PROF. JORDAN H. CHILL - CURRICULUM VITAE (NOVEMBER 2022)

1. Personal Data

Place of Birth: Boston, MA, USA	**Nationality:** Israeli-US dual citizenship
Family Status: Married (1992) +3	**Website:** http://www.chill-lab.com

2. Education, Certificates and Degrees

From-To	Institute	Area of Specialty	Degree
2004-2007	Lab of Chemical Physics, NIH, USA. **Advisor:** Dr. Adriaan Bax	NMR structure and dynamics of the KcsA potassium channel	EMBO Postdoctoral Fellow
1998-2004	Weizmann Institute, Rehovot, Israel. **Advisor**: Prof. J. Anglister	Structural Biology: NMR structure of the human IFN receptor	PhD, *summa cum laude*
1995-1998	Tel-Aviv University, Israel	Business Administration	MBA, *cum laude*
1988-1991	Tel-Aviv University, Israel	Chemistry	BSc, *summa cum laude*

3. Current Positions

From-To	Institute	Area of Specialty	Degree
2014-present	Bar-Ilan University	Chemistry	Associate Professor
2007-2014	Bar-Ilan University	Chemistry	Assistant Professor

4. Administrative Positions Held (past 5 years)

From-To	Position
2019-present	Vice-Chair Department of Chemistry
2019-2020	University committee for establishing a youth-program center
2018-present	Departmental Teaching Committee
2015-2018	PhD Committee Board, member

5. Supervision of Graduate Students and Post-Doctoral Fellows

Currently supervising: 2 PhD students and 2 MSc students
Overall 2007-present: 4 post-doctoral fellows, 14 PhD students and 9 MSc students

6. Other Organizational Activities

From-To	Activity
2017	FEBS satellite meeting on IDPs – Organizer (with Prof. Dana Reichmann)
2017	82nd Israel Chemical Society meeting, member of Organizing Committee
2015-2019	COST Action BM1405 – Non-Globular Protein Network – member of Management Committee
2015	Israel Society for Biochemistry and Molecular Biology, Organizer of annual meeting (with Prof. Masha Niv
2011-2018	Coordinator of "Chemistry-for-High-Schools" project, Dept. of Chemistry, Bar Ilan University

7. Funding (last 5 years)

Year	Funding Agency	Research Topic	Amount
2014-2018	Binational Israel-US Foundation	Channel-toxin complexes reveal the mechanism of KcsA inhibition	190,000 USD 60% Chill group
2016-2019	Israel Science Foundation	Affinity and selectivity in toxin inhibition of Kv1 potassium channels investigated by nanodisc technology	160,000 USD
2016-2019	ISF-NCSF (China-Israel)	The hepatitis C virus envelope glycoprotein dimerization as a model for helix-helix interactions in membrane proteins	280,000 USD
2018-2022	Binational Israel-US Foundation	The role of toxin dynamics in molecular recognition between KcsA and its inhibitors	243,000 USD 60% Chill group
2018-2021	M. of Science and Technology	Cyclic peptides as novel therapeutics for LC amyloidosis: structure-based design and determination of efficacy	300,000 USD 50% Chill group
2019-2023	Israel Science Foundation	Structural and mechanistic aspects of binding, folding and signaling of WIP, a disordered multi-functional polypeptide	360,000 USD

8. Teaching Experience

Years	Course title	Institute
2007-present	Inorganic Chemistry (undergraduate course)	Bar Ilan University
2007-present	Magnetic Resonance (graduate course)	Bar Ilan University
2008-2019	Biomaterials and Biopolymers (undergraduate course)	Bar Ilan University
2018-present	Spectroscopy and Structure Determination	Bar Ilan University
2019-present	Statistics for Chemists	Bar Ilan University
2022-present	Peptides: Synthesis, Structure and Function	Bar Ilan University

