Curriculum vitae

Andrew Philip Carter

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CAREER AND EDUCATION:

2015 – present:	MRC Program Leader, MRC LMB, Cambridge UK. Structural studies on the dynein transport complex.
2010 – 2015:	MRC Program Leader Track, MRC LMB, Cambridge UK. Structural and single molecule studies on cytoplasmic dynein.
2003 – 2010:	Post-doctoral research with Prof Ron Vale, UCSF, San Francisco, USA. The structure and mechanism of cytoplasmic dynein.
1999 – 2003:	MRC PhD Studentship with Dr Venki Ramakrishnan, MRC LMB, Cambridge, UK. X-ray crystallographic studies of the bacterial small ribosomal subunit.
1994 – 1999:	First Class Honours Degree in Biochemistry ($M_{Biochem}$), The Queen's College, University of Oxford, UK.

HONOURS AND AWARDS:

Apr 2018	Wellcome Investigator Award
May 2016	EMBO Membership
Dec 2012	Wellcome Trust New Investigator Award
Nov 2012	EMBO Young Investigator Program
Oct 2010	Elected Fellow of Clare College, Cambridge
Jul 2006	The Leukemia & Lymphoma Society Special Fellow Award
Jul 2003	Agouron Institute / Jane Coffin Childs Memorial Fund Fellowship
Oct 2002	Max Perutz PhD Student Prize (MRC Lab of Molecular Biology)
Oct 2001	Clare College, Cambridge: Junior Research Fellowship
Jun 1999	University of Oxford, Department of Biochemistry: Project Prize

PROFESSIONAL ACTIVITIES:

Funding agency and advisory boards

2017	HCERES evaluation committee for IGBMC (Strasbourg)
2016 – present	Wellcome Trust Multi-user Equipment Committee Member

Journal editorial boards

2017 – present	Life Science Alliance – Advisory Editorial Board Member
2017 – present	Board of Reviewing Editor for eLife

Other activities

2020	Organizer: Company of Biologists Workshop
2019 – present	External Mentor for IMP new group leader (David Haselbach)
2019	Initiated LMB cryo-electron tomography discussion group
2018	Teaching: Brno RNA course (cryoEM)
2018 – present	LMB Structural Studies Committee Member
2017 – present	British Society for Cell Biology (BSCB) Membership Secretary
2017	Organizer: EMBO YIP Structural Biology Sectoral Meeting
2016 – present	Teaching: EMBO YIP PhD Program
2016	Organizer: Mighty Motors outreach event (Big Biology Day)
2016	Review panel for NMR provision at MRC LMB
2015	Organizer: 2017 Spring Meeting for the BSCB
2015 – present	British Society for Cell Biology (BSCB) Committee Member
2015 – present	MRC LMB Seminar Committee Member
2015	Organizer: Motor protein outreach event (Diamond Open Day)
2015 – present	Organizer: UK Microtubule Meeting, Edinburgh
2012 – 2017	Estates Committee Member, Clare College, Cambridge,
2010 – present	Biology Admissions Coordinator, Clare College, Cambridge
2010 – present	Director of Studies, Clare College, Cambridge

MENTORING:

Postdocs:

2019 – present	Sami Chaaban
2019 – present	Alex Fellows
2018 – present	Ferdos Abid Ali
2017 – 2019	Grigory Sharov (CryoEM facility manager, MRC LMB)
2016 – present	Girish Mali
2015 – present	Clinton Lau
2015 – 2016	Edgar Morales (PI – CINVESTAV, Mexico)
2014 – 2018	Kai Zhang (PI- Yale University, USA)
2013 – 2015	Carina Motz (Lab Manager, TU Munich, Germany)
2011 – 2015	Max Schlager (Application specialist, Roche, Germany)
2010 – 2017	Helgo Schmidt (PI – IGBMC, France)

PhD Students:

2019 – present	Camilla Ventura Santos
2018 – present	Chris van Hoorn (Gates Cambridge Fellowship)
2016 – present	Helen Foster
2015 – present	Sam Lacey
2013 – 2017:	Linas Urnavicus (Postdoc, Rockefeller University, USA)
2012 – 2016:	Ruta Zalyte (ThermoFisher, Lithuania)
2011 – 2015:	Aristides Diamant (Medical School, St Louis, USA)
2010 – 2014:	Emma Gleave (Astra Zeneca, UK)

LIST OF PUBLICATIONS:

1) Toropova K, Zalyte R, Mukhopadhyay AG, Mladenov M, Carter AP, Roberts AJ‡ (2019) Structure of the dynein-2 complex and its assembly with intraflagellar transport trains. *Nat Struct Mol Biol.* doi: 10.1038/s41594-019-0286-y

2) Lacey SE, He S, Scheres SHW, Carter AP‡ (2019) Cryo-EM of dynein microtubule-binding domains shows how an axonemal dynein distorts the microtubule. *Elife.* **8**:e47145.

