

Relation between the structure and function of proteins studied by the changes of tyrosine and tryptophan residues.

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2004 Fiscal Year Final Research Report Summary

Relation between the structure and function of proteins studied by the changes of tyrosine and tryptophan residues.

Research Project

Project/Area Number

14570103

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

General medical chemistry

Research Institution

Hosei University (2004)
Kanazawa University (2002-2003)

Principal Investigator

NAGAI Masako Hosei University, College of Technology, Visiting Professor, 工学部, 客員教授 (60019578)

Co-Investigator(Kenkyū-buntansha)

SAKURAI Hiroshi Kanazawa University, School of Medicine, Professor (2002-,2003), 医学部, 助教授 (00225848)
IMAI Kiyohiro Hosei University, College of Technology, Professor (2004), 工学部, 教授 (50028528)

Project Period (FY)

2002 – 2004

Keywords

hemoglobin / SH3 / near-UV CD / UV resonance Raman / mutants / tyrosine / tryptophan / quaternary structure transition

Research Abstract

To get insight into how the quaternary structure changes correlate to their functions, we examined the near-UV CD and UV resonance Raman spectra of hemoglobin and the domain of Src-homology-3 protein with and without ligands. Using four newly synthesized mutant hemoglobins at $\alpha 42\text{Tyr}$, $\alpha 140\text{Tyr}$, $\beta 145\text{Tyr}$, and/or $\beta 37\text{Trp}$, it was clarified that the main contributors for a negative CD band, a T-sate marker band, are $\alpha 140\text{Tyr}$ and $\beta 145\text{Tyr}$, located at C-terminal positions. The T-structure specific UV resonance Raman bands of Tyr and Trp were characterized using a natural mutant Hb, Hb M Boston and a Ni-Fe Hybrid hemoglobin.

Src-homology-3(SH3) protein recognize a Pro rich peptides and communicate with the other proteins. We demonstrated that SH3 interacts to the ligand peptide via Tyr residue(s) using UV CD and UV resonance Raman spectroscopy. SH3 has six Tyr residues. Specific Tyr residue for the interaction with Pro-rich peptide was specified as 14Tyr using mutants synthesized in E.coli each Tyr replaced by Ala. Interestingly, Src-SH3 and PI3K-SH3 showed different shtructure changes with the interaction of ligand peptides reflecting the different protein recognition.

Research Products (12 results)

All	2004	2003	2002	Other
All	Journal Article			

- [Journal Article] Changes of near-UV CD spectrum of human hemoglobin upon oxygen binding : A study of mutants at α 42, α 140, β 145 Tyr or β 37 Trp. **2004** ▾
- [Journal Article] Heme structures of five variants of Hemoglobin M probed by resonance Raman spectroscopy. **2004** ▾
- [Journal Article] Changes of near-UV CD spectrum of human hemoglobin upon oxygen binding : A study of mutants at α 42, α 140, β 145 tyrosine or β 37 tryptophan. **2004** ▾
- [Journal Article] Heme structures of five variants of hemoglobin M probed by resonance Raman spectroscopy. **2004** ▾
- [Journal Article] Differential ligand recognition by the Src and PI3K Src homology 3 domeins : CD and UV resonance Raman studies. **2003** ▾
- [Journal Article] Different ligand recognition by the Src and PI3K Src homology 3 domeins : CD and UV resonance Raman studies **2003** ▾
- [Journal Article] Changes in the abnormal α -subunit upon CO-binding to the normal β -subunit of Hb M Boston : resonance Raman, EPR and CD study. **2002** ▾
- [Journal Article] Differences in changes of the α 1- β 2 subunit contacts between ligand binding to the α and β subunits of Hb A : UV resonance Raman analysis using Ni-Fe hybrid hemoglobin. **2002** ▾
- [Journal Article] Changes in the abnormal α -subunit upon CO-binding to the normal β -subunit of Hb M Boston : resonance Raman, EPR, and CD study. **2002** ▾
- [Journal Article] Differences in changes of the α 1 β 2 subunit contacts between ligand binding to the α and β subunits of Hb A. UV resonance Raman analysis using Ni-Fe hybrid hemoglobin **2002** ▾
- [Journal Article] Quaternary structures of intermediately liganded human hemoglobin A and influences from strong allosteric effectors ; resonance Raman investigation. ▾
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