9. Miscellaneous

Years	Memberships
2008-present	Israel Chemistry Society, Israel Society for Biochemistry and Molecular Biology
2015-present	Biophysical Society
Years	**Reviewer for Journals and Research Foundations**
2009-present	Reviewer Nat. Commun., Biochemistry, JBNMR, Science Reports, ChemBioChem and more
2010-2019	Reviewer for research foundations, Israel Science Foundation, German-Israel Fund
Date	**Awards and Honors**
2009,2018	Award for excellence in teaching, Bar Ilan University
2006	FARE Award (Fellow Award for Research Excellency), NIH, Bethesda, MD, USA
2004	EMBO long-term post-doctoral fellowship
2004	Esther Helinger Memorial Prize for Ph.D. thesis

10. Main Research Interests and Scientific Activities (brief summary; for details see next section)

- NMR-based approach to protein structural biology, protein-protein interactions with biomedical/pharmaceutical implications; emphasis on Wiskott-Aldrich syndrome
- Structure, dynamics and function of interactions between potassium channels and inhibiting toxins
- Intrinsically disordered proteins – NMR methods for backbone assignment, transient structure, folding events, development of methods for studying structural propensities in IDPs
- Structural studies of aggregation-prone proteins and mechanisms of aggregation inhibition

11. <u>Peer-reviewed publications</u> (20 selected of 52, ~1300 citations, h-index 19, h10 index 27)

4. Samson, A.O.; Scherf, T.; Eisenstein, M.; **Chill, J.H**.; Anglister J. The mechanism for acetylcholine receptor inhibition by α-neurotoxins and species-specific resistance to α-bungarotoxin revealed by NMR. *Neuron*, **2002**, *35(2)*, 319-332.

5. Chill, J.H.; Quadt, S.R.; Levy, R.; Schreiber, G.; Anglister J. The human type I interferon receptor: NMR structure reveals the molecular basis of ligand binding. *Structure (Camb.)*, **2003**, *11(7)*, 791-802.

9. Chill, J.H.; Louis, J.M.; Miller, C.; Bax A. NMR study of the tetrameric KcsA potassium channel in detergent micelles. *Protein Sci*, **2006**, *15(4)*, 684-698.

19. Haba, N.Y.; Gross, R.; Novacek, J.; Shaked, H.; Zidek, L,; Barda-Saad, M.; **Chill, J.H.*** NMR determines transient structure and dynamics in the disordered C-terminal domain of WASp interacting protein. *Biophyiscal J.* **2013**, 105(2), 481-493. (*Corresponding author)

23. Fried, S.; Eliyaho, S.; Pauker, H.M.; Noy, E.; Reicher, B.; **Chill, J.H.** and Mira Barda-Saad**.** Triple color-FRET analysis reveals a dynamic conformational change within the actin regulating WIP:WASp complex. *Science Signaling,* **2014**, 7(331):ra60. doi: 10.1126/scisignal.2005198.

25. Elazari-Shalom, H.; Zazrin-Grynspan, H.; Shaked, H.; **Chill, J.H.*** An NMR study of the transmembrane domain of hepatitis C virus E2 glycoprotein. *BBA Biomembranes*, **2014**, 1838(11):2919-2128. (*Corresponding author)

26. Sher, I.; Chang, S.-C.; Li, Y.; Chhabra, S.; Palmer III, A.G.;.Norton, R.S. and **Chill, J.H.*** Conformational flexibility in the binding surface of the potassium channel blocker ShK. *ChemBioChem*, **2014**, 15(16):2402-2410. **Featured on cover.** (*Corresponding author)

31. Zhao, R.; Dai, H.; Mendelman, N.; Cuello, L.; **Chill, J.H.;** Goldstein, S. Designer and natural peptide toxin blockers of KcsA potassium channel identified by phage-display. *Proc. Natl. Acad. Sci.* **2015***,* 112(50), E7013-7021.

36. Halle-Bikovski, A.; Fried, S.; Biber, G.; Rozentur-Shkop, E.; Joseph, N.; Shaked, H.; Barda-Saad, M.† **Chill, J.H.†** New structural insights into formation of the key actin regulating WIP-WASp complex determined by NMR and molecular imaging. *ACS Chem. Biol.* **2018**, 13(1), 100-109.

