

David Cowburn

Professional Biographical Information

Education:

- 1965 B. Sc. Hon. Dept. of Biochemistry, University of Manchester Institute of Science and Technology;
- 1970 Ph. D., Medical Research Council Biophysics Research Unit, King's College, University of London;

Employment:

- 2010- Professor, Biochemistry, Physiology and Biophysics, Albert Einstein College of Medicine of Yeshiva University, New York
- 2000-10 President and CEO; Director, Lab. Physical Biochemistry, New York Structural Biology Center
- 1973-2000 Assistant, Associate Professor, Head of Lab, Rockefeller University
- 1970-3 Research Associate, Department of Neurology; College of Physicians and Surgeons of Columbia University
- 1971-3 Research Fellow of the Interdisciplinary Research Training Program in the Biological Sciences in relation to Mental Health, Columbia University
- 1970 Research Fellow of the European Molecular Biology Organization, Laboratory of Molecular Biophysics, Portsmouth Polytechnic, England
- 1968-9 Physics Teacher, London Education Authority Adult Classes (Part time)
- 1966-8 Demonstrator in Biochemistry, King's College

Awards and distinctions:

State scholar, 1962-5; EMBO Fellow, 1970; Member, American Society of Biochemistry and Molecular Biology, 1978; Doctor of Science, University of London, 1981 (by examination); Adjunct Faculty, The Rockefeller University, 2000-11; Mount Sinai School of Medicine, 2008- : Fellow, New York Academy of Sciences, 2003; Fellow, Royal Society of Chemistry, 2012.

Patents issued:

1. [United States Patent 5,888,763](#) Hanafusa, et al. March 30, 1999 Peptides specific for the first Crk-SH3 domain. Licensed to Amgen.
2. [United States Patent 6,171,804](#) Cowburn, et al. January 9, 2001 Method of determining interdomain orientation and changes of interdomain orientation on ligation.
3. [United States Patent 6,391,649](#) Cowburn, et al. May 21, 2002 Method for the comparative quantitative analysis of proteins and other biological material by isotopic labeling and mass spectroscopy. Licensed by Invitrogen and others
4. [United States Patent 6,642,059](#) Cowburn, et al. November 4, 2003 Method for the comparative quantitative analysis of proteins and other biological material by isotopic labeling and mass spectroscopy. Licensed by Invitrogen and others
5. [World Patent WO9816638-A1](#); AU9674324-A Cowburn et al. 1998, Consolidated ligand comprising two ligands - for different binding domains on protein, used as diagnostic agent, for drug screening and therapeutically, has greater affinity and specificity than single ligands.
6. [World Patent WO2006086800](#) Cowburn et al. 2006 Methods and devices for characterizing macromolecular complexes using isotope labeling techniques.

Research Interests:

Structure - function relationships in biological chemistry. Understanding molecular contributions to physiological mechanisms in health and diseases of control of genetic expression, and of intracellular signal transduction. Development of magnetic resonance, applied math, and molecular biophysics techniques in biomedical research for structural and chemical biology.

Publications: (Peer reviewed, and/or [PubMed listed](#) and/or [Google Scholar](#))

144. Eryilmaz, E., Shah, N., Muir, T., Cowburn, D., (2014) "Structural and Dynamical Features of Inteins and Implications on Protein Splicing" *J. Biol. Chem.* In press.
- [143.](#) Shah, N. H., Eryilmaz, E., Cowburn, D., Muir, T. W. (2013). Naturally split inteins assemble through a "capture and collapse" mechanism. *J. Am. Chem. Soc.*, **135**, 18673-81.
- [142.](#) Eryilmaz, E., Janda, A., Kim, J., Cordero, R.J.B., Cowburn, D., and Casadevall, A. (2013). Global structures of IgG isotypes expressing identical variable regions. *Molecular Immunology* **56** 588-98
- [141.](#) Shah, N. H., Eryilmaz, E., Cowburn, D., Muir, T. W. (2013); Extein Residues Play an Intimate Role in the Rate-Limiting Step of Protein Trans-Splicing *Journal of the American Chemical Society* **135** 5839-47
- [140.](#) Chen, H., Huang, Z., Dutta, K., Blais, S., Neubert, T.A., Li, X., Cowburn, D., Traaseth, N.J., and Mohammadi, M. (2013). Cracking the Molecular Origin of Intrinsic Tyrosine Kinase Activity through Analysis of Pathogenic Gain-of-Function Mutations. *Cell reports* **4** 376-384
- [139.](#) Bhattacharya S, Ho J, Orlova A, Khajeh JA, Cowburn D, Bu Z. (2013) Ligand induced dynamics changes in extended PDZ domains from NHERF1 *J Mol Biol.* 2013 **425** 2509-28

- [138.](#) Cucuringu, M., Singer, A., Cowburn, D. (2012). Eigenvector synchronization, graph rigidity, and the molecule problem. *Information and Inference* **1** 21-61
- [137.](#) Janda, A., Eryilmaz, E., Nakouzi, A., Cowburn, D., and Casadevall, A. (2012). Variable region identical immunoglobulins differing in isotype express different paratopes. *J Biol Chem.* **287** 35409-17
- [136.](#) Xu, R., Liu, D., and Cowburn, D. (2012). Abl kinase constructs expressed in bacteria: facilitation of structural and functional studies including segmental labeling by expressed protein ligation. *Mol Biosyst* **8** 1878-1885
- [135.](#) Piserchio A, Cowburn D, Ghose R. Expression and Purification of Src-family Kinases for Solution NMR Studies.(2012) *Methods Mol Biol.* **831** 111-31. PMID: 22167671
- [134.](#) Bhattacharya S, Zhang H, Cowburn D, Debnath AK. Novel structures of self-associating stapled peptides. *Biopolymers.* 2012 **97** 253-64 PMID: 3306222
- [133.](#) Kalinina J, Dutta K, Ilghari D, Beenken A, Goetz R, Eliseenkova AV, Cowburn D, Mohammadi M. (2012) "The alternatively spliced acid box region plays a key role in FGF receptor autoinhibition", *Structure* **20** 77-88
- [132.](#) Zhang H, Curreli F, Zhang X, Bhattacharya S, Waheed AA, Cooper A, Cowburn D, Freed EO, Debnath AK. Antiviral activity of alpha-helical stapled peptides designed from the HIV-1 capsid dimerization domain. *Retrovirology.* 2011;**8**(1):28. PMID: 3097154.
- [131.](#) Zhao F, Ilbert M, Varadan R, Cremers CM, Hoyos B, Acin-Perez R, Vinogradov V, Cowburn D, Jakob U, Hammerling U. Are zinc-finger domains of protein kinase C dynamic structures that unfold by lipid or redox activation? *Antioxid Redox Signal.* 2011; **14**(5):757-66. PMID: 3030452.
- [130.](#) Fabien Ferrage; Amy Reichel; Shibani Bhattacharya; David Cowburn; Ranajeet Ghose. 2010 "On the measurement of ¹⁵N-¹H nuclear Overhauser effects. 2. Effects of the saturation scheme and water signal suppression." *J. Magn Res* **207**:294-303
- [129.](#) Tait S, Dutta K, Cowburn D, Warwicker J, Doig AJ, McCarthy JE. Local control of a disorder-order transition in 4E-BP1 underpins regulation of translation via eIF4E. *Proc Natl Acad Sci U S A.* 2010;**107**(41):17627-32. PMID: 2955097.
- [128.](#) Silvia Frutos, Michael Goger, Baldissera Giovani, David Cowburn and Tom W. Muir (2010) "Branched Intermediate Formation Stimulates Peptide Bond Cleavage in the *Mxe* GyrA Intein Protein Splicing Reaction", *Nat Chem Biol*, **6** 527-533 PMID: 2889191.
- [127.](#) Ferrage, F., Shekhtman, D., Dutta, K., and Cowburn, D. (2010) "Structural Determination of Biomolecular Interfaces by Nuclear Magnetic Resonance of Proteins with Reduced Proton Density, *J. Biomol. NMR* **47** 41-54
- [126.](#) Matthew P. Nicholas, Ertan Eryilmaz, Fabien Ferrage, David Cowburn, and Ranajeet Ghose (2010) "Nuclear Spin Resonance Relaxation in Isotropic and Anisotropic Media" *Prog. NMR Spectroscopy* **57** 111-158
- [125.](#) Bhattacharya, S., Dai, Z., Li, J., Baxter, S., Callaway, D.J., Cowburn, D., and Bu, Z. (2010). "A conformational switch in the sodium/ hydrogen exchange regulatory factor 1(NHERF1) controls autoinhibition and complex formation." *J Biol Chem.* **285** 9981-94 PMID: 2843244.
- [124.](#) Liu, D., Xu, R., and Cowburn, D. (2009). "Segmental isotopic labeling of proteins for nuclear magnetic resonance." *Methods Enzymology* **462**, 151-175.

