its compound ultra-structure, molecular structure and biochemical processes within this tissue have not been sufficiently cleared out yet and as such they represent a challenge for researchers.

The authors set themselves a goal to analyse the structure of dentin extra cellular matrix by applying contemporary electrophoretic analysis of dentin fraction, and to bring those results into correlation with literary data.

Extracting proteins within dentin was performed by using a technique of sodium dodecyl sulphate poly acryl amide elecrophoresis gel (SDS PAGE electrophoresis) which separates polypeptides according to the difference in their molecular masses. Electrophoretic analysis of proteins is crucial in basic researches of the groups (families) of proteins which compose organic base of dentin tissue.

The results of SDS poly acryl amide electrophoresis gel fractions of dentin indicate a great concentration of proteins and protein families. Due to big concentration of proteins as well as due to their being widely spread in greater number of dentin fractions in places of different molecular masses, it can be concluded that we are dealing with phosphoprotein family whose mass moves in intervals of 35 to 158 kDa. SDS PAGE analysis of three samples with high fraction concentrations of dentin number 20 confirms the presence of proteoglycan in non-collagen dentin structure. Their mass is about 75 kDa. The presence of gamma-carboxy-glutamate proteins (Gla proteins) has also been proven and their carboxyl group enables their affinity towards calcium ions.

Key words: SDS PAGE electrophoresis, phosphoproteins, proteoglycans, Gla proteins, dentin mineralisation