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CURRENT ADDRESS

Institute of Molecular Biophysics
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National High Magnetic Field Laboratory
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Florida State University
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CITIZENSHIP

Australian citizen
Born: Canberra, Australia 16th December 1980

EDUCATION:

The University of Sydney, Sydney 1999-2007

- (i) Doctor of Philosophy, 2003 – 2007, submitted March 2007, awarded July 2007, graduated December 2007. Discipline of Pathology, Faculty of Medicine.
Thesis title: “Structural and functional studies of the N-terminus of cardiac Myosin Binding Protein - C”. Supervisors: Assoc. Prof. Brett Hambly (Discipline of Pathology) and Dr. Louise Brown (Department of Chemistry and Biomolecular Sciences, Macquarie University).
- (ii) Bachelor of Medical Science, Honours class I, 2002, graduated June 2003
Department of Pathology, Faculty of Medicine.
Thesis title “Structural and Function Studies of a Mutation in Motif V of Myosin Binding Protein-C”. Supervisors: Dr. Brett Hambly (Dept of Pathology) and Dr. Louise Brown (School of Physics, UNSW)
- (iii) Bachelor of Medical Science, 1999 – 2001.
(Academic transcripts attached) (WAM: Distinction average)

EMPLOYMENT

2006 – present Postdoctoral Fellow, Institute of Molecular Biophysics, Florida State University, Florida, USA. Supervisor: Prof. Piotr Fajer

PRIZES AND AWARDS

2006 Student Presentation Prize, “Best Student Oral Presentation”.
Australian Society for Biophysics.

- 2004 Thomas and Ethel Mary Ewing Fellowship, Faculty of Medicine, University of Sydney.
- 2003-2006 Australian Postgraduate Award (APA) Scholarship.
- 2003 Student travel award, Australian Society for Biophysics.
- 2003/4, 2006 Postgraduate Research Support Scheme (PRSS), Department of Pathology, University of Sydney.
- 2002-2003 Summer Research Scholarship, Department of Pathology, University of Sydney

MEMBERSHIP OF PROFESSIONAL SOCIETIES

American Biophysical Society since 2003

American Heart Association (AHA) 2005 - 2007

Australian Society of Biochemistry and Molecular Biology (ASBMB) 2002 - 2006

Australian Society for Biophysics (ASB) since 2002

PUBLICATIONS

See separate section

PAPERS PRESENTED

See separate section

RESEARCH INTERESTS

Biochemistry, Biophysics and Disease in general and

Muscle Biophysics:

Actin-myosin interaction

Myosin binding protein C

Protein defects in Familial Hypertrophic Cardiomyopathy

Techniques:

Protein chemistry (including recombinant protein expression, chromatography (IEX, metal affinity, size exclusion), gel electrophoresis (SDS-PAGE, native-PAGE, urea-PAGE, DNA-agarose), ultra-filtration)

Molecular Biology (including PCR, cloning, mutagenesis)

Spectroscopic techniques (including Circular Dichroism Spectroscopy, Mass spectrometry, Surface Plasmon Resonance, Electron Paramagnetic Resonance, Fluorescence and Analytical Ultra-Centrifugation)

Molecular Modelling

TRACK RECORD and FUTURE DIRECTIONS

I completed an Honours I Medical Science degree at the University of Sydney in 2002. In 2007 I completed a PhD research degree in the Faculty of Medicine, during which I published two first author papers (in journals with impact factors > 3.4) and a book chapter. I am currently undertaking a postdoctoral fellowship at the Institute of Molecular Biophysics in Tallahassee Florida, where I am using a number of biophysical techniques to study muscle structure and disease. This work aims to investigate a poorly understood but highly important cardiac protein; myosin binding protein-C. I am using several traditional biophysical techniques, including FRET and CD, as well as the relatively novel technique of pulsed EPR (electron paramagnetic resonance) with site directed labelling.

I have presented work from my undergraduate, post-graduate and post-doctoral research at domestic and international conferences, winning a student presentation award at the Australian Biophysical Society meeting in 2006. During my PhD I was sponsored to travel to the US to carry out experiments at the National High Magnetic Field Laboratory in Tallahassee, Florida, which is where I met my current supervisor, Prof. Fajer.

I am now seeking a position in which I can use the skills I have learned in my current post-doctoral fellowship and acquire new techniques and methodologies for my future career.

My ultimate aim is to develop an independent research career at the interface between the physical, biological and medical sciences. My research training spans these diverse areas, with an undergraduate degree in medical science, a PhD project which involved biochemistry, molecular biology and medicine and a post-doctoral position which expanded my biophysical and spectroscopic repertoire.

