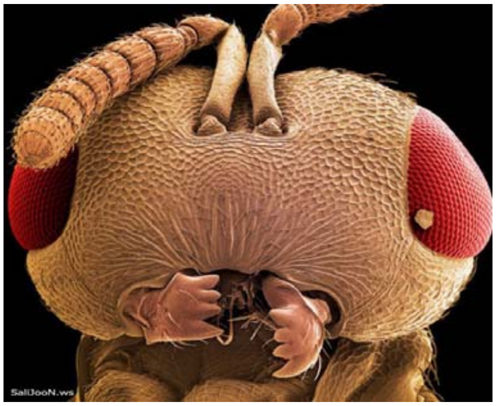
BIOPHYSICAL CHEMISTRY LAB

ANNUAL REPORT 2009



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Institute of Biochemistry and Biophysics
Tehran, Iran

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FOREWORD

The Laboratory of Biophysical Chemistry (LBC) was established in 1986 in the Institute of Biochemistry and Biophysics (IBB) and now functions as the main base and the mother of Biophysical Chemistry in Iran. This laboratory is well-known in the national and international level. It is also famous worldwide in the research area of Thermodynamics of Protein Denaturation and Protein-Ligand Interaction.

This laboratory enjoys from advanced facilities and is equipped with advanced apparatuses for the research on Biothermodynamics and Biomacromolecular Interactions. LBC is equipped with Nano and Micro Differential Scanning Calorimeters (DSC); Nano and Micro Isothermal Titration Calorimeters (ITC); modern Circular Dichroism (CD) Spectropolarometry, Sensitive Densitometer and Tensiometer; Fluorescence and Uv-vis Spectrophotometers, Microviscometers and Biochemical and Biophysical methods as well as and Computational facilities.

LBC is an appropriate place for the promotion of the research and science in the field of Biochemistry, Nanobiophysics, Biotechnology and Biophysical Chemistry. LBC is a suitable laboratory for training PhD students and postdoctorate researchers, associate researchers and sabbatical leaves for faculty members at national and international levels.

Up to the present time, 40 Ph.D and 60 Master students have developed their theses in this laboratory and graduated from the university. Faculty members, postdoctorates and students and foreign research associates using the facilities of this laboratory which have published hundreds of full research articles in international prestigious journals. LBC is an appropriate laboratory for supporting and promoting the research of scientists and researchers at national and international levels.

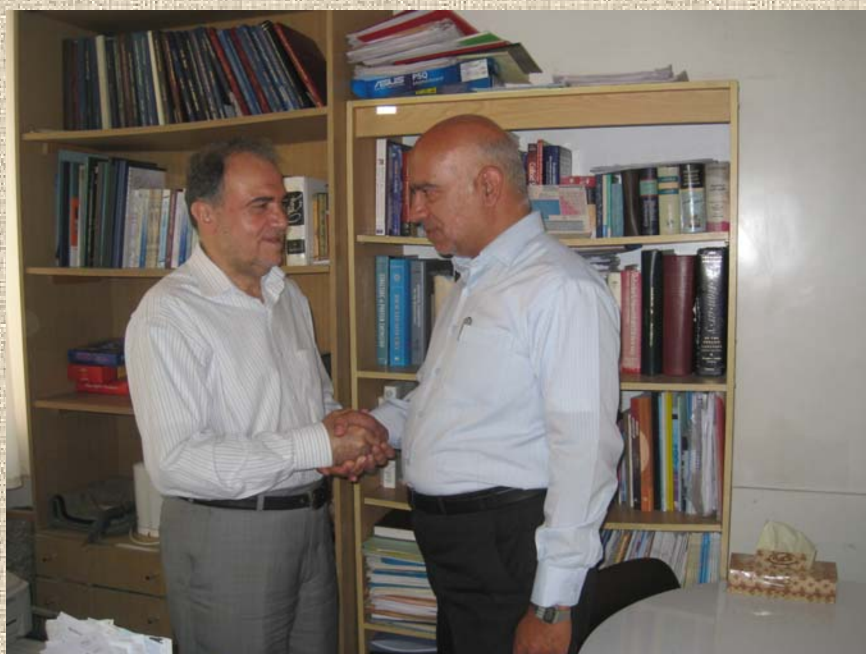
Biophysical Chemistry Lab

Accession of Biophysical Chemistry laboratory (BCL) to Iran Nanotechnology Laboratory Network

A laboratory facility in the field of nanotechnology (such as equipment, technicians and operators, maintenance facilities, etc.) in many cases is beyond the power of individual researchers and investors. Therefore laboratory networking technology is particularly important in various branches of nanotechnology. Nanotechnology Laboratory Network was formed in Iran in early 1383 AH with the aim of creating appropriate laboratory to researchers and foundation of industrial laboratories to use better the country capacities. So far, during the network activity, more than 39 laboratory collections are accepted the members of the created firm network. Biophysical Chemistry laboratory (BLC) at Institute of Biochemistry and Biophysics (IBB), University of Tehran, also recently is joined to this network. This laboratory has become accessible to the Nano site and is ready to bring forward suitable services in various aforementioned areas. For more information, visit:

www.ibb.ut.ac.ir/bcl

SUPERVISORS



Ali A. Moosavi-Movahedi
(left person)
Professor of Biophysics
Protein Thermodynamics

Ali A. Saboury
(right person)
Professor of Biophysics
Protein- Ligand Binding

Lab Colleagues

Professor M. Shamsipur Razi University Department of Chemistry	**Professor A. Shafiei** University of Tehran Faculty of Pharmacy, Medical Sciences
Professor P. Norouzi University of Tehran College of Science, Department of Chemistry	**Dr. S. Safarian** University of Tehran College of Science, Department of Biology
Professor. B. Moshiri University of Tehran Dept. of Electrical and Computational Eng.	**Dr. K. Nazari** Research Institute of Petroleum Industry, Tehran, Iran
Professor A. Niasari-Naslaji University of Tehran Department of Veterinary	**Dr. M. Habibi-Rezaei** University of Tehran College of Science, Department of Biology
Professor H. Ghourchian University of Tehran Institute of Biochemistry and Biophysics (I.B.B)	**Dr. M. Amanlou** Medical Science University of Tehran Department of Pharmacy
Professor M. R. Ganjali University of Tehran College of Science, Department of Chemistry	**Dr. G. Ataei** Medical Science Shahid Beheshti University Department of Premedical Science