- [123.](#) Piserchio, A., Ghose, R., Cowburn, D. (2009) "Optimized Bacterial Expression and Purification of the c-Src Catalytic Domain for Solution NMR Studies" *J. Biomol. NMR*, **44** 87-93 PMID: 2735562.
- [122.](#) Ferrage, F., Cowburn, D., Ghose, R. (2009) "Accurate Sampling of High-Frequency Motions in Proteins by Steady-State ^{15}N - $\{^1\text{H}\}$ Nuclear Overhauser Effect Measurements in the Presence of Cross-Correlated Relaxation" *J. Am. Chem. Soc.* **131**, 6048-9.
- [121.](#) Pellecchia, M.; Bertini, I.; Cowburn, D.; Dalvit, C.; Giralt, E.; Jahnke, W.; James, T. L.; Homans, S. W.; Kessler, H.; Luchinat, C.; Meyer, B.; Oschkinat, H.; Peng, J.; Schwalbe, H.; Siegal, G., (2008) "Perspectives on NMR in drug discovery: a technique comes of age." *Nat Rev Drug Discovery* **7** 738-45
- [120.](#) Schwartz EC, Shekhtman A, Dutta K, Pratt MR, Cowburn D, Darst S, Muir TW. (2008) "A full-length group 1 bacterial σ factor adopts a compact structure incompatible with DNA binding." *Chem Biol.* **15** 1091-103.
- [119.](#) Bhattacharya S., Zhang H., Debnath A., Cowburn D. (2008) "Solution structure of a peptide inhibitor in complex with monomeric C-terminal domain of HIV-1 capsid", *J Biol Chem*, **283** 16274-8.
- [118.](#) Xiong X, Cui P, Hossain S, Xu R, Warner B, Guo X, An X, Debnath A, Cowburn D, Kotula L. (2008). Allosteric Inhibition of the non Myristoylated c-Abl Tyrosine Kinase by Phosphopeptides Derived from Abi1/Hssh3bp1. *BBA Molecular Cell Research*, **1783** 737-47.
- [117.](#) Zhang H, Zhao Q, Bhattacharya S, Waheed A, Tong X, Hong A, Heck S, Curreli F, Goger M, Cowburn D, Freed E, Debnath A. (2008) A Cell-penetrating Helical Peptide as a Potential HIV-1 Inhibitor. *J Mol Biol*, **378**, 565-80.
- [116.](#) Liu D, Xu R, Dutta K, Cowburn D. (2008) N-terminal cysteinyl proteins can be prepared using thrombin cleavage. *FEBS Letts*, **382**, 1163-7.
- [115.](#) Ferrage F, Piserchio A, Cowburn D, Ghose R. (2008) On the Measurement of ^{15}N - $\{^1\text{H}\}$ Nuclear Overhauser Effects. *J Magn Res*, **192**, 302-13.
- [114.](#) Valentine ER, Ferrage F, Massi F, Cowburn D, and Palmer AG (2007) 'Joint Composite Rotation Adiabatic-Sweep Isotope Filtration' *J. Biomol. NMR* **38**, 11-22.
- [113.](#) Ferrage, F, Pelepussey P, Cowburn D, Bodenhausen G (2007) "Intra-residue dipolar cross-relaxation rates between $^{13}\text{C}\alpha$ and $^{13}\text{C}'$ as a measure of internal dynamics in proteins by NMR Spectroscopy" *J. Am. Chem. Soc.* **128** 11072-8
- [112.](#) Ji, H., Shekhtman, A., McDonnell, J., Ghose, R., Cowburn D. (2006) "NMR determination that an extended BH3 motif of pro-apoptotic BID is specifically bound to BCL-X_L" *Magnetic Res. Chem.* **44** 101-6
- [111.](#) Mukherjee, M., Dutta, K., White, M.A., Cowburn, D., Fox, R.O. (2006) "NMR solution structure and backbone dynamics of domain III of the E protein of tick-borne Langat flavivirus, suggests a potential site for molecular recognition" *Protein Science* **15** 1342-1355.
- [110.](#) Muralidharan V., Dutta K., Cho J., Vila-Perello M., Raleigh D.P., Cowburn D., Muir TW (2006) 'Solution Structure and Folding Characteristics of the C-Terminal SH3 Domain of c-Crk-II' *Biochemistry* **45** 8874-8884
- [109.](#) Burz, D.S., Dutta, K., Cowburn, D., Shekhtman, A. (2006) Mapping structural interactions in proteins using NMR (STINT-NMR). *Nature Methods* **3**, 93-95