37. Belostozky, A.; Richman, M.; Lisiansky, E.; Tovchygrechko, A.; **Chill, J.H.;** Rahimipour, S. Inhibition of tau-derived hexapeptide aggregation and toxicity by a self-assembled cyclic D,L-α-peptide conformational inhibitor. *Chem Commun (Camb)* **2018**, 54(47), 5890-5893.

39. Baskin, M.; Zhu, H.; Qu, Z.-W.; **Chill, J.H.;** Grimme, S.; Maayan, G. Folding of unstructured peptoids and heterobimetallic peptoid complexes formation upon side chains-to-metal coordination. *Chem. Sci.* **2019**, doi: 10.1039/c8sc03616k.

40. Qasim. A.; Sher, I.; Hirschhorn, O.; Shaked, H.; Qasim, Z.; Ruthstein, S.; **Chill, J.H.** A KcsA cytoplasmic pH-gate investigated in lipoprotein nanodiscs**.** *ChemBioChem,* 2019, doi: 10.1002/cbic.201800627

42. Yahalom, A.; Davidov, G.; Kolusheva, S.; Shaked, H.; Barber-Zucker, S.; Zarivach, R.† **Chill, J.H**.† Structure and membrane-targeting of a Bordetella pertussis effector N-terminal domain. *BBA-Biomembranes*, 2019, 1861(12):183054 (†Co-corresponding author).

44. Zhao, R.; Dai, H.; Mendelman, N.; **Chill, J.H.**†; Goldstein, S.A.N†. Tethered peptide neurotoxins display two blocking mechanisms in the K^+ channel pore as do their untethered analogues. *Sci. Adv.* 2020, 6(10), eaaz3439. (†Co-corresponding author)

45. Sokolik, C.G.; Qassem, N.; **Chill, J.H**. The disordered cellular multi-tasker WIP and its protein-protein interactions: a structural view. *Biomolecules* 2020, 10(7), 1084-1093.

48. Rotem-Bamberger, S.; Fahoum, J.; Keinan-Adamsky, K.; Tsaban, T; Avraham, O.; Shalev, D.E.; **Chill, J.H.** †, Schueler-Furman, O.† Tandem WW/PPxY motif interactions in WWOX: the multifaceted role of the second WW domain. *J. Biol. Chem.* 2022, 298(8), 102145. (†Co-corresponding author)

49. Yahalom, A.; Shaked, H.; Ruthstein, S.; **Chill, J.H.** Inherent minor conformer of *Bordetella* effector BteA directs chaperone-mediated unfolding. *J. Am. Chem. Soc.* 2022, 144(26), 11553–11557.

50. Twafra, S.; Sokolik, C.G.; Sneh, T.; Srikanth, K.D.; Meirson, T., Genna, A.; **Chill, J.H.†;** Gil-Henn, H.† A novel Pyk2-derived peptide inhibits invadopodia-mediated breast cancer metastasis. *Oncogene* 2022, doi: 10.1038/s41388-022-02481-w (†Co-corresponding author)

51. Habashi, M., Vutla, S.; Senapati, S.; Chauhan, P.S.; Haviv-Chesner, A.; Richman, M.; Mohand, S.A.; Dumulon-Perreault, V.; Tripathi, K.; Mulamreddy, R.; **Chill, J.H.;** Guérin, B.; Lubell, W.D.; Rahimipour, S. Early detection and treatment of Alzheimer's disease by targeting toxic soluble amyloid oligomers. *Proc. Natl. Acad. Soc. USA*, *accepted*.