Dr. M. Amani
Medical University of Ardebil

INTERNATIONAL COLLABORATION

★**Professor G. Floris:**

Department of Applied Science in Biosystem, University of Cagliari, Cagliari, Italy

★**Professor T. Haertle**

National Research Institute of Agronomique, 44316 Nantes Cedex 03, France

★ **Professor F. Ahmad**

Director, Centre for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia (A Central University), Jamia Nagar, NEW DELHI - 110 025, India

★**Professor G. Hakimelahi**

Taigen Biotechnology X, 7F, 138 Hsin Ming Rd. Neihu Dist, Taipei, Taiwan

★**Dr. N. Sheibani**

Department of Ophthalmology and Visual Science, University of Wisconsin, Madison, WI S370S, USA

LAB ASSISTANTS:

Mrs. N. Poursasan

P. Daneshgar

POSTDOCTS

M. Salami

STUDENTS (Year 2009)

Doctor of Philosophy (Ph.D)

****

- ❋M. Alijanianzadeh
- ❋M. Atri
- ❋S. Bagheri
- ❋M. Bohlooli
- ❋M. Falahati
- ❋A. Fallahbagheri
- ❋F. Farivar
- ❋L.Fotouhi
- ❋F. Ghamari
- ❋H. Hadi-Alijanvand
- ❋M. A. Hekmat
- ❋Y. Sefidbakht
- ❋H. Sepasi-Tehrani
- ❋A. Sharifizadeh
- ❋F. Taghavi
- ❋H. Zare
- ❋S. Zolghadr Jahromi

Master of Science (MSc)

****

- ☆H. Ahmadizadeh
- ☆L. Alaie
- ☆R. Amany
- ☆M. J. Bagheri-Arabi
- ☆P. Bazzi
- ☆H. Derakhshankhah
- ☆S. Ebrahim Damavandi
- ☆M. Ghasemi Aliabadi
- ☆M. Goodarzi
- ☆E. Kachooei
- ☆R. Malekjani
- ☆M. Naderi
- ☆A. Rashidnia

Associate researcher

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- ✓ **Faezeh Moosavi-Movahedi**

Alumni (Year 2009)

Name	*Topic of Thesis*

Ph.D:

J. Badraghi	Comparative structural and chaperone studies on phosphorylated and dephosphorylated αS1-casein from camel and bovine milks
S.J. Mousavy	Effects of mobile phone radiofrequency on the structure and function of the normal and beta thalassemia human hemoglobin and in the presence of deferasirox
M. Salami	Bioactive peptide production and fractionation from hydrolysis of camel milk proteins

MS.C

E. Amin	Effect of some synthetic dithiocarbamates on the structure and function of mushroom tyrosinase
M. Rohban	Thermodynamical investigation on the Effects of silver nanoparticles on the structure of calf thymus DNA and determination of its cytotoxicity on K562 cell line
M. Esmaeili	The Study of Nanomicelle-Beta Casein and its Peptides from Camel Milk upon Interaction with Curcumin;Antioxidant Activity

PUBLICATIONS 2009

1- H. Mansoori-Torshizi, M. Islami-Moghaddam, A. Divsalar and A. A. Saboury, "Diimine platinum(II) and palladium(II) complexes of dithiocarbamate derivative as potential antitumor agents: synthesis, characterization, cytotoxicity and detail DNA-binding studies", Journal of Biomolecular Structure & Dynamics **26** (2009), 575-586.

2- A. Divsalar, A. A. Saboury, H. Mansoori-Torshizi, F. Ahmad, M. Islami-Moghaddam, F. Ahmad and G. H. Hakimelahi, "Comparative studies on the interaction between bovine β-lacto globulin type A and B and a new designed Pd(II) complex with anti-tumor activity at different temperatures", Journal of Biomolecular Structure & Dynamics **26** (2009), 587-598.

3- G. Rezaei-Behbehani, A. Divsalar, A. A. Saboury and A. Hekmat, "A thermodynamic study on the binding of PEG-stearic acid copolymer with lysozyme", Journal of Solution Chemistry **38** (2009), 219-229.

4- G. Rezaei-Behbehani, A. Divsalar, A. A. Saboury, F. Faridbod and M. R. Ganjali, "A high performance theory for thermodynamic study on the binding of human serum albumin with erbium chloride", Chinese Journal of Chemistry **27** (2009), 289-294.

5- P. Norouzi, R. Dinarvand, M. R. Ganjali, A. A. Moosavi-Movahedi, A. A. Saboury and A. Tamaddoni, "Application of adsorptive voltammetry for the detection of sub-nano molar cyclizine in biological fluids and tablets using fast Fourier transform continuous cyclic voltammetry in a flowing system", Analytical Sciences **25** (2009), 505-510.

6- J. Badraghi, R. Yousefi, A. A. Saboury , A. Sharifzadeh, T. Haertlé, F. Ahmad and A. A. Moosavi-Movahedi, "Effect of salts and sodium dodecyl sulphate on chaperone activity of camel alpha-S1-CN: Insulin as the target protein", Colloids and Surfaces B: Biointerfaces, **71** (2009), 300-305.

7- A. A Saboury, "Enzyme inhibition and activation: A General Theory", Journal of the Iranian Chemical Society **6** (2009), 219-229.

8- S. Rezaei-Zarchi, A. Javed, M. J. Ghani, S. Ahmadian, H. Bari-Abarghouei, S. A. Hashemizadeh and A. A. Saboury, "Electrochemically different behaviors of cytochrome c in the presence of organic phosphates", Analytical & Bioanalytical Electrochemistry **1** (2009), 2-10.

9- M. Salami, R. Yousefi, M. R. Ehsani, S. H. Razavi, Jean-Marc Chobert, T. Haertlé, A. A. Saboury, M. S. Atri, A. Niasari-Naslaji, F. Ahmad and A. A.

Moosavi-Movahedi, "Digestion and antioxidant activity of native and MG state of camel α-lactalbumin: possible use in infant formula", International Dairy Journal, **19** (2009), 518-523.