- [108.](#) Romanelli, A., Shekhtman, A., Cowburn, D., and Muir, T. W. (2004). "Semisynthesis of a segmental isotopically labeled protein splicing precursor: NMR evidence for an unusual peptide bond at the N-extein-intein junction". *Proceedings of the National Academy of Sciences U S A* **101**, 6397-6402
- [107.](#) Goger, M. J., McDonnell, J. M., and Cowburn, D. (2003). "Using cryoprobes to decrease acquisition times of triple-resonance experiments used for protein resonance assignments". *Spectroscopy-an International Journal* **17**, 161-167.
- [106.](#) Shekhtman, A., and Cowburn, D. (2002). An ubiquitin-interacting motif from Hrs binds to and occludes the ubiquitin surface necessary for polyubiquitination in monoubiquitinated proteins. *Biochemical and Biophysical Research Communications* **296**, 1222-1227
- [105.](#) Shekhtman, A., Ghose, R., Goger, M., and Cowburn, D. (2002). "NMR structure determination and investigation using a reduced proton (REDPRO) labeling strategy for proteins". *FEBS Lett* **524**, 177-182
- [104.](#) Camarero, J. A., Shekhtman, A., Campbell, E. A., Chlenov, M., Gruber, T. M., Bryant, D. A., Darst, S. A., Cowburn, D., and Muir, T. W. (2002). "Autoregulation of a bacterial sigma factor explored by using segmental isotopic labeling and NMR". *Proceedings of the National Academy of Sciences of the United States of America* **99** 8536-8541.
- [103.](#) Shekhtman, A., Ghose, R., Wang, D., Cole, P. A., and Cowburn, D. (2001). "Novel mechanism of regulation of the non-receptor protein tyrosine kinase Csk: insights from NMR mapping studies and site-directed mutagenesis". *J Mol Biol* **314** 129-138.
- [102.](#) Camarero, J. A., Fushman, D., Cowburn, D., and Muir, T. W. (2001). "Peptide chemical ligation inside living cells: in vivo generation of a circular protein domain". *Bioorg Med Chem* **9** 2479-2484.
- [101.](#) Ghose, R., Shekhtman, A., Goger, M. J., Ji, H., and Cowburn, D. (2001). "A novel, specific interaction involving the Csk SH3 domain and its natural ligand". *Nature Str Biol* **8** 998-1004.
- [100.](#) Camarero, J. A., Fushman, D., Sato, S., Giriat, I., Cowburn, D., Raleigh, D. P., and Muir, T. W. (2001). "Rescuing a destabilized protein fold through backbone cyclization". *Journal of Molecular Biology*, 308 1045-1062.
- [99.](#) McDonnell, J. M., Calvert, R., Beavil, R. L., Beavil, A. J., Henry, A. J., Sutton, B. J., Gould, H. J., and Cowburn, D. (2001). "The structure of the IgE ϵ 2 domain and its role in stabilizing the complex with its high-affinity receptor Fc ϵ R1 α ". *Nature Structural Biology*, 8 437-441.
- [98.](#) Stefania Pfeiffer, David Fushman, and David Cowburn (2001) "Simulated and NMR derived backbone dynamics of a protein with significant flexibility: A comparison of spectral densities for the β ARK1 PH domain", *J. Am. Chem. Soc.* **123** 3021-3036.
- [97.](#) Fushman, David; Cowburn, David (2001) "Determination of residue-specific ^{15}N chemical shift tensors in proteins in solution using NMR relaxation; implications for protein dynamics and structure, and applications of Transverse Relaxation Optimized Spectroscopy (TROSY)" *Met. Enz.* **339**, 109-126.
- [96.](#) Fushman, David; Ghose, Ranajeet; Cowburn, David (2000) "The effect of finite sampling on the determination of orientational properties: A theoretical treatment with application to interatomic vectors in proteins", *J. Am. Chem. Soc.* **122** 10640-9

- [95.](#) Nicholas, Peter; Fushman, David; Ruchinsky, Vladislav; Cowburn, David (2000) "The Virtual NMR Spectrometer: a Computer Program for Efficient Simulation of NMR Experiments Involving Pulsed Field Gradients" *J. Magn. Reson.* **145**, 262-275.
- [94.](#) Fushman, David; Tjandra, Nico; Cowburn, David (1999) "An approach to direct determination of protein dynamics from ^{15}N NMR relaxation at multiple fields, independent of variable ^{15}N chemical shift anisotropy and chemical exchange contributions" *J. Am. Chem. Soc.*, **121**, 8577-8582.
- [93.](#) Oda, Y.; Huang, K.; Cross, F. R.; Cowburn, D.; Chait, B. T. (1999) "Accurate Quantitation of Protein Expression and Site-Specific Phosphorylation" *PNAS*, **6**, 6591-6596.
- [92.](#) Fushman, David; Xu, Rong; Cowburn, David. (1999) "Direct determination of changes of interdomain orientation on ligation: use of the orientational dependence of ^{15}N NMR relaxation in Abl SH (32)" *Biochemistry*, **38**, 10225-10230.
- [91.](#) McDonnell, James M.; Fushman, David; Milliman, Curt L.; Korsmeyer, Stanley J.; Cowburn, David. (1999) "Solution structure of the pro-apoptotic molecule, BID: a structural basis for apoptotic agonists and antagonists" *Cell*, **96**, 625-34.
- [90.](#) Xu, Qinghong; Zheng, Jie; Xu, Rong; Barany, George; Cowburn, David. (1999) "Flexibility of Interdomain Contacts Revealed by Topological Isomers of Bivalent Consolidated Ligands: Abelson SH (32)" *Biochemistry*, **38**, 3491-7.
- [89.](#) Xu, Rong; Cahill, Sean; Cowburn, David. (1999) "Triple resonance-based assignment for Abl SH (32) and its complex with a consolidated ligand" *J. Biomol. NMR* **4** 187-8
- [88.](#) Pfeiffer, Stephania; Fushman, David, and Cowburn, David (1999) "Impact of Cl^- and Na^+ ions on simulated structure and dynamics of βARK1 PH domain", *Proteins* **35** 206-19
- [87.](#) Xu, Rong; Ayers, Brenda; Cowburn, David; Muir, Tom W. (1999) "Chemical Ligation of Folded Recombinant Proteins: Segmental Isotopic Labeling of Domains for NMR Studies" *PNAS* **96** 388-93
- [86.](#) Fushman, David; Cowburn, David. (1999) "The effect of noncollinearity of ^{15}N - ^{1}N dipolar and ^{15}N CSA tensors and rotational anisotropy on ^{15}N relaxation, CSA/dipolar cross correlation, and TROSY." *J. Biomol. NMR* **13** 139-47
- [85.](#) Fushman, David; Nico Tjandra; Cowburn, David. (1998) "Direct measurement of ^{15}N chemical shift anisotropy in solution." *J. Am. Chem. Soc.* **102** 10947-52
- [84.](#) Fushman, D.; Cowburn, D. (1998) "Model-independent analysis of ^{15}N chemical shift anisotropy from NMR relaxation data. Ubiquitin as a test example." *J Am Chem Soc* **120** 7109-10
- [83.](#) Posern, G.; Zheng, Jie; Knudsen, B.S.; Kardinal, C.; Muller, K. B.; Voss, J.; Shishido, T.; Cowburn, David; Cheng, C.; Wang, B.; Kruh, G. D.; Burrell, S. K.; Jacobson, C.A.; Lenz, D. M.; Zamborelli, T.J.; Adermann, K.; Hanafusa, H.; Feller, S. M. " Development of highly selective SH3 binding peptides for Crk, CRKL which disrupt Crk-complexes with DOCK180, SoS, and C3G." (1998) *Oncogene*, **16** 1903-12
- [82.](#) McDonnell, James M.; Fushman, David; Cahill, Sean M.; Zhou, Wenjun; Wolven, Amy; Wilson, Carol B.; Nelle, Timothy D.; Resh, Marilyn D.; Wills, John; Cowburn, David "Solution structure and dynamics of the bioactive retroviral M domain from Rous sarcoma virus" (1998) *J. Mol. Biol.* **279** 921-8