52. Baruch-Leshem, A.; Sloan-Dennison, S.; Massarano, T.; Ben-David, S.; Graham, D.; Faulds, K.; Gottlieb, H.; **Chill, J.H.†;** Lampel, A.† Biomolecular condensates formed by designer minimalistic peptides. chemArXiv https://doi.org/10.26434/chemrxiv-2022-013k3 (†Co-corresponding author)

12. <u>Lectures delivered in international scientific conferences</u> (selected)

Conference	Place and Date	Title of Lecture/Poster
27th International Conference of Magnetic Resonance in Biological Systems	Kyoto, Japan, 2016	Potassium channels in lipoprotein nanodiscs: insights into toxin inhibition and gating **(oral presentation)**
62nd Biophysical Society meeting	San Francisco, USA, 2018	From disordered polypeptide to functional regulator: a structural view of WIP and its complex with WASp in human T cells. **(oral presentation)**
European Magnetic Resonance Meeting	Berlin, Germany 2019	Solution NMR of nanodisc-embedded proteins: new molecular insights into protein-protein and protein-membrane interactions **(oral presentation)**
ASIA-ChemBio conference	Virtual meeting, February 2021	An NMR view of SH3 domains and their ligands **(Invited talk)**
Wiskott-Aldrich syndrome 2022	Virtual presentation, June 2022	Towards a molecular understanding of WAS/ XLT using biological NMR (**Invited talk**)
Intrinsically Disordered Proteins GRC	Les Diablerets, June 2022	Fuzzy' and 'tandem' complexes: a wealth of interaction modes between binding modules and their linear motifs (**Poster**)
47st Congress of the Federation of European Biochemical Societies	Lisbon, July 2022	Structure and 'fuzziness' in the newly discovered WIP-cortactin regulatory complex (**Oral presentation**)
Israel Medicinal Chemistry Society Meeting	Rehovot, July 2022	The Structural Basis of Biological Regulation by Proline-Rich Motifs (**Invited talk**)

13. Synopsis of research

Research in the Chill group is dedicated to unraveling the secrets of structure, dynamics and function of proteins, including their interactions with ligands and other proteins, in health and disease. Motivation for structural bioNMR studies of proteins and their interactions is convincing: all biological processes are based upon cellular events of protein-protein encounters, and a structural view of these is vital for achieving a deeper understanding of and developing approaches for controlling them. The main tool employed is high-resolution biomolecular nuclear magnetic resonance (bioNMR), a powerful approach distinguishing itself from other biophysical methods by offering an exquisitely molecular-level view of protein behavior. The group combines additional biophysical methodologies and computational tools to enhance the impact of these results.

Main research efforts

Structural biology of Wiskott-Alrdrich syndrome, specifically the WIP-WASp interaction: Focus is on understanding how WIP epitopes bind to WASp, thereby regulating its activation and protecting it from degradation, and how phosphorylation and/or WAS-inducing mutations disrupt this interaction.

Interactions between K^+-channels and their inhibiting toxins: structural basis of the affinity and specificity of channels and toxins of marine source, in particular how conformational exchange in toxins contributes to the pose assumed in the channel opening.

Intrinsically disordered proteins (IDPs) and their protein-protein interactions (PPIs): Focus is on WASp interacting protein (WIP) and its cellular interactions with actin, cortactin and WASp in hematopoietic cells. First pursued as separate polypeptides each bound to its own partner, now emphasis is on full-length WIP in a more holistic approach, including in cells.

Structure-function relations in amyloid-related aggregation and pathologies: We investigate the mechanism of aggregation at various conditions by following changes in the NMR spectrum of monomers and short oligomers. Recently we have also addressed questions of liquid-liquid phase separation, in which short peptides form droplets in a tunable fashion.

Summary

- BSc from Tel-Aviv U, Israel (1988-1991), PhD from WIS, Israel (1998-2004)
- Post-doctoral fellowship at NIH, USA (2004-2007)
- Independent investigator in the Department of Chemistry, Bar Ilan University, Israel (since 2007)
- Assistant Professor since 2007, Associate Professor since 2014, department Vice-Chair since 2019
- Research interests: NMR-based approach to protein structural biology, structure-function relations in biologically important systems, protein-protein interactions with biomedical/pharmaceutical implications
- Active mentoring of post-docs and grad students, award-winning teaching and program development
- Organization of national and international conferences
- Past and current funding (Israel Science Foundation, bi-national award Israel-US, Ministry of Science and Technology, and Israel-China)
- ~50 peer-reviewed publications, >1250 citations, h-index 19
- Presentations on leading international conference platforms