10- G. Rezaei Behbehani, A. Divsalar, A.A. Saboury**,** F. Faridbod and M.R. Ganjali, "A high performance meothod for thermodynamic study on the binding of human serum albumin with erbium chloride", Journal of Thermal Analysis and Calorimetry **96** (2009), 663-668.

11- P. Daneshgar, A.A. Moosavi-Movahedi, P. Norouzi, M. R. Ganjalia, A. Madakar-Sobhani and A. A. Saboury, "Molecular interaction of human serum albumin with paracetamol: Spectroscopic and molecular modeling studies", International Journal of Biological Macromolecules **45** (2009), 129-134.

12- G. Rezaei-Behbehani, A. Divsalar, A. A. Saboury, F. Faridbod and M. R. Ganjali, "A new approach for Thermodynamic Study on the Binding of human Serum Albumin with Cerium Chloride", Bulletin of the Korean Chemical Society **30** (2009), 1262-1266.

13- F. Mohammadi, A. K. Bordbar, A. Divsalar, K. Mohammadi and A. A. Saboury, "Interaction of curcumin and diacetylcurcumin with the lipocalin member β-lactoglobulin", The Protein Journal **28** (2009), 117-123.

14- F. Mohammadi, A. K. Bordbar, A. Divsalar, K. Mohammadi and A. A. Saboury, "Analysis of binding interaction of curcumin and diacetylcurcumin with human and bovine serum albumin using fluorescence and circular dichroism spectroscopy", The Protein Journal **28** (2009), 189-196.

15- M. Islami-Moghaddam, H. Mansouri-Torshizi , A. Divsalar and A. A. Saboury "Synthesis, characterization, cytotoxic and DNA binding studies of diimine Platinum(II) and Palladium(II) complexes of short hydrocarbon chain ethyldithiocarbamate ligand", Journal of the Iranian Chemical Society **6** (2009), 552-569.

16- A. A. Saboury, C. O. Aboluwoye and N. S. Sarraf, "pH Dependence study of the kinetic reaction of bovine carbonic anhydrase with 2,2'-dithiobispyridine in the absence and presence of surfactants", Journal of Physical and Theoretical Chemistry **6** (2009), 57-61.

17- M. Saeidfar, H. Masouri-Torshizi, G. Rezaei-Behbehani, A. Divsalar and A. A. Saboury, "A thermodynamic study of new designed complex of ethylendiamine 8-hydroxyquinolinato palladium (II) chloride with calf thymus DNA", Bulletin of the Korean Chemical Society **30** (2009), 1951-1955.

18- G. Rezaei Behbehani , A .A. Saboury, M. Mohebbian, S. Tahmasbi Sarvestani and M. Poorheravi, "Thermodynamic Study of CN^- ion Inhibition of Jack bean urease using the extended solvation theory", Chinase Chemical Letters **20** (2009), 1389-1392.

19- N. Gheibi, A. A. Saboury, K. Haghbeen, F. Rajabi and A. A. Pahlavani, "Dual effects of aliphatic carboxylic acids on cresolase and catecholase reactions of mushroom tyrosinase", Journal of Enzyme Inhibition and Medicinal Chemistry**,** **24** (2009), 1076-1081.

20- A. A. Moosavi-Movahedi, S. J. Mousavy, A. Divsalar A. Babaahmadi, K. Karimian, A. Shafiee, M. Kamarie, N. Poursasan, B. Farzami, G. H. Riazi, G. H. Hakimelahi, F.-Y. Tsai, F. Ahmad, M. Amani and A. A. Saboury, "The effects of deferiprone and deferasirox on the structure and function of β-thalassemia hemoglobin", Journal of Biomolecular Structure & Dynamics **27** (2009), 319-339.

21- S. Zolghadri, A. A. Saboury, A. Golestani, A. Divsalar, S. Rezaei-Zarchi and A. A. Moosavi-Movahedi, "Binding process of nanosilver to bovine hemoglobin at different temperatures", Journal of Nanoparticle Research, **11** (2009), 1751-1758.

22- A. Divsalar, M. J. Bagheri, A. A. Saboury, H. Mansoori-Torshizi and M. Amani, "Investigation on the interaction of new designed anti-cancer Pd(II) complexes with different aliphatic tails and Human serum albumin", Journal of Physical Chemistry B, **113** (2009), 14035-14042.

23- J. Badraghi, A. A. Moosavi-Movahedi, A. A. Saboury, R. Yousefi, A. Sharifzadeh , J. Hong, T. Haertlé, "Dual behavior of sodium dodecyl sulfate as enhancer or suppressor of insulin aggregation and chaperone-like activity of camel αS1-casein", International Journal of Biological Macromolecules, **45** (2009), 511-517.

24- D. Ajloo, L. Najafi and A. A. Saboury, "Effects of dimaine, diacid and dintitro derivatives on the inhibition of adenosine deaminase: Experimental, molecular docking and QSAR studies" Bulletin of the Korean Chemical Society, **30** (2009), 2523-2531.

25- G. Rezaei-Behbehani, A. A. Saboury, M. Mohebbian, S. Tahmasebi, M. Poorheravi, "A Structural and calorimetric study between Jack bean urease and cyanide ion ", Journal of Solution Chemistry, **38** (2009), 1612-1621.

26- A. Divsalar, A. A. Saboury, F. Ahmad and A. A. Moosavi-Movahedi, "Effect of temperature and chromium (III) ion on the structure of bovine beta-lactoglobulin-A", Journal of the Brazilian Chemical Society 20 (2009), 1782-1789.

27- G. Rezaei Behbehani, A. Divsalar and A.A. Saboury, "A novel method for thermodynamic study on the inding of milk carrier protein BLG-A with Cr^{+3}" Polish Journal of Chemical Technology **11** (2009), 24-29.

28- S.Majidi, A. Jabbari, H. Heli, H. Yadegari, A.A. Moosavi-Movahedi and S. Haghgoo "Electrochemical oxidation and determination of ceftriaxone on a glassy carbon and carbon-nanotube-modified glassy carbon electrodes" Journal of Solid State Electrochemistry 13,407-416 (2009).