- [81.](#) Fushman, David; Najmabadi-Haske, Tareneh; Cahill, Sean; Zheng, Jie; LeVine III, Harry; Cowburn, David "The solution structure and dynamics of the pleckstrin homology domain of G-protein coupled receptor kinase 2 (β ARK1): A binding partner of G subunits" (1998) *J. Biol. Chem.* **273** 2835-43
- [80.](#) Zheng, Jie; Chen, R.-H.; Corblan-Garcia, S.; Cahill, Sean M.; Bar-Sagi, Dafna; Cowburn, David "The solution structure of the Pleckstrin homology domain of human SOS1: a possible structural role for the sequential association of Dbl homology and Pleckstrin homology domains" (1997) *J. Biol. Chem.* **272** 30340-4
- [79.](#) McDonnell, James M; Fushman, David; Cahill, Sean M.; Sutton, Brian J.; Cowburn, David. "Solution structure of Fc ϵ RI α -chain mimics: a β -hairpin peptide and its retroenantiomer" (1997) *J. Am. Chem. Soc.* **119** 5321-8
- [78.](#) Fushman, David; Cahill, Sean; Cowburn, David. "The main chain dynamics of the dynamin pleckstrin homology (PH) domain in solution: Analysis of ^{15}N relaxation with monomer/dimer equilibration" (1997) *J. Mol. Biol.* **266** 173-94
- [77.](#) Zheng, Jie; Cahill, Sean M.; Lemmon, Mark, A.; Fushman, David; Schlessinger, Joseph; Cowburn, David. "Identification of the binding site for acidic phospholipids on the PH domain of dynamin: Implications for stimulation of GTPase activity" (1996) *J. Mol. Biol.* **255** 14-21
- [76.](#) Cowburn, David; Zheng, Jie; Xu, Qinghong; Barany, George. "Enhanced affinities and specificities of consolidated ligands for the SH3 and SH2 domains of Abelson protein tyrosine kinase". (1995) *J. Biol. Chem.* **270** 26738-41
- [75.](#) Gosser, Yuying Q.; Zheng, Jie; Overduin, Michael; Mayer, Bruce J., Cowburn, D. "The solution structure of Abl SH3, and its relationship to SH2 in the SH(32) construct." (1995) *Structure* **3** 1075-86
- [74.](#) Lee, Chi-Hon; Leung Benjamin; Lemmon, Mark A.; Zheng, Jie; Cowburn, David; Kuriyan, John; Saksela, Kalle. "A single amino acid in the SH3 domain of Hck determines its high affinity and specificity in binding to HIV-1 Nef protein" (1995) *EMBO J.* **14** 5006-16
- [73.](#) Knudsen, Beatrice S.; Zheng, Jie; Feller, Stephan M.; Mayer, John P.; Burrell, Sarah K.; Cowburn, David; Hanafusa, Hidesaburo. "Affinity and specificity requirements for the first Src homology 3 domain of the Crk proteins" (1995) *EMBO J.* **14** 2191-8
- [72.](#) Wu, Xiaodong; Knudsen, Beatrice; Feller, Stephen M.; Zheng, Jie; Sali, Andrej; Cowburn, David; Hanafusa, Hidesaburo; Kuriyan, John. "Structural basis for the specific interaction of lysine-containing proline-rich peptides with the amino-terminal SH3 domain of c-Crk" (1995) *Structure* **3** 215-26
- [71.](#) Fushman, David; Cahill, Sean; Lemmon, Mark A.; Schlessinger, Joseph; Cowburn, David. "Solution structure of Pleckstrin homology domain of dynamin by heteronuclear NMR spectroscopy" (1995) *Proc. Natl. Acad. Sci. USA* **92** 816-20
- [70.](#) Mahmood, Umar; Alfieri, Alan A.; Thaler, Howard; Cowburn, David; Koutcher, Jason A. "Radiation dose-dependent changes in tumor metabolism measured by ^{31}P Nuclear Magnetic Resonance spectroscopy" (1994) *Cancer Res.* **54** 4885-91
- [69.](#) Sandros, Jens; Rozdzinski, Eva; Zheng, Jie; Cowburn, David; Tuomanen, Elaine. "Lectin domains in the toxin of *Bordetella pertussis*: selectin mimicry linked to microbial pathogenesis" (1994) *Glycoconjugate Journal* **11** 501-6

68. Shuai, Ke; Horvath, Curt M.; Huang, Linda H. Tsai; Quereshi, Sajjad A.; Cowburn, D.; Darnell, J. E. "Interferon activation of the transcription factor Stat91 involves dimerization through SH2-phosphotyrosyl peptide interactions" (1994) *Cell*, **76** 821-828
67. Gibbs, Andrew; Morris, Gareth A.; Swanson, Alistair, G.; Cowburn, D. "Suppression of t_1 -noise in 2D NMR Spectroscopy by Reference Deconvolution" (1993) *J. Magn. Res.* **A101** 351-6
66. Waksman, G.; Shoelson, S.E.; Pant, N.; Cowburn, D.; Kuriyan, J. "Binding of a high affinity phosphotyrosyl peptide to the *src* SH2 domain: crystal structures of the complexed and peptide-free forms" (1993) *Cell* **72** 779-787
65. Waksman, G.; Kominos, D.; Robertson, S.C.; Pant, N.; Baltimore, D.; Birge, R.B.; Cowburn, D.; Hanafusa, H.; Mayer, B.J.; Overduin, M.; Resh, M.D.; C.B.; Silverman, L.; Kuriyan, J. "Crystal structure of the phosphotyrosine recognition domain SH2 of v-src complexed with tyrosine-phosphorylated peptides" (1992) *Nature* **358** 654-663
64. Overduin, M.; Rios, C.B.; Mayer, B.M.; Baltimore, D.; Cowburn, D. "Three dimensional solution structure of the Src homology domain 2 domain of c-Abl" (1992) *Cell* **70** 697-704
63. Overduin, M.; Mayer, B.M.; Rios, C.B.; Baltimore, D.; Cowburn, D. "The secondary structure of the Abl SH2 domain from multinuclear NMR studies in solution" (1992) *Proc. Natl. Acad. Sci. USA* **89** 11673-11677
62. Koutcher, J.A.; Alfieri, M.L.; Delvitt, M.L.; Rhee, J.G.; Kornblith, A.B.; U. Mahmood; Merchant, T.E.; Cowburn, D. "Quantitative changes in tumor metabolism, partial pressure of oxygen, and radiobiological oxygenation status post radiation" (1992) *Cancer Res.* **52** 4620-4627
61. Barany, F.; Slatko, B.; Danzitz, M.; Cowburn, D.; Schildkraut, I.; Wilson, G. "The corrected nucleotide sequence of the *TaqI* restriction and modification enzymes reveal a large overlap" (1992) *Gene* **112** 91-5
60. Digennaro, F.; Cowburn, D. "Simulated annealing as an approach to time-frequency conversion in NMR" (1992) *J. Mag. Res.* **96** 582-8
59. Ashcroft, J.; Live, D.H.; Patel, D.; Cowburn, D. "Heteronuclear 2D ^{15}N and ^{13}C NMR studies of DNA oligomers and their netropsin complexes using indirect proton detection" (1991) *Biopolymers* **31** 45-55
58. Koutcher, J.A.; Sawyer, R.C.; Kornblith, A.B.; Stolfi, R.L.; Martin, D.S.; Devitt, M.L.; Cowburn, D.; Young, C.W. "In-vivo monitoring of changes in 5-fluorouracil metabolism induced by methotrexate measured by ^{19}F NMR spectroscopy" (1991) *Magnetic Resonance in Medicine* **19** 113-123
57. Glushka, J.; Barzû, O.; Sarfati, R. S.; Kansal, V.; Cowburn D. "The Binding of ATP and AMP to *E. coli* adenylate kinase investigated by ^1H and ^{15}N NMR Spectroscopy" (1990) *Biochem. Biophys. Res. Comm.* **172** 432-438
56. Henderson, G. B.; Glushka, J.; Cowburn, D.; Cerami, A. "Synthesis and NMR characterization of the trypanosomatid metabolite N^1, N^8 -bis (glutathionyl) spermidine disulfide (trypanothione disulphide)" (1990) *J. Chem. Soc. Perkin Trans. I* 911-914
55. Koutcher, J. A.; Alfieri, A. A.; Kornblith, A. B.; Devitt, M. L.; Cowburn, D.; Ballon, D.; Kim, J. H. "Changes in Radiation Sensitization induced by Fluosol-DA as Measured by ^{31}P NMR Spectroscopy" (1990) *Cancer Research* **50** 7252-7256

