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# STRUCTURE AND FUNCTION OF PROTEINS AND PEPTIDES

<table>
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<th>Suren A. Tatulian</th>
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POLARIZED TOTAL INTERNAL REFLECTION INFRARED SPECTROSCOPY

Allows determination of the structure and orientation of membrane proteins

Publications:
Transmission electron micrographs of amyloid β peptide Aβ_{1-42} (above) and the pyroglutamylated Aβ_{PpE3-42} (below).

FTIR spectra of pyroglutamylated Aβ_{pE3-42} (left) and uniformly $^{13}$C-labeled Aβ_{1-42} (right) peptides identify an augmented $\alpha$-helical propensity of the former.

The pyroglutamylated Aβ peptide may form hypertoxic $\alpha$-helical intermediates and convert the Aβ peptide into similar assemblies of increased cytotoxicity.

Publication:
The C-terminal 20-residue peptide of Bax protein was shown to form large pores in lipid bilayer membranes. The pore was shown to assume a previously unknown structure, an \( \alpha/\beta \) ring, where 8 peptide molecules, each partially \( \alpha \)-helical and partially \( \beta \)-strand, form the pore.

**Publications:**
The depth of membrane insertion of human pancreatic phospholipase A2 (PLA2) is determined by tryptophan fluorescence quenching by bromines attached at different positions of membrane lipids.

Human and bee venom PLA2s bind to membranes with distinct modes, which explains differences in their interfacial activation.

Publications:
The peptide is synthesized with a thioester group at the C-terminus, which is reacted with the N-terminal cysteine of a recombinant, $^{13}$C-labeled fragment to create a segmentally $^{13}$C-labeled protein.

Analysis of the segmentally $^{13}$C-labeled PLA2 by polarized FTIR and fluorescence quenching allows positioning of the protein in a membrane (PDB entry 1ysk).

Publications:

An algorithm, named HELO (Helix Orientation), has been developed to determine the interhelical angles and helical bends or twists, using analytical geometry operations with the protein’s atom coordinates. Conformational changes in calmodulin upon binding to a target peptide were described at greater detail.

Publication:


Journal of Physical Chemistry & Biophysics
Related Journals

- [Journal of Electrical & Electronic Systems](#)
- [Journal of Lasers, Optics & Photonics](#)
Gynecology & Obstetrics Related Conferences

- 3rd International Conference and Exhibition on Lasers, Optics & Photonics
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