29- K Nazari, A. Mahmoudi; M. Khosraneh, Z. Haghighian, A.A. Moosavi-Movahedi "Kinetic Analysis for Suicide-Substrate Inactivation of Microperoxidase-11: A Modified Model for Bisubstrate Enzymes in the Presence of Reversible Inhibitors Journal of Molecular Catalysis B: Enzymatic 56, 61–69 (2009).

30- S. Hashemnia, H. Ghourchian, A. A. Moosavi-Movahedi and H. Faridnouri "Direct electrochemistry of chemically modified catalase immobilized on oxidatively activated glassy carbon electrode" Journal of Applied Electrochemistry 39, 7-14 (2009).

31- A. Niasari-Naslaji, D. Nikjou, J. A. Skidmore, A. Moghiseh, M. Mostafaey, K. Razavi and A. A. Moosavi-Movahedi "Interspecies embryo transfer in camelids: the birth of the first Bactrian camel calves (Camelus Bactrianus) from dromedary camels (Camelus dromedarius)" Reproduction, Fertility Development 21, 333-337 (2009).

32- R.Mahinpour, G.h. Riazi, M.N. Sarbolouki, A.A.Moosavi-Movahedi, M.A. Shokrgozar and S.Z. Moosavi-Nejad " Interference of arsenic trioxide on magnesium dependent polymerization of microtubule proteins" Journal of Iran. Chem. Soc.6(4), 715-721(2009).

33- H. Heli, A. Jabbari, M. Hajjizadeh, A. A. Moosavi-Movahedi "Copper nanoparticles-modified carbon paste transducer as a biosensor for determination of acetylcholine" Biosensors and Bioelectronics 24, 2328-2333 (2009).

34- E. Sharifi, N. Sattarahmady, M. Habibi-Rezaei, M. Farhadi, N. Sheibani, F. Ahmad and A. A. Moosavi-Movahedi "Inhibitory effects of β-cyclodextrin and trehalose on nanofibril and AGE formation during glycation of human serum albumin” Protein Peptide Letters 16(6), 653-9 (2009).

35- A. Barzegar, A.A.Moosavi-Movahedi, M.R.Ganjali "Amplification of Electrocatalytic Oxidation of NADH Based on Cysteine Nanolayers" Journal of Applied Electrochemistry 39, 1111-1116 (2009).

36- S. J. Mousavy, G. H. Riazi, M. Kamarei, H. Aliakbarian, N. Sattarahmady, A. Sharifizadeh, S. Safarian, F. Ahmad, A. A. Moosavi–Movahedi "Effects of mobile phone radiofrequency on the structure and function of the normal Human Hemoglobin"International Journal of Biological Macromolecule 44, 278-285 (2009).

37- P. Daneshgar, P. Norouzi, F. Dousty , M. R. Ganjali and A. A. Moosavi-Movahedi " Dysprosium hydroxide Nanowires Modified Electrode for Determination of Rifampicin in Human Urine and Capsules by Adsorptive Square Wave Voltammetry. Current Pharmaceutical Analysis 5, 246-255 (2009).

38- H. Heli , M. Hajjizadeh , A. Jabbari , A. A. Moosavi-Movahedi "Fine steps of electrocatalytic oxidation and sensitive detection of someamino acids on copper nanoparticles" Analytical Biochemistry 388, 81-90 (2009).

39- H. Heli, A. Jabbari, A.A. Moosavi-Movahedi and M. Tabeshnia "Electrooxidation and determination of mannitol and saccharose on a cobalt hydroxide nanoparticles-modified glassy carbon electrode" Chem. Anal. (Warsaw), 54, 619-628 (2009).

40- P. Daneshgar, P. Norouzi, M. R. Ganjali and A. A. Moosavi-Movahedi " Dysprosium hydroxide nanowires modified electrode for determination of rifampicin drug in human urine and capsules by adsorptive square wave voltammetry " Current Analytical Chemistry 5, 246-255 (2009).

41- R. Yousefi, Y. Shtchutskaya, J. Zimny, Jean-Charles Gaudin, A. A. Moosavi-Movahedi, V. I. Muronetz, Y. Zuev, Jean-Marc Chobert and T. Haertlé "Chaperone-like activities of different molecular forms of ß-casein. Importance of polarity of N-terminal hydrophilic domain." Biopolymers 91(8), 623-632 (2009).

42- P. Daneshgar, P. Norouzi, A. A. Moosavi-Movahedi, M. R. Ganjali,E. Haghshenas, F. Dousty and M. Farhadi " Fabrication of Carbon nanotube and Dysprosium nanowire modified electrodes as a sensor for determination of Curcumin" Journal of Applied Electrochemistry 39,1983-1992 (2009).

43- H. Heli , M. Zarghan , A. Jabbari , A. A. Moosavi-Movahedi "Copper nanoparticles-carbon microparticles nanocomposite for electrooxidation and sensitive detection of sotalol" Sensors & Actuators: B. Chemical 140,245-251(2009).

44- A. Barzegar, A. A. Moosavi-Movahedi, J. Z. Pedersen, M. Miroliaei "Comparative thermostability of mesophilic and thermophilic alcohol dehydrogenases Stability-determining roles of proline residues and loop conformations" Enzyme and Microbial Technology 45,73-79 (2009).

45- H.Bahrami, M.Davari, M. Keshavari, M.Zahedi, A. Bazgir and A.A.Moosavi-Movahedi "Kinetics and mechanism of the dehydration reaction of sarcosine to a bislactame through diacyclperoxide intermediate in strong acidic medium" International Journal of Chemical Kinetics 689-703 (2009).

46- R. Yousefi, J.C. Gaudin, J.M. Chobert; Z. Pourpak, M. Moin, A. A. Moosavi-Movahedi and T. Haertlé "Micellisation and immuno reactivities of dimeric β-caseins" Biochim. Biophys. Acta [Proteins and Proteomics] 1794, 1775-1783 (2009).

47- P. Daneshgar , P. Norouzi , M. R. Ganjali, R. Dinarvand and A. A. Moosavi-Movahedi "Determination of diclofenac on a dysprosium nanowire-modified carbon paste electrode accomplished in a flow injection system by advanced filtering" Sensors 9, 7903-7918 (2009).