54. Koutcher, J. A.; Barnett, D.; Kornblith, A. B.; Cowburn, D.; Brady, T.J.; Gerweck, L. E. "Relationship of changes in pH and energy status to hypoxic cell fraction and hyperthermia sensitivity" (1990) *Int. J. Rad. Onc. Biol. Phys.* **18** 1429-35
53. Koutcher, J.A.; Alfieri, A. A.; Barenett, D.C.; Cowburn, D.; Kornblith, A.B.; Kim, J.H. "³¹P NMR Changes with Tumor Growth in Radioresistant and Radiosensitive Tumors" (1990) *Radiation Res.* **121** 312-319
- [52.](#) Morris, G.A.; Cowburn, D. (1989) "Suppression of Artifacts in Nuclear Overhauser Effect Difference Spectroscopy by Reference Deconvolution" *Magnetic Resonance in Chemistry* **27** 1085-1089
51. Glushka, J.; Barany, F.; Cowburn, D. "Observation of arginyl-deoxyoligonucleotide interactions in *TaqI* endonuclease by detection of specific ¹H NMR signals from a 140 kDa [N η 1, N η 2, ¹⁵N Arg]*TaqI*/Oligomer complexes" (1989) *Biochem. Biophys. Res. Comm.* **264** 88-93
- [50.](#) Glushka, J.; Lee, M.; Coffin, S.; Cowburn, D. "¹⁵N Chemical Shifts of Backbone Amides in Bovine Pancreatic Trypsin Inhibitor and Apamin" (1989) *J. Am. Chem. Soc.* **111** 7716-7722 and (1990) **112** 2843
- [49.](#) Ashcroft, J.; LaPlante, S.; Borer, P.N.; Cowburn, D. "Sequence Specific ¹³C NMR Assignment of non-protonated carbons in [d (TAGCGCTA)₂] using Proton Detection" (1989) *J. Am. Chem. Soc.* **111** 362-365
- [48.](#) Jain, D. C.; Sapse, A. M.; Cowburn, D. "Solvent effects on some imine-carboxyl complexes" (1988) *J. Phys. Chem.* **92** 6847-6849
- [47.](#) LaPlante, S. R.; Boudreau, E. A. ; Zanatta, N.; Levy, G. C.; Borer, P. N.; Ashcroft, J.; Cowburn, D. "¹³C NMR of the bases in three DNA oligonucleotide duplexes: Assignment Methods and Structural Features" (1988) *Biochemistry* **27** 7902-7909
46. LaPlante, S. R.; Ashcroft, J.; Cowburn, D.; Levy, G. C.; Borer, P. N. "¹³C NMR assignments of the protonated carbons of [d(TAGCGCTA)]₂ by two-dimensional proton detected heteronuclear correlation" (1988) *J. Biomol. Str. Dyn.* **5** 1089-1099
- [45.](#) Glushka, J.; Cowburn, D. "¹⁵N Chemical Shifts of the Backbone Amides in Bovine Pancreatic Trypsin Inhibitor" (1987) *J. Am. Chem. Soc.* **109** 7879-7881.
44. Live, D. H.; Cowburn, D.; Breslow, E. "The binding of Oxytocin and [8 Arginine] Vasopressin to Neurophysin studied by ¹⁵N NMR using Magnetization Transfer and Indirect Detection via Protons" (1987) *Biochemistry* **26** 6415-6422
- [43.](#) Schussheim, A. ; Cowburn, D. "Digital Signal Processing of Two-Dimensional NMR spectra using Linear Predictive Singular Value Decomposition" (1987) *J. Magn. Res.* **71** 379-383
- [42.](#) Ortiz-Polo, G.; Krishnamoorthi, R.; Markley, J. L.; Live, D. H.; Davis, D. G.; Cowburn, D. "Natural Abundance ¹⁵N NMR Spectroscopy Studies of Turkey Ovomucoid Third Domain: Assignment of Peptide ¹⁵N Resonances to the Residues at the Reactive Site Region via Proton-Detected Multiple Quantum Coherence" (1986) *J. Magn. Res.* **68** 303-310
- [41.](#) Sapse, A.M.; Fugler, L. M.; Cowburn, D. "An *Ab Initio* Study of Intermolecular Hydrogen Bonding Between Small Peptide Fragments" (1986) *Int. J. Quantum Chemistry* **29** 1241-1251

- [40.](#) Kubiak, T.; Cowburn, D. "Enzymatic semisynthesis of porcine despentapeptide (B26-30) insulin using unprotected desoctapeptide (B23-30) insulin as a substrate" (1986) *Int. J. Peptide and Protein Res.* **27** 514-521
39. Sacks, W.; Hammer, B.; Bigler, R. E.; Cowburn, D.; Sacks, S.; Fleischer, A.; Zazonico, P. B.; Badaleменти, A.; Hennessy, M. "The use of carbon-13 glucose and NMR to study cerebral metabolism *in vivo* in the rat and the rhesus monkey" (1986) *Neurol. Neurobiol.* **21** 283-302
- [38.](#) Kubiak, T.; Cowburn, D. "Trypsin catalyzed formation of porcine des [23-63] proinsulin from desoctapeptide [B23-30] insulin" (1986) *Biochemical Journal* **234** 665-670
- [37.](#) Live, D. H.; Kojiro, C. L.; Cowburn, D.; Markley, J.L. "Identification of proton NMR signals from the metal-ligands of Cadmium substituted plastocyanin via two-dimensional multi-quantum detection in the absence of explicitly resolved ^1H - ^{113}Cd coupling" (1985) *J. Am. Chem. Soc.* **107** 3043-3044
36. Sacks, W.; Cowburn, D.; Bigler, R. E.; Sacks, S.; Fleischer, A. "Evidence for the cerebral uptake *in vivo* from two pools of glucose and the role of glucose-6-phosphatase in removing excess substrate from brain" (1985) *Neurochemical Research* **10** 201-227
- [35.](#) Live, D.H.; Delgano, D.; Armitage, I.A.; Cowburn, D. " ^{113}Cd NMR spectra of Metallothionein observed via proton detected multiquantum spectroscopy" (1985) *J. Am. Chem. Soc.* **107** 441-443
- [34.](#) Davis, D. G.; Cowburn, D. "Suppression of solvent lines in ^{13}C NMR" (1984) *J. Magn. Res.* **62** 128-130
- [33.](#) Live, D. H.; Davis, D. G.; Agosta, W. C.; Cowburn, D. "Observation of thousand-fold enhancement for ^{15}N NMR via multiple quantum coherences: Studies of large peptides." (1984) *J. Am. Chem. Soc.* **106** 6104-6105
- [32.](#) Coffin, S.; Limm, M.; Cowburn D. "Correlation of ^{13}C and ^1H chemical shifts in bovine high density lipoprotein from two-dimensional NMR" (1984) *J. Magn. Res.* **59** 268-274
- [31.](#) Live, D. H.; Davis, D. G.; Agosta, W. C.; Cowburn, D. "Long range hydrogen bond mediated effects in peptides: ^{15}N NMR study of gramicidin S in water and organic solvents" (1984) *J. Am. Chem. Soc.* **106** 1939-1942.
- [30.](#) Engel, A. K.; Cowburn, D. "Approaches to the complete determination of the rotation axes and flexibility in the methylene segments of phospholipids: deuterium, ^{13}C and proton NMR studies of Dipalmitoyl Phosphatidyl Choline" (1983) *J. Biomolecular Structure and Dynamics* **1** 319-335
- [29.](#) Davis, D. G.; Agosta, W. C.; Cowburn, D. "Long-range proton-nitrogen spin coupling constants via polarization-enhanced two-dimensional ^{15}N NMR" (1983) *J. Am. Chem. Soc.* **105** 6189-6190
- [28.](#) Cowburn, D.; Live, D. H.; Fischman, A. J.; Agosta, W. C. "Side chain conformations of oxytocin and vasopressin studied by NMR observation of isotopic isomers" (1983) *J. Am. Chem. Soc.* **105** 7435-7442
27. Fotadar, U.; Cowburn, D. "Syntheses of 1- ^{13}C and 3- ^{13}C isotopic isomers of Aspartic and Glutamic acids" (1983) *J. Label. Compds. Radiopharm.* **20** 1003-1009
26. Davis, D. G.; Live, D. H.; Agosta, W. C.; Cowburn, D. "Spin Connectives to protons of ^{13}C and ^{15}N NMR spectra by selective suppression" (1983) *J. Magn. Res.* **53** 350-354