TEACHING EXPERIENCE

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| 2008 | Guest lecture on Respiration to undergraduate biology students at Florida State University. |
| 2007 | Supervision of undergraduate students, Ms. Giannina Luisi and Ms. Sylvia Megyerdi, Directed Independent Studies, Spring and Summer (for Giannina) and Fall (for Sylvia) 2007, Florida State University. |
| 2006 | Supervision of Honours Year student: Ms. Joo-Mee Hwang (Honours Class I, Discipline of Pathology, University of Sydney). |
| 2003-2006 | Graduate Medical Program (GMP) tutor, Faculty of Medicine, University of Sydney. Blocks include Foundation Studies (Block 1), Drug and Alcohol / Musculoskeletal Sciences (Block 2), Cardiovascular Sciences (Block 5) and Endocrine, Nutrition, Gastroenterology (Block 7). |

2002-2006 Cell Pathology Demonstrator, Faculty of Science, University of Sydney.
2002-2003 Private tutoring for Higher School Certificate Maths and Science students

UNIVERSITY SERVICES

2004 Member of the Department of Pathology Seminar organising committee
2005 Member of the Institute for Biomedical Research Young Investigators organising committee

RESEARCH EXPERIENCE

Post-doctoral research: Institute of Molecular Biophysics, Florida State University, September 2006 – present (principal investigator: Dr Piotr Fajer)

- **Current Research Aims:** In my current post-doctoral position, I am working on identifying the molecular interface between Myosin Binding Protein C and F-actin. I am using a number of biophysical techniques including electron paramagnetic resonance (EPR), fluorescence spectroscopy (FRET in particular) and analytical ultracentrifugation (AUC). I am also using surface plasmon resonance (SPR/Biacore) and co-sedimentation to investigate the binding and circular dichroic (CD) spectroscopy to assess changes in conformation due to modifying the investigated protein with extrinsic probes.
- **Protein Chemistry** involved in this project includes recombinant protein expression and purification by chromatography. As well as purification of proteins from muscle tissue. Other techniques used include electrophoresis and labelling of protein with extrinsic probes (both spin and fluorescent labels).
- **Spectroscopy techniques** utilized for this project are EPR (both CW and DEER), FRET, AUC and SPR. I perform all the experiments myself, but with supervision for the DEER measurements.

Doctoral research: Department of Pathology, University of Sydney, 2003-2006 (research advisors: Dr Brett Hambly, Dr Louise Brown)

- **Cloning and expression** of a portion of Myosin Binding Protein C (MyBPC) – IgI domains C1 – C2: PCR using a human heart library and/or full length MyBPC cDNA template yielded C1 – C2 DNA that was inserted into a storage vector (blunt ended) and a pET expression vector (sticky ends). The C1 – C2 protein was then expressed, purified using both ion exchange and sizing chromatography and analysed using gel electrophoresis. Several (about 25) mutants were created using site directed mutagenesis.

- **Functional and Spectroscopic studies** of both wild type and mutant MyBPC, including circular dichroic (CD) spectroscopy, binding studies using co-sedimentation and native gel electrophoresis and phosphorylation studies using urea-PAGE gels and MALDI-TOF mass spectrometry. (*Paper in submission and presented at American Biophysics, 2007/08*). Preliminary labelling experiments were also undertaken.
- **Molecular modelling** of MyBPC: Sequence alignments of different isoforms of MyBPC from a number of species were built using computer programs (including CLUSTAL X). From these alignments (and under the guidance of Paul Curmi, UNSW) computer models of the domains of MyBPC were developed. The alignments and the models enabled a detailed study of sequence conservation and divergence, especially with respect to the position of known FHC point mutations. (*Paper in Cell Research and presented at American Biophysics, 2004*).

Undergraduate Honours Research: Department of Pathology, University of Sydney
2002 research advisors: Dr Brett Hambly, Dr Louise Brown)

- **Functional and spectroscopic** studies of an FHC mutation of Myosin Binding Protein C. I expressed in a bacterial expression system a fragment of MyBPC (Motif 5) that has mutations known to cause the cardiac disease Familial Hypertrophic Cardiomyopathy (FHC). I investigated the structural and functional properties of this mutant protein. Circular Dichroism Spectroscopy was used to investigate the structural integrity and stability of the mutant protein in comparison to their native structure. (*Presented at American Biophysics, 2003*). Binding assays were also carried out to attempt to identify interactions between Motif 5 and other proteins of the heart. (*Presented at Australian Society for Biophysics, 2002*).

REFEREED PAPERS

1. Myosin Binding Protein – C: enigmatic regulator of cardiac contraction. C.E. Oakley, J. Chamoun, L.J. Brown and B.D. Hambly. 2007. *International Journal of Biochemistry and Cell Biology*. **39**: 2161 – 2166.
2. Myosin binding protein C: structural abnormalities in familial hypertrophic cardiomyopathy. C.E. Oakley, B.D. Hambly, P.M.G. Curmi and L.J. Brown. 2004. *Cell Research*. **14(2)**: 95-110.

PAPERS IN SUBMISSION

1. Mutations in N-terminal Cardiac Myosin Binding Protein – C Alter Structure, F-actin Binding and Phosphorylation. C.E. Oakley, A.V.G. Edwards, J. Hwang, S.J. Cordwell, P.G. Fajer, L.J. Brown and B.D. Hambly.