ABSTRACTS/

International

1- Divsalar, M. J. Bagheri, A.A. Saboury and H. Mansoori-Torshizi, "A comparative study on the interaction of new designed aliphatic Pd(II) complexes with human serum albumin", 53th Annual Meeting of Biophysical Society, Massachusetts, Boston, MA 02210, USA (28 Feb. - 4 Mar. 2009). Biophysical Journal 96 (2009), 596-597 (3073-Pos Board B120).

2- A. Hekmat, A.A. Saboury and A. Divsalar, "pH induced conformational and structural alterations on choline oxidase", 53th Annual Meeting of Biophysical Society, Massachusetts, Boston, MA 02210, USA (28 Feb. - 4 Mar. 2009). Biophysical Journal 96 (2009), 582 (2996-Pos Board B43).

3- S. Zolghadri and A. A. Saboury, "Characterization of nanoparticles binding to hemoglobin", VIII European Symposium of the Protein Society, Zurich, Switzerland (14-18 June, 2009).

4- J. Badraghi, A. A. Moosavi-Movahedi, A. A. Saboury and A. Sharifizadeh, "Effect of nanomolar concentration of sodium dodecyl sulfate on insulin aggregation", VIII European Symposium of the Protein Society, Zurich, Switzerland (14-18 June, 2009).

5- S. Bagheri, A. A. Saboury and J. Davoodi, "Evaluation of caspase inhibition by claps", VIII European Symposium of the Protein Society, Zurich, Switzerland (14-18 June, 2009).

6- A. Sharifizadeh, R. Yousefi, A. A. Saboury, A. A. Moosavi-Movahedi and J. Badraghi, "A comparative study on temperature induced self-association of camel and bovine beta-caseins", VIII European Symposium of the Protein Society, Zurich, Switzerland (14-18 June, 2009).

7- A. A. Saboury, E. Amin and H. Mansuri-Torshizi, "Inhibition of mushroom tyrosinase by benzyl and p-xylidine-bis dithiocarbamate sodium salts", 21^{st} IUBMB and 12^{th} FAOBMB International Congress of Biochemistry and Molecular Biology , Shanghai, China (2-7 August, 2009).

8- A. Divsalar, A. A. Saboury and H. Mansoori-Torshizi, "Cytotoxic and whey carrier protein binding studies of new synthesized palladium complexes", 21^{st} IUBMB and 12^{th} FAOBMB International Congress of Biochemistry and Molecular Biology , Shanghai, China (2-7 August, 2009). Selected as the best poster in the Young Scientists Section.

9- E. Tazikeh, A. A. Saboury, G. Rezaei-Behbehani and M. Monajjemi, "Thermodynamic characterization of binding copper ion to human growth hormone ", 21st IUBMB and 12th FAOBMB International Congress of Biochemistry and Molecular Biology , Shanghai, China (2-7 August, 2009).

10- R. Yousefi, N. Gheibi, A. Sharifizadeh, A. A. Moosavi-Movahedi, A. A. Saboury, J. M. Chobert and T. Haertle, "Chaperone-like activity of the dimeric betacaseins: a first study towards development of Gemini-like protein surfactant", 34th FEBS Congress, Prague, Czech Republic (4-9 July 2009). The FEBS Journal 276 (2009), 353.

11- S. Zolghadri and A. A. Saboury, "Spectroscopic studies on the interaction of human hemoglobin and copper nanoparticles", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S13.

12- M. Rahban, A. Divsalar and A. A. Saboury, "Cytotoxicity and spectroscopic studies of silver nanoparticle: A biophysical approach to nanaotoxicology", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S15.

13- R. Safaeijavan, M. Taghizadeh, A. A. Saboury and A. Divsalar, "Chitosan nanoparticles containing salicylic acid as a model for an oral drug delivery system", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S15.

14- H. Mansouri-Torshizi, M. Khastan and A. A. Saboury, "Synthesis, characterization of 1,10-phenanthrolinedithiocarbamato Pd(II) nitrate complexes and their interaction with calf thymus DNA", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S43.

15- H. Ramshini, A. A. Saboury and, M. Nemat-Gorgani, "Inhibition of thermal aggregation of type B yeast hexokinase by small molecules: possible involvement of aromatic interactions", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S72.

16- E. Tazikeh, A. A. Saboury, G. Rezaie-Behbehani and M. Monajjemi, "A thermodynamic study on the binding of zinc with human growth hormone", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S85.

17- H. Mansouri-Torshizi, M. Saeidifar, A. Divsalar and A. A. Saboury, "Interaction of calf thymus DNA with a diimine palladium (II) complex of hexyldithiocarbamato ligand: Thermodynamic, cytotoxic and spectroscopic studies", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S87.

18- A. Fallah-Bagheri and A. A. Saboury, "A thermodynamic study on the binding of, magnesium and cobalt ions with myelin basic protein", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S89.

19- M. Salami, R. Yousefi, M. R. Ehsani, A. A. Saboury and A. A. Moosavi-Movahedi, "Effect of calcium binding on the functional properties of camel alpha-Lactalbumin", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S93.

20- M. S. Atri, A. A. Saboury, R. Yousefi and A. A. Moosavi-Movahedi, "A comparative study on the stability of bovine and camel α-lactalbumin: Effects of temperature and N-dodecyl trimethylammonium Bromide", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S94.

21- E. Amin, A. A. Saboury, H. Mansouri-Torshizi and A. A. Moosavi- Movahedi, "Potent inhibitory effects of benzyl and p-xylidine-bis dithiocarbamate sodium salts on catecholase activity of mushroom tyrosinase", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S98.

22- R. Yousefi, A. Barzegar, T. Haertle, J.-M. Chobert, A. A. Moosavi-Movahedi, A. A. Saboury, A. Sharifizadeh and M. Hasani-Saadi, "Analysis of reversible interaction between beta-casein chaperone and partially unfolded state of target protein (ADH)", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S209.

23- G. Rezaei-Behbehani, A. A. Saboury and M. Mohebbian, "A thermodynamic study of CN ion interaction with jack bean urease", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S238.

24- L. Ahadi, A. Divsalar, A. A. Saboury and H. Mansouri-Torshizi, "Effects of temperatures on interaction of human serum albumin with new designed platinum complex", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S239.