25. Live, D. H.; Davis, D. G.; Agosta, W. C.; Cowburn, D. "Conformations of side chains of somatostatin: Very high field proton NMR studies" (1982) *Org. Magn. Reson.* **19** 211-215
24. Lau, A. Y. L.; Cowburn, D. "Proton NMR studies of vesicles incorporating glycoporphin." (1981) *Biophysical Chemistry* **14** 267-276
- [23.](#) Engel, A. K.; Cowburn, D. "The origin of multiple quadrupole couplings in the deuterium NMR spectra of the 2-chain of 1,2-dipalmitoyl-*sn*-glycero-3-phosphorylcholine" (1981) *FEBS Letts.* **126** 169-171
22. Krauss, E.; Cowburn, D. "Hydrogen-deuterium exchange kinetics for the peptide amide protons of oxytocin studied by NMR" (1981) *Biochemistry* **20** 671-679
21. Krauss, E.; Cowburn, D. "Anomalous exchange kinetics of amide protons in peptides" (1981) *Int. J. Pept. Prot. Res.* **17** 42-47
20. Fischman, A. J.; Live, D. H.; Wyssbrod, H. R.; Agosta, W. C.; Cowburn, D. "Torsion angles in the cystine bridge of oxytocin in aqueous solution; measurements of circumjacent vicinal couplings between ^1H , ^{13}C and ^{15}N ." (1980) *J. Am. Chem. Soc.* **102** 2533-9
- [19.](#) Wittbold, W. M.; Fischman, A. J.; Ogle, C.; Cowburn, D. "Optimal filtering in Fourier transform NMR." (1980) *J. Magn. Reson.* **39** 127-35
18. Giulian, D.; Des Ruisseaux, H.; Cowburn, D. "Biosynthesis and intraaxonal transport of proteins during neuronal regeneration" (1980) *J. Biol. Chem.* **255** 6494-501
17. Giulian, D.; Des Ruisseaux, H.; Cowburn, D. "A study of the proteins from ganglion cells of the goldfish retina" (1980) *J. Biol. Chem.* **255** 6486-93
16. Live, D. H.; Wyssbrod, H. R.; Fischman, A. J.; Agosta, W. C.; Bradley, C.; Cowburn, D. "A study of the peptide hormone oxytocin and of prolylleucylglycinamide by ^{15}N NMR." (1979) *J. Am. Chem. Soc.* **101** 474-9
15. Fischman, A. J.; Rieman, M.; Cowburn, D. "Averaging of ϕ and ψ in [5-leucyl]-enkephalin: NMR studies of two isotopic isomers." (1978) *FEBS. Letts.* **94** 236-40
14. Fischman, A. J.; Wyssbrod, H. R.; Agosta, W. C.; Cowburn, D. "Heteronuclear vicinal coupling constants and site-specific isotopic substitution in the investigation of rotational isomerism in leucine." (1978) *J. Am. Chem. Soc.* **100** 54-8
13. Live, D. H.; Agosta, W. C.; Cowburn, D. "A rapid and efficient synthesis of oxytocin and [8-arginine] vasopressin." (1977) *J. Org. Chem.* **42** 3556-61
12. Wyssbrod, H. R.; Ballard, A.; Schwartz, I. L.; Walter, R.; Van Binst, G.; Gibbons, W. A.; Agosta, W. A.; Field, F. H.; Cowburn, D. "Side chain torsional angles and rotational isomerism of oxytocin in aqueous solution." (1977) *J. Am. Chem. Soc.* **99** 5273-6
11. Wouters, J. M.; Petersson, G. A.; Agosta, W. C.; Field, F. H.; Gibbons, W. A.; Wyssbrod, H. R.; Cowburn, D. "Reference line-shape adjusted difference NMR spectroscopy II. Experimental Verification." (1977) *J. Magn. Reson.* **28** 93-104.
10. Fischman, A. J.; Wyssbrod, H. R.; Agosta, W. C.; Gibbons, W. A.; Field, F. H.; Cowburn, D. "Rotational isomerism in leucine: Proton magnetic resonance study of [γ - ^2H] leucine and thermodynamic analysis." (1977) *J. Am. Chem. Soc.* **99** 1953-7.
- [9.](#) Karlin, A.; McNamee, M. G.; Cowburn, D. "Assay of the acetylcholine receptor by affinity labeling." (1976) *Anal. Biochem.* **76** 442.

8. Bowen, D.; Cowburn, D.; Renenkamp, M.; Sullivan, J. "Benzyl Alcohol: High levels found in plasma of uremic patients on dialysis." (1975) *Clin. Chim. Acta* **61** 399-401
 7. Stoner, E. C.; Cowburn, D.; Craig, L. C. "Examination of volatile metabolites in plasma." (1975) *Anal. Chem.* **47** 344-6
 - [6.](#) Karlin, A.; Cowburn, D. "The affinity labeling of partially purified acetylcholine receptor from electric tissue of *Electrophorus*." (1973) *Proc. Natl. Acad. Sci. US* **70** 3636-40
 5. Prives, J.; Reiter, M. J.; Cowburn, D.; Karlin, A. "Interaction of affinity labels and cobratoxin with the acetylcholine receptor in the electroplax." (1972) *Mol. Pharmacol.* **8** 786-9
 - [4.](#) Reiter, M. J.; Cowburn, D.; Prives, J.; Karlin, A. "Affinity labeling of the acetylcholine receptor in the electroplax: electrophoretic separation in sodium dodecyl sulfate" (1972) *Proc. Natl. Acad. Sci. US* **69** 1168-72
 - [3.](#) Cowburn, D.; Brew, K.; Gratzer, W. B. "The optical activity of the lysozyme- α -lactalbumin family of proteins." (1972) *Biochemistry* **11** 1228-34
 - [2.](#) Cowburn, D.; Bradbury, E.M.; Crane-Robinson, C.; Gratzer, W. B. "An optical and magnetic spectroscopic investigation of the conformation of bovine α -lactalbumin." (1970) *Eur. J. Biochem.* **14** 83-93
 - [1.](#) Gratzer, W. B.; Cowburn, D. "Optical activity of biopolymers." (1969) *Nature* **222** 426-31
-

Reviews, conference proceedings, invited articles:

- R44. Cowburn, D. Less silos and more thought. Essay. (2011) *Nature Structural and Molecular Biology*, **18**, 1314
- R43. Eryilmaz, Ertan; Liu, Dongsheng; Cowburn, David. (2012) Protein segmental labeling. *Encyclopedia of Biophysics, Springer Verlag, Berlin.*
- R42. Cowburn, D. (2007). Moving parts: how the adaptor protein CRK is regulated, and regulates. *Nat Struct Mol Biol.* **14**, 465-6.
- R41. Cowburn, D., Shekhtman, A., Xu, R., Ottesen, J. J., and Muir, T. (2005). "Segmental Isotopic Labeling for structural biological applications of NMR". In "Methods in Molecular Biology". pp. 1-29.
- R40. Ottesen, J. J., Blashke, U. K., Cowburn, D., and Muir, T. W. (2003). "Segmental Isotopic Labeling: Prospects for a New Tool to Study the Structure-Function Relationships in multi-domain proteins" in "Biological Magnetic Resonance", N. R. Krishna, and L. J. Berliner, eds.. New York: Kluwer Academic. pp. 35-51.
- R39. Fushman, D., and Cowburn, D. (2003). Characterization of inter-domain orientations in solution using the NMR relaxation approach. in "Biological Magnetic Resonance", N. R. Krishna, and L. J. Berliner, eds. (New York, Kluwer Academic), pp. 53-77.
- R38. Fushman, D., and Cowburn, D. (2001). Nuclear magnetic resonance relaxation in determination of residue-specific N-15 chemical shift tensors in proteins in solution: Protein dynamics, structure, and applications of transverse relaxation optimized spectroscopy. in "Nuclear Magnetic Resonance of Biological Macromolecules", Pt B, pp. 109-126.

- R37. Cowburn, D., and Muir, T. W. (2001). Segmental isotopic labeling using expressed protein ligation. in "Nuclear Magnetic Resonance of Biological Macromolecules", Pt B, pp. 41-54.
- R36. Lee, C. H., Cowburn, D., and Kuriyan, J. (1998). Peptide recognition mechanisms of eukaryotic signaling modules. *Methods in Molecular Biology*, 84, 3-31.
- R35. Fushman, David; Cowburn, David. "Studying Protein Dynamics with NMR Relaxation Structure, Motion, Interaction, and Expression of Biological Macromolecules. Vol. II, ISBN 940030-75-6 Eds. R. H. Sarma & M. H. Sarma, Adenine Press, 63-77.
- R34. Cowburn, David; Riddihough, Guy "A never ending frontier" (1997) *Nature Structural Biology*, 4, 761-2. (Editorial)
- R33. Cowburn, David "Peptide recognition by PTB and PDZ domains" (1997) *Current Op. Struct. Biol.* 7, 835-838.
- R32. Kuriyan, John; Cowburn, David. (1997) "Modular peptide recognition domains in eukaryotic signaling" *Ann. Rev. Biophys. Biomol. Struct.* 26, 257-86
- R31. Cowburn, David & Kuriyan, John. (1996) "SH2, SH3 and PH domains", in "Signal Transduction", Modular Texts in Molecular and Cell Biology, 1, Carl-Henril Heldin and Mary Purton, Eds., Chapman & Hall, London, pp. 127-142.
- R29. Cowburn, David (1996) "Adaptors and Integrators; the PTB domain expands both the PH-domain set, and peptide-protein recognition motifs; the PDZ domain shows an intriguing resemblance" *Structure* 4, 1005-1009.
- R28. Cowburn, David. (1996) "Much more than the sum of the parts: structures of the dual SH2 domains of ZAP-70 and Syp. [Mini review]" *Chemistry & Biology* 3, 79-82.
- R27. David Cowburn, "Src homology adaptor proteins: more than the sum of the parts" (1995) *Structure* 3, 429-430.
- R26. David Cowburn; Michael Overduin, (1994) "SH2 Domain Structure -- NMR as a mature tool in Structural Biology," *Encyclopedia of NMR*
- R25. David Cowburn, "Helical Encounter" (1994) *Nature Structural Biology*, 1, 489-491
- R24. Michael Overduin; Carlos B. Rios; Bruce J. Mayer; David Baltimore; David Cowburn, "Methods used in the assignment of the Abl SH2 domain" NATO ASI Series, "Structure of Biological Macromolecules by NMR," Springer Verlag, 1994
- R23. John Kuriyan, David Cowburn. "Structures of SH2 and SH3 domains", (1993) *Curr. Op. Stru. Biol.* 3, 828-838.
- R22. Michael Overduin, Carlos B. Rios; Bruce Mayer; David Baltimore; David Cowburn. "Three dimensional solution structure of the SRC homology 2 domain of c-Abl" (1993) *J. Cell. Biochem.* 17C, 281 (abstract number LZ347)
- R21. Cowburn, D.; DiGennaro, F.; Rios, C.; Glushka, J. "Parametric Estimation applied to 2 and 3-D NMR" in "Computational Aspects of the study of biological macromolecules by nuclear magnetic resonance spectroscopy" J. C. Hoch et al. Ed., Plenum Press, New York, 1991, 27-38
- R20. Cowburn, D.; Chaudhary, J. "LPT: Linear Predictive Single value Decomposition of Decaying Sinusoids for Spectral Analysis in NMR" Program QCPE 579 (1989) Quantum Chemistry Program Exchange 997

- R19. Cowburn, D. "Data Analysis Methods", *Frontiers of NMR in Molecular Biology*, UCLA Symposium (1989) *J. Cell. Biochem.* **13A** 13
- R18. Cowburn, D. Review of "Magnetic Resonance Imaging", Eds. D. D. Stark and W. G. Bradley, Jr. (1988) *New Engl. J. Med.* **319** 1487-1488
- R17. Cowburn, D. "Non-Invasive Tissue Studies Using Magnetic Resonance." (1988) *Clinical Chemistry* **34** 1147
- R16. Cowburn, D. Review of "Cardiac Imaging: New Technologies and Clinical Applications" and "Nuclear Cardiac Imaging: Principles and Applications." (1987) *New Engl. J. Med.* **316** 1033
- R15. Cowburn, D. "Bio-organic Applications of Heteronuclear Multiquanta Proton-Detected Spectroscopy" (1986) *Ann. New York Acad. Sci.* **471** 304
- R14. Cowburn, D. Review of "NMR in Biology" by D. Gadian, Oxford U. P. (1983) *J. Magn. Res.* **50** 547
- R13. Cowburn, D.; Live, D. H.; Fischman, A. J.; Agosta, W. C. "Dynamic Structure of Peptides studied by multinuclear NMR" (1982) in "Intramolecular Dynamics" J. Jortner and B. Pullman, Eds., Reidel Publ., Boston, pp. 473-480
- R12. Cowburn, D. Review of "Nuclear Magnetic Resonance Imaging in Medicine." (1982) *New Engl. J. Med.* **306** 940
- R11. Cowburn, D. Review of "Applications of Fourier-Transform IR to molecular and biological systems." (1982) *J. Am. Chem. Soc.* **104** 369-370
- R10. Cowburn, D.; Live, D. H.; Agosta, W. C. "Dynamic conformations of peptide hormones: NMR studies of isotopic isomers containing deuterium, carbon-13, and nitrogen-15." Proc. Second SUNYA Conversation in the Discipline of Biomolecular Stereodynamics, Albany, NY, 1981.
- R9. Cowburn, D.; Live, D. H.; Fischman, A. J.; Wyssbrod, H. R.; Agosta, W. C. "Dynamic conformations of oxytocin and AVP, investigated by ^1H NMR couplings to ^{13}C , ^{15}N , and ^1H ." (1980) in *Peptides: Proc. Sixth Amer. Peptide Symp.* Gross, E.; Meienhofer, J. Eds., Pierce, 225-8
- R8. Cowburn, D. Review of "Intermolecular interactions and biomolecular organization" by Hopfinger, A. J. (1977) *BioScience* **27** 818
- R7. Fischman, A. J.; Cowburn, D.; Live, D.; Agosta, W. C.; Wyssbrod, H. R. "Determination of Peptide Conformations." (1977) in *NMR in Biology* Dwek, R. A. et al. Eds. Academic, London. 351-2
- R6. Cowburn, D.; Fischman, A. J.; Live, D. H.; Agosta, W. C.; Wyssbrod, H. R. "An approach to the unequivocal determination of peptide conformations." (1977) in *Peptides: Proc. Fifth Amer. Peptide Symp.* Goodman, M.; Meienhofer J. Eds. Halsted, New York. 323-4
- R5. Craig, L. C.; Cowburn, D.; Bleich, H. "Methods for the study of the conformation of small peptide hormones and antibiotics in solution." (1975) *Ann. Rev. Biochem.* **44** 477-90
- R4. Cowburn, D.; Fischman, A. "Applications and methods of biospecific affinity chromatography." (1975) *Chemistry and Biology of Peptides.* Ed. J. Meienhofer and R. Walter. (Ann Arbor Scientific)