3) Can S*, Lacey SE*, Gur M, Carter AP, Yildiz A‡ (2019) Directionality of dynein is controlled by the angle and length of its stalk. *Nature*. **566**:407-410

4) Reck-Peterson SL‡, Redwine WB, Vale RD, Carter AP‡ (2018) The cytoplasmic dynein transport machinery and its many cargoes. *Nat Rev Mol Cell Biol.* **19**: 382-398

5) Urnavicius L*, Lau CK*, Elshenawy MM, Morales-Rios E, Motz C, Yildiz A, Carter AP‡ (2018) Cryo-EM shows how dynactin recruits two dyneins for faster movement. *Nature.* **554**: 202-206

6) Nieuwburg R, Nashchekin D, Jakobs M, Carter AP, Khuc Trong P, Goldstein RE, St Johnston D‡ (2017) Localised dynactin protects growing microtubules to deliver oskar mRNA to the posterior cortex of the Drosophila oocyte. *Elife.* **6**:e27237

7) Zhang K*, Foster HE*, Rondelet A, Lacey SE, Bahi-Buisson N, Bird AW, Carter AP‡ (2017) Cryo-EM Reveals How Human Cytoplasmic Dynein Is Auto-inhibited and Activated. *Cell.* **169**: 1303-1314

8) Steinman JB, Santarossa CC, Miller RM, Yu LS, Serpinskaya AS, Furukawa H, Morimoto S, Tanaka Y, Nishitani M, Asano M, Zalyte R, Ondrus AE, Johnson AG, Ye F, Nachury MV, Fukase Y, Aso K, Foley MA, Gelfand VI, Chen JK, Carter AP, Kapoor TM‡ (2017) Chemical structure-guided design of dynapyrazoles, cell-permeable dynein inhibitors with a unique mode of action. *Elife*. **6**: e25174

9) Hoang HT, Schlager MA, Carter AP, Bullock SL‡ (2017) DYNC1H1 mutations associated with neurological diseases compromise processivity of dynein-dynactin-cargo adaptor complexes. *Proc Natl Acad Sci U S A.* **114**: E1597-E1606

10) Belyy V, Schlager MA, Foster H, Reimer AE, Carter AP, Yildiz A‡ (2016) The mammalian dynein-dynactin complex is a strong opponent to kinesin in a tug-of-war competition. *Nat Cell Biol.* **18**: 1018-24

11) Schmidt H, Carter AP‡ (2016) Review: Structure and mechanism of the dynein motor ATPase. *Biopolymers.* **105**: 557-67

12) Carter AP‡, Diamant AG, Urnavicius L (2016) How dynein and dynactin transport cargos: a structural perspective. *Curr Opin Struct Biol.* **37**: 62-70

13) See SK, Hoogendoorn S, Chung AH, Ye F, Steinman JB, Sakata-Kato T, Miller RM, Cupido T, Zalyte R, Carter AP, Nachury MV, Kapoor TM, Chen JK‡ (2016)

Cytoplasmic Dynein Antagonists with Improved Potency and Isoform Selectivity. *ACS Chem Biol.* **11**: 53-60

14) Urnavicius L*, Zhang K*, Diamant AG*, Motz C, Schlager MA, Yu M, Patel NA, Robinson CV, Carter AP‡ (2015) The structure of the dynactin complex and its interaction with dynein. *Science.* **347**: 1441-6

15) Schmidt H*, Zalyte R*, Urnavicius L, Carter AP‡ (2015) Structure of human cytoplasmic dynein-2 primed for its power stroke. *Nature.* **518**: 435-438

16) Schlager MA*, Hoang HT*, Urnavicius L, Bullock SL‡, Carter AP‡ (2014) In vitro reconstitution of a highly processive recombinant human dynein complex. *EMBO J.* **33**: 1855-68

17) Gleave ES, Schmidt H, Carter AP‡ (2014) A structural analysis of the AAA+ domains in Saccharomyces cerevisiae cytoplasmic dynein. *J Struct Biol.* **186**: 367-75

18) Carter AP‡ (2013) Crystal clear insights into how the dynein motor moves. *J Cell Sci.* **126**: 705-13

19) Schmidt H, Gleave ES, Carter AP‡ (2012) Insights into dynein motor domain function from a 3.3-Å crystal structure. *Nat Struct Mol Biol.* **19**: 492-7

20) Carter AP‡*, Cho C*, Jin L, Vale RD‡ (2011) Crystal structure of the dynein motor domain. *Science.* **331:** 1159-65

21) Carter AP‡, Vale RD (2010) Communication between the AAA+ ring and microtubule-binding domain of dynein. *Biochem Cell Biol.* **88**: 15-21