25- A. Hekmat, A. Divsalar, G. Rezaie-Behbehani and A. A. Saboury, "Investigation of the interaction between silver nanoparticles and doxorubicin", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S239.

26- J. Badraghi, A. A. Moosavi-Movahedi, A. A. Saboury, F. Farivar and A. Shrifzadeh, "Agregation and disagregation of insulin by different concentration of sodium dodecyl sulphate: A spectroscopic study", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S240.

27- G. Rezaei Behbehani, A. Divsalar, A. A. Saboury, " A thermodynamic study of nickle ion interaction with bovine carbonic anhydrase II molecule", 3rd International Congress of Biochemistry and Molecular Biology & 10th Iranian Congress of Biochemistry, Tehran, Iran (16-19 November 2009). Journal of the Iranian Chemical Society 6 (2009), S240.

28- A. A. Moosavi-Movahed "New mechanistic outlooks on protein disaggregation" J. Iran. Chem. Soc., Vol. 6, Suppl.1, pages S4-S5 (2009). 3rd International Congress of Biochemistry and Molecular Biology , Tehran, Iran,16-19 November 2009.

29- R. Yousefi, T. Haertle, Jean-Marc Chobert, A.A. Moosavi-Movahedi "Effect of position polarity of cysteine substitution on the antigenic response of mutant forms of beta-casein" J. Iran. Chem. Soc., Vol. 6, Suppl.1, page S239 (2009). 3rd International Congress of Biochemistry and Molecular Biology, Tehran, Iran, 16-19 November 2009.

30- J. Mousavy, G. H. Riazi, M. Kamarei, R. Faraji-Dana, M. Saviz, A. N. Askarpour, A. Sharifizadeh, A. A. Moosavi-Movahedi "Electromagnetic fields of 940 MHz induced conformational change of β-Thalassemia hemoglobin" J. Iran. Chem. Soc., Vol. 6, Suppl., pages S239-S240 (2009). 3rd International Congress of Biochemistry and Molecular Biology, Tehran, Iran, 16-19 November 2009.

31- F. Rezaie, M. Sharifahmadian, M. Habibi-Rezaei, A.A. Moosavi-Movahedi "Enhanced heme degradation of hemoglobin in diabetes" J. Iran. Chem. Soc., Vol. 6, Suppl., page S92 (2009). 10th Iranian Congress of Biochemistry & 3rd International Congress of Biochemistry and Molecular Biology, Tehran, Iran, 16-19 November 2009.

32- A. Barzegar, A.A. Moosavi-Movahedi "Antioxidant activity of dipyridamole against extracellular/intracellular free-radical scavenging" J. Iran. Chem. Soc., Vol. 6, Suppl., page S147 (2009). 3rd International Congress of Biochemistry and Molecular Biology, Tehran, Iran, 16-19 November 2009.

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Kinetic analysis for suicide-substrate inactivation of microperoxidase-11: A modified model for bisubstrate enzymes in the presence of reversible inhibitors

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ABSTRACT

Kinetics of microperoxidase-11 (MP-11) as a heme–peptide enzyme model in oxidation reaction of guaiacol (AH) by hydrogen peroxide was studied in the presence of amino acids, taking into account the inactivation of MP-11 during reaction by its suicide substrate, H_2O_2. Reliability of the kinetic equation was evaluated by non-linear mathematical fitting. Fitting of experimental data into a new integrated kinetic relation showed a close match between the kinetic model and the experimental data. Indeed, it was found that the mechanism of suicide-peroxide inactivation of MP-11 in the presence of amino acids is different from MP-11 and/or horseradish peroxidase. In this mechanism, amino acids compete with hydrogen peroxide for the sixth co-ordination position of iron atom in the heme group through a competitive inhibition mechanism.

The proposed model can successfully determine the kinetic parameters including inactivation by hydrogen peroxide as well as the inhibitory rate constants by the amino acid inhibitor.

Kinetic parameters of inactivation including the initial activity of MP-11, α_0, the apparent inactivation rate constant, k_i and the apparent inhibition rate constant for cysteine, k_I were obtained $0.282 \pm 0.006\,min^{-1}$, $0.497 \pm 0.013\,min^{-1}$ and $1.374 \pm 0.007\,min^{-1}$ at $[H_2O_2] = 1.0\,mM$, 27 °C, phosphate buffer 5.0 mM, pH 7.0. Results showed that inactivation and inhibition of microperoxidase as a peroxidase model enzyme occurred simultaneously even at low concentrations of hydrogen peroxide (0.4 mM). This kinetic analysis based on the suicide-substrate inactivation of microperoxidase-11, provides a tool and model for studying peroxidase models in the presence of reversible inhibitors. The introduced inhibition procedure can be used in designing activity tunable and specific protected enzyme models in the hidden and reversibly inhibited forms, which do not undergo inactivation.

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Copper nanoparticles-modified carbon paste transducer as a biosensor for determination of acetylcholine

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ABSTRACT

The electrocatalytic oxidation of acetylcholine (Ach) on two different copper-based transducers, copper microparticles-modified carbon paste electrode (m-CPE) and copper nanoparticles-modified carbon paste electrode (n-CPE), was investigated. In the voltammograms recorded using m-CPE, a single anodic oxidation peak related to the oxidation of ACh was appeared which was related to the electrocatalytic oxidation of ACh via the electrogenerated Cu(III) species in an EC′ mechanism. Using n-CPE, however, two overlapped anodic peaks appeared which were related to two fine tunable steps of oxidation. ACh oxidized on n-CPE with higher rates at low potentials with respect to m-CPE. The kinetic of the reaction was formulated and the charge-transfer resistance of the system was obtained both theoretically and experimentally. The catalytic rate constant, the transfer coefficient for the electrocatalytic oxidation and the diffusion coefficients for ACh were reported using chronoamperometry, pseudo-steady-state polarization measurement and electrochemical impedance spectroscopy. Sensitive and time-saving sensing procedures in both batch and flow systems were developed for the analysis of ACh, and the corresponding analytical parameters were reported.