R3. Karlin, A; Cowburn, D. "Molecular properties of membrane-bound and of solubilised and purified acetylcholine receptor identified by affinity labeling." (1974) *Neurochemistry of cholinergic receptors*. Ed. E. De Robertis and R. Schacht. Raven Press, New York.

R2. Karlin, A.; Cowburn, D.; Reiter, M. J. "Molecular properties of the acetylcholine receptor." (1973) *Drug receptors* Ed. H. P. Rang, MacMillan, London, 193-209

R1. Cowburn D. "Equilibrium and kinetic studies of the conformation of proteins." (1970) Ph.D. Thesis University of London.

Numerous other anonymous publications as editorial correspondent of journals and as contributor to computer program libraries.

Theses

1978 Alan J. Fischman. "The solution conformation of oxytocin." Ph. D.

1978 Dana Giulian, M.D. "Biochemical events within the visual system of the goldfish during neural regeneration." Ph. D.

1980 Alan K. Engel. "NMR studies of isotopic isomers of Dipalmitoyl Phosphatidyl Choline." Ph. D.

1993 Michael Overduin. "Solution structure of c-Abl SH2" Ph .D.

Reviewing, Consulting, Adjunct Positions

I have been a reviewer for, consultant to, or have held adjunct, board, or editorial positions with the following agencies or journals:

National Institutes of Health; National Science Foundation; U.S. Department of Defense; U.S. Dept. of Energy; European Commission; Canadian Foundation for Innovation; BBSRC-UK; U.S.-Israel Bi-national Science Foundation; Oak Ridge National Laboratory; New York State Health Department; State of Missouri; American Heart Association; American Cancer Society; Wellcome Foundation; Petroleum Research Fund; Memorial Sloan-Kettering Cancer Center; New York Hospital/ Cornell University Medical College; New York University; Columbia University; Australian National University; City University of New York; Mount Sinai School of Medicine; University of Southern California; Eastern Analytical Symposium; NMR Concepts; General Electric; Kodak; Lederle Laboratories; Technovon Corp.; Intermagnetics General Co.; Merck & Co.; Coferon Llc; Oxford University Press; Bioorganic Chemistry; Biochemistry; Biopolymers; Biophysical Journal; Canadian Journal of Chemistry; Cell; Chemical Sciences; Concepts in Magnetic Resonance; EMBO Journal; Faculty of 1000 Journal; Inorganic Chemistry; International Journal of Peptide and Protein Research; Journal of Biomolecular Stereodynamics; Journal of Chemical Information; Journal of The American Chemical Society; Journal of Biological Chemistry; Journal of Computational Chemistry; Journal of Experimental Medicine; Journal of Magnetic Resonance; Journal of Molecular Biology; Journal of Proteomics and Computational Biology; Magnetic Resonance in Medicine; The Medical Letter; Molecular and Biochemical Parasitology; Nature; New England Journal of Medicine; Open Cell Signaling Journal; PLOS Computational Biology; Proceedings of the National Academy of Science; Science; Steroids; Structure.

Funded Grants Since 2000:

- 1992-10 National Institutes of Health, "Structural Biology of Tyrosyl Kinases"
 - 2000- National Institutes of Health, "Segmental labeling for protein NMR" (PI Tom Muir)
 - 2000-03 DOD Breast Cancer, "Designed Mimics of BH3 motifs"
 - 2000-04 National Institutes of Health, "Myosin Binding Proteins" (PI Don Fischman)
 - 2001-09 New York State Office of Science, Technology and Academic Research, "Strategically Targeted Academic Research Center"
 - 2002 National Institutes of Health, "Research Facilities Construction"
 - 2002-08 National Institutes of Health, "900 MHz NMR Spectrometer for Structural Biology"
 - 2002-08 Department of the Army, "900 MHz NMR Spectrometer for Structural Biology"
 - 2005-09 National Institutes of Health "Novel Receptors for vitamin A in the cytoplasm" (PI Ulrich Hammerling)
 - 2008-13 National Institutes of Health, "Dynamic character of kinase domains" (PI Ranajeet Ghose)
 - 2009-11 National Institutes of Health, "Rational design of HIV capsid inhibitors" (PI Asim Debnath)
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Society Memberships.

The American Society of Biochemistry and Molecular Biology; The American Chemical Society; American Association for the Advancement of Science; The Harvey Society; New York Academy of Science (Fellow); Royal Society of Chemistry (Fellow).

Selected Past and Future Lectures

- 2014** Brown University, Chemistry Dept.
- 2013** Princeton University, NMR in Chemistry Symposium (Sept.)
Gordon Conference, Computational Methods in NMR/Structural Biology (June)
- 2012** Chianti Conference, June
- 2011** Einstein / Montefiore Center for AIDS Research, 2 Dec
Dept. of Biology, Brookhaven National Laboratory, Nov.
Steenbock Symposium, U. Wisconsin, Madison, June 27-28
Albany Conversation / Stereodynamics June 14-18
Ohio State U., Mathematics and Biology Institute, "How NMR could benefit from new applied math" February
- 2010** D.E. Shaw Research -Dynamic structures in protein – protein interactions. Dec
University of Frankfurt - Macromolecular Complexes November
U. Kansas – Symposium on protein interaction modeling
ICMRBS- Cairns – Protein-Protein interactions, structure and Dynamics
ISMAR-Euromar - NMR approaches to protein-protein interactions
- 2009** University of South Florida – Structural Biology using NMR
Albert Einstein College of Medicine – Dynamic structures ...
- 2008** Duke University – Biochemistry Seminar
New York University (Chemistry)
Academy of American Medical Colleges –The New York Structural Biology Center
U Colorado Cancer Center – Structural Biology in Cancer Drug Design
Mid-Atlantic American Chemical Society
- 2007** U. Maryland – Symposium in Modern Applications of NMR
U. Kansas – Symposium on protein interaction modeling
- 2006** XXII ICMRBS – Gottingen – Protein Interfaces
Cleveland Center for Structural Biology – Frontiers of NMR Spectroscopy
NHLBI, NIH – Forty years of NMR in Biological Systems
- 2005** Rockefeller U - NMR determination of protein structure, Biochem. Course
IBM Almaden - The future of Structural Biology
XXI ICMRBS, Hyderabad, India - Reduced proton density interface mapping

- 2004** Bionet Conference on Enabling Technologies, Durham, UK - Using NMR to study protein domain interactions
Tokyo Metropolitan University - New methods of isotope labeling
Yokohama U. - NMR studies of Csk
ANZMAG 04 - What NMR can do in studying domain motions?

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