BOOK CHAPTERS

1. B.D Hambly, C.E. Oakley and P.G. Fajer. 2008. Chapter 13: Protein comparative sequence analysis and computer modeling. pp 245 – 256 In: *Clinical Bioinformatics* (Methods in Molecular Biology Series, Vol. 141). New Jersey, USA: Humana Press. Edited by R. J. A. Trent.

PAPERS PRESENTED

1. Phosphorylation of Myosin Binding Protein-C altered in Hypertrophic Cardiomyopathy. C. E. Oakley, J. Hwang, L. J. Brown, P.G. Fajer and B. D. Hambly. 2008. *Biophysical Journal*. **94(1)**: 1441.
2. Interaction of the Phosphorylation Domain of Cardiac Myosin Binding Protein-C with Myosin and Actin. J. Hwang, C. Oakley, L. Brown, M. Kekic and B. Hambly. 2008. *Biophysical Journal*. **94(1)**: 1438.
3. Hypertrophic cardiomyopathy causing mutations in myosin binding protein – C alter PKA phosphorylation. C. Oakley, J. Hwang, L. Brown, M. Kekic, P. Fajer and B. Hambly. Presented at the annual meeting of the Australian Society for Biophysics. December 2007, Newcastle, N.S.W.
4. F-actin binding to the N-terminal region of Cardiac Myosin Binding Protein – C. Cecily Oakley, Joo-Mee Hwang, Louise Brown, Murat Kekic, Piotr Fajer, Brett D. Hambly. 2007. *Biophysical Journal*. **92**: 489a.

5. Studies of the N-terminal region of cardiac myosin binding protein – C. C. Oakley, J. Hwang, L. Brown, M. Kekic, P. Fajer and B. Hambly. Presented at the annual meeting of the Australian Society for Biophysics. December 2006, Sydney, N.S.W.
6. Structure and function of the N-terminal region of cardiac myosin binding protein – C. C. Oakley, L. Brown, M. Kekic, P. Fajer and B. Hambly. 2006. *Biophysical Journal*. **90**: January.
7. Circular dichroic spectra of the N-terminal region of cardiac myosin binding protein – C. C.E. Oakley, L.J. Brown and B.D. Hambly. Presented at the annual meeting of the Australian Society for Biophysics. September 2005, Canberra, A.C.T.
8. Structural analysis of myosin binding protein – C. C. Oakley, L. Brown, B. Hambly and P. Curmi. 2004. *Biophysical Journal*. **86(1)**: 211a.
9. Structural effects of hypertrophic cardiomyopathy mutations on sarcomeric proteins. C. Oakley, L. Singh, L. Brown and B. Hambly. 2003. *Biophysical Journal*. **84(2)**: 452a.
10. Myosin Binding Protein-C Structural defect resulting from a point mutation in familial hypertrophic cardiomyopathy. C. Oakley, L. Brown and B. Hambly (2002). Presented at the annual meeting of the Australian Society for Biophysics. November 2002, Melbourne, VIC.

ACADEMIC RECORD

Bachelor of Medical Science (BMedSc) with Honors – University of Sydney

<i>1999</i>	<i>Grade</i>	<i>Mark</i>
Concepts in Biology	CR	72
Human Biology	CR	73
Chemistry I Life Sciences A Advanced	HD	85
Chemistry I Life Sciences B Mol (Adv)	CR	71
Physics IA (Advanced)	P	60
Physics I (Environmental & Life Science)	CR	69
Discrete Mathematics	CR	68
Statistics	CR	70
Differential Calculus	CR	66
Linear Algebra	CR	69

<i>2000</i>	<i>Grade</i>	<i>Mark</i>
Pharmacology Drugs and People	D	83
Pharmacology Fundamentals	D	84
Human Life Sciences A	D	80
Human Life Sciences B	HD	86
Genes and Proteins Theory	D	78
Molecules, Metabolism and Cells Theory	D	77
Molecular and General Genetics	D	79

<i>2001</i>	<i>Grade</i>	<i>Mark</i>
Microbiology and Immunology	D	83
Immunology	CR	73
Pathological Basis of Human Disease	HD	85
Cell Pathology A	D	80
Human Life Sciences (Cell & Molecular)	HD	91

<i>2002</i>	<i>Grade</i>	<i>Mark</i>
Cell Pathology Honours	H1	90
(10 month research project, no course work, grade is based on thesis and final presentation)		

Explanation of Grading System

<i>Grade</i>		<i>Mark (out of 100)</i>	<i>Grade</i>		<i>Mark (out of 100)</i>
HD	High Distinction	85-100	<i>(For Honors year)</i>		
D	Distinction	75-84	H1	Honors Class I	80+
CR	Credit	65-74	H2	Honors Class II	70-79
P	Pass	50-64	H3	Honors Class III	65-69
F	Fail	Below 50	F	Fail	Below 65