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Effects of mobile phone radiofrequency on the structure and function of the normal human hemoglobin

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ABSTRACT

Widespread use of mobile phones has increased the human exposure to electromagnetic fields (EMFs). It is required to investigate the effect of EMFs on the biological systems. In this paper the effect of mobile phone RF (910 MHz and 940 MHz) on structure and function of HbA was investigated. Oxygen affinity was measured by sodium dithionite with UV–vis spectrophotometer. Structural changes were studied by circular dichroism and fluorescence spectroscopy. The results indicated that mobile phone EMFs altered oxygen affinity and tertiary structure of HbA. Furthermore, the decrease of oxygen affinity of HbA corresponded to the EMFs intensity and time of exposure.

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Enzymatic digestion and antioxidant activity of the native and molten globule states of camel α-lactalbumin: Possible significance for use in infant formula

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Native- and molten globule states of α-lactalbumin (α-La) from camel and bovine milk were used for comparative assessment of digestibility and antioxidant activity. The proteolysis assessments were performed in the presence of gastrointestinal enzymes, using the o-phthaldialdehyde assay, and the antioxidant activity was carried out using a 2,20-azinobis(3-ethylenebenzothiazoline-6-sulfonic acid based method. Camel and bovine α-La revealed similar sensitivity to proteolysis by pepsin. The degree of hydrolysis (DH) of camel α-La by either trypsin or chymotrypsin was noticeably higher than that of the bovine protein counterpart. This can be explained by the different conformational and structural features of these proteins, as shown by studies of intrinsic- and 8-anilinonaphthalene-1-sulfonic acid fluorescence. The greater antioxidant activity of camel α-La could be explained by the higher content of antioxidant amino acid residues and different conformational features between bovine and camel α-La. The results may suggest that α-La produced from camel milk may be used for infant formulae as an alternative to that produced from bovine milk.

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Fine steps of electrocatalytic oxidation and sensitive detection of some amino acids on copper nanoparticles

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ABSTRACT

The electrocatalytic oxidation of five amino acids—glycine, aspartic acid, cysteine, glutamic acid, and tyrosine—on two copper-based electrodes comprising copper microparticle-modified carbon paste electrode (m-CPE) and copper nanoparticle-modified CPE (n-CPE) was investigated. In the voltammograms recorded using m-CPE, a single anodic peak related to the oxidation of amino acids appeared and was related to the electrocatalytic oxidation of the amino acids via the electrogenerated Cu(III) species. Using n-CPE, however, two overlapped anodic peaks in the voltammograms appeared and were related to two fine tunable steps of the oxidation process. The currents of the two peaks were controlled by diffusion and were confirmed by chronoamperometric measurements. The amino acids were oxidized on n-CPE at higher rates and at lower potentials compared with m-CPE. This was attributed to the nanosize of copper nanoparticles. Some primary linear-chain amines and primary branched-chain amines were oxidized on the copper-based electrodes as markers. The catalytic rate constants, the transfer coefficients, and the diffusion coefficients for the amino acids are reported. Simple, sensitive, and time-saving sensing procedures in both batch and flow systems were developed for the analysis of the amino acids, and the corresponding analytical parameters are reported.

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RESEARCH PAPER

Interaction between silver nanoparticle and bovine hemoglobin at different temperatures

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A. Divsalar · S. Rezaei-Zarchi ·
A. A. Moosavi-Movahedi

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Abstract The binding of silver nanoparticles to bovine hemoglobin (BHb) was studied by fluorescence, UV–Visible, and circular dichroism (CD) spectroscopic techniques at different temperatures of 20, 37, and 42 °C. The absorption spectrum of soret band, in the presence of silver nanoparticle, showed a significant spectral change, which indicated the heme groups of BHb were directly attacked and degraded by silver nanoparticle. The fluorescence data explained that the nanoparticle binding to BHb occurred at a single binding site, which demonstrated a dynamic quenching procedure. Nanoparticles could reduce the fluorescence of tryptophanyl residues of BHb to a lesser extent. Circular dichroism studies demonstrated a conformational change of BHb in the presence of silver nanoparticles. The helicity of BHb was reduced by increasing silver nanoparticle concentration at different temperatures. Thermodynamic analysis of the protein interaction by silver nanoparticles suggested that the binding process is only entropy driven.

Keywords Silver nanoparticle · BHb · Circular dichroism · Fluorescence · Nanobiotechnology

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Introduction

There has been considerable progress in the synthesis of nanomaterials with precise dimensions, geometries, and surface properties (Peng et al. 2000; Strano et al. 2003). Now, there is an increasing interest in understanding and controlling the interactions of nanomaterials with biological molecules such as proteins (Luk et al. 2003; Roach et al. 2006; Hong et al. 2004; Karajanagi et al. 2004). Proteins have been used to functionalize nanomaterials and to influence their properties for applications ranging from sensing (Barone et al. 2005; Besteman et al. 2003; Patolsky and Lieber 2005) and diagnostics (Loo et al. 2005; Medintz et al. 2005) to delivery (Pantarotto et al. 2004; Shi Kam et al. 2004), and for the design of nanocomposites (Luckarift et al. 2004; Pender et al. 2006; Park et al. 2001; Niemeyer 2001). Nanomaterial properties in turn have a strong influence on the structure and function of proteins and there has been increasing emphasis on obtaining a fundamental understanding of these effects.

Bovine hemoglobin (BHb) is well known for its function in the vascular system of animals, being a

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Effect of salts and sodium dodecyl sulfate on chaperone activity of camel αS_1-CN: Insulin as the target protein

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In this study camel αS_1-casein (αS_1-CN) was purified, using a two-step purification procedure. The anti-aggregation (chaperone-like) ability of the purified protein sample was examined in a wide range of experimental conditions and at different concentrations of camel αS_1-CN, in the presence of salts and sodium dodecyl sulfate (SDS). To examine chaperone-like activity of camel αS_1-CN, bovine pancreatic insulin was used as the target protein. Insulin aggregation performed chemically in the presence of 20 mM dithiotreitol (DTT) and was studied at 360 nm wavelength by UV–vis spectrophotometer. Camel αS_1-CN exhibited a dose-dependent chaperone-like activity as the molar ratios of chaperone/target protein varied between 0 and 0.07. The presence of salts or surfactants changing the protein properties had an influence on chaperone capacity of camel αS_1-CN. The results of UV–visible and fluorimetric measurements indicated that the salts neutralize the chaperone-like activity of casein due to dehydration effect and the increased association and aggregation of proteins, while SDS plays a role as chaperone and chaperone-like properties of camel αS_1-CN enhanced in the presence of SDS due to the binding of the hydrophobic tail of SDS and αS_1-CN to the exposed hydrophobic sites of insulin strongly preventing aggregation of insulin.