22) Houdusse A‡, Carter AP‡ (2009) Dynein swings into action. *Cell.* **136**: 395-6

23) Carter AP*, Garbarino JE*, Wilson-Kubalek EM, Shipley WE, Cho C, Milligan RA, Vale RD‡, Gibbons IR (2008) Structure and functional role of dynein's microtubule-binding domain. *Science.* **322**: 1691-5

24) Gennerich A, Carter AP, Reck-Peterson SL, Vale RD‡ (2007) Force-induced bidirectional stepping of cytoplasmic dynein. *Cell.* **131**: 952-65

25) Reck-Peterson SL, Yildiz A*, Carter AP*, Gennerich A, Zhang N, Vale RD‡ (2006) Single-molecule analysis of dynein processivity and stepping behavior. *Cell.* **126**: 335-48

26) Gibbons IR‡, Garbarino JE, Tan CE, Reck-Peterson SL, Vale RD and Carter AP (2005) The affinity of the dynein microtubule-binding domain is modulated by the conformation of its coiled-coil stalk. *J Biol Chem.* **280**: 23960-23965.

27) Brodersen DE, Clemons WM, Jr., Carter AP, Wimberly BT and Ramakrishnan V‡ (2003) Phasing the 30S ribosomal subunit structure. *Acta Crystallogr D Biol Crystallogr.* **59**: 2044-50

28) Ogle JM, Carter AP and Ramakrishnan V‡ (2003) Insights into the decoding mechanism from recent ribosome structures. *Trends Biochem Sci.* **28**: 259-66

29) Brodersen DE, Clemons WM, Jr., Carter AP, Wimberly BT and Ramakrishnan V‡ (2002) Crystal structure of the 30 S ribosomal subunit from Thermus thermophilus: structure of the proteins and their interactions with 16 S RNA. *J Mol Biol.* **316**: 725-68

30) Ouwens DM, de Ruiter ND, van der Zon GC, Carter AP, Schouten J, van der Burgt C, Kooistra K, Bos JL, Maassen JA and van Dam H‡ (2002) Growth factors can activate ATF2 via a two-step mechanism: phosphorylation of Thr71 through the Ras-MEK-ERK pathway and of Thr69 through RalGDS-Src-p38. *EMBO J.* **21**: 3782-93

31) Brodersen DE, Carter AP, Clemons WM, Jr., Morgan-Warren RJ, Murphy FV, Ogle JM, Tarry MJ, Wimberly BT and Ramakrishnan V‡ (2001) Atomic structures of the 30S subunit and its complexes with ligands and antibiotics. *Cold Spring Harb Symp Quant Biol.* **66**: 17-32

32) Carter AP, Clemons WM, Jr., Brodersen DE, Morgan-Warren RJ, Hartsch T, Wimberly BT and Ramakrishnan V‡ (2001) Crystal structure of an initiation factor bound to the 30S ribosomal subunit. *Science.* **291**: 498-501

33) Clemons WM, Jr., Brodersen DE, McCutcheon JP, May JL, Carter AP, Morgan-Warren RJ, Wimberly BT and Ramakrishnan V‡ (2001). Crystal structure of the 30 S ribosomal subunit from Thermus thermophilus: purification, crystallization and structure determination. *J Mol Biol.* **310**: 827-43

34) Ogle JM, Brodersen DE, Clemons WM, Jr., Tarry MJ, Carter AP and Ramakrishnan V‡ (2001) Recognition of cognate transfer RNA by the 30S ribosomal subunit. *Science.* **292**: 897-902

35) Brodersen DE, Clemons WM, Jr., Carter AP, Morgan-Warren RJ, Wimberly BT and Ramakrishnan V‡ (2000) The structural basis for the action of the antibiotics tetracycline, pactamycin, and hygromycin B on the 30S ribosomal subunit. *Cell.* **103**: 1143-54

36) Carter AP*, Clemons WM*, Brodersen DE*, Morgan-Warren RJ*, Wimberly BT* and Ramakrishnan V‡ (2000) Functional insights from the structure of the 30S ribosomal subunit and its interactions with antibiotics. *Nature.* **407**: 340-8

37) Wimberly BT*, Brodersen DE*, Clemons WM, Jr.*, Morgan-Warren RJ*, Carter AP*, Vonrhein C, Hartsch T and Ramakrishnan V‡ (2000) Structure of the 30S ribosomal subunit. *Nature.* **407**: 327-39

38) Guo Y, Wang Z, Carter A, Kaiser K and Dow JA‡ (1996) Characterisation of vha26, the Drosophila gene for a 26 kDa E-subunit of the vacuolar ATPase. *Biochim Biophys Acta.* **1283**: 4-9

* These authors made equal contributions ‡ Corresponding authors