Chaperone-Like Activities of Different Molecular Forms of β-casein. Importance of Polarity of N-Terminal Hydrophilic Domain

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ABSTRACT:

As a member of intrinsically unstructured protein family, β-casein (β-CN) contains relatively high amount of prolyl residues, adopts noncompact and flexible structure and exhibits chaperone-like activity in vitro. Like many chaperones, native β-CN does not contain cysteinyl residues and exhibits strong tendencies for self-association. The chaperone-like activities of three recombinant β-CNs wild type (WT) β-CN, C4 β-CN (with cysteinyl residue in position 4) and C208 β-CN (with cysteinyl residue in position 208), expressed and purified from E. coli, which, consequently, lack the phosphorylated residues, were examined and compared with that of native β-CN using insulin and alcohol dehydrogenase as target/substrate proteins. The dimers (β-CND) of C4-β-CN and C208 β-CN were also studied and their chaperone-like activities were compared with those of their monomeric forms. Lacking phosphorylation, WT β-CN, C208 β-CN, C4 β-CN and C4 β-CND exhibited significantly lower chaperone-like activities than native β-CN. Dimerization of C208 β-CN with two distal hydrophilic domains considerably improved its chaperone-like activity in comparison with its monomeric form. The obtained results demonstrate the significant role played by the polar contributions of phosphorylated residues and N-terminal hydrophilic domain as important functional elements in enhancing the chaperone-like activity of native β-CN.

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Comparative thermostability of mesophilic and thermophilic alcohol dehydrogenases: Stability-determining roles of proline residues and loop conformations

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ABSTRACT

The present study demonstrates the comparative thermal, conformational and kinetic stabilities of the three closely related enzymes; the mesophilic yeast alcohol dehydrogenase (YADH), horse liver alcohol dehydrogenase (HLADH), and the extreme-thermophilic *Thermoanaerobacter brockii* alcohol dehydrogenase (TBADH). The mid-point unfolding temperatures for TBADH and HLADH were at least 10 °C and 6 °C higher, respectively, than that of YADH. When YADH was completely inactivated by thermal stress, the residual activities of HLADH and TBADH were 70% and 100%, respectively. The optimum temperature (T_{opt}) activities of HLADH and TBADH were at least 40 °C and 55 °C higher, respectively, than that of YADH. Due to the higher rigidity of HLADH and TBADH, the enzymatic activation energies of HLADH and TBADH were higher than that of YADH. Geometric X-ray analysis indicated a comparatively higher coil (turn and loop) percentage in TBADH and HLADH than in YADH. Pairwise alignment for TBADH/HLADH exhibited a similarity score approximately 2.5-fold greater than that of the TBADH/YADH pair. Multiple alignments made with ClustalW revealed a higher number of conserved proline residues in the two most stable enzymes (HLADH/TBADH). These extra prolines tend to occur in surface loops and are likely to be responsible for the increased stability of TBADH and HLADH, by loop rigidification.

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Investigation on the interaction of newly designed anticancer Pd(II) complexes with different aliphatic tails and human serum albumin.

Divsalar A, Bagheri MJ, Saboury AA, Mansoori-Torshizi H, Amani M.

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Abstract

The pharmacokinetics and pharmacodynamics of any drug will depend, largely, on the interaction that it has with human serum albumin (HSA), the most abundant plasma protein. The interaction between newly synthesized Pd(II) complexes, 2,2'-bipyridin octyl dithiocarbamato Pd(II) nitrate (Octpd), 2,2'-bipyridin butyl dithiocarbamato Pd(II) nitrate (ButPd), 2,2'-bipyridin ethyl dithiocarbamato Pd(II) nitrate (EtPd), antitumor components, with human serum albumin, a carrier protein, were studied at different temperatures of 27 and 37 degrees C by fluorescence spectroscopy, far UV circular dichroism (CD), and spectrophotometric and differential scanning calorimetry (DSC) techniques. By the analysis of fluorescence intensity, it was observed that Pd(II) complexes have strong abilities to quench the intrinsic fluorescence of HSA through a dynamic quenching procedure. The binding parameters were evaluated by the fluorescence quenching method. The thermodynamic parameters, including DeltaH degrees , DeltaS degrees , and DeltaG degrees , were calculated by the fluorescence quenching method and indicated that hydrophobic forces play a major role in the interaction of Pd(II) complexes with HSA. Far-UV-CD results represented that Pd(II) complexes induced a decrease in content of the alpha helical structure of protein. The binding of newly designed drugs (Pd(II) complexes) on the blood carrier protein of HSA resulted in significant alterations on the structure and conformation of protein via decreasing stability of HSA by decreasing the T(m), a red shift in maximum fluorescence intensity, a decrease in content of the alpha-helical structure, and the increase of the nonpolar or accessible hydrophobic surface of HSA to solvent.

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Enzyme Inhibition and Activation: A General Theory

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The rate of an enzymatic reaction may be changed by a moderator. Usually, the effect is to reduce the rate, and this is called inhibition. Sometimes the rate of enzyme reaction is raised, and this is called activation. Not only enzyme activation is subject of a less detailed presentation, but also enzyme inhibition and activation are very often discussed independently in enzymology. I attempt to introduce a general model of enzyme inhibition and activation to allow one to interpret inhibition and activation from a mechanistic or physical perspective using the significance of cooperativity as a new approach. The magnitude of interaction between substrate and inhibitor binding sites is given by the α parameter and the magnitude of increasing catalytic reaction constant is given by the β parameter, which both parameter values characterize the type of inhibition and activation. The moderation of mushroom tyrosinse is described by application of the model as a typical.

Keyword: Inhibition, Activation, Cooperativity, Enzyme kinetics