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**Place of Birth:** Burton-On-Trent, Staffordshire, UK

### Education

2004 PhD University of London  
2004 DIC Imperial College, London  
1998 BSc(Hons) University of Manchester Institute of Science and Technology

### Postdoctoral Training

July 2004- August 2006 Post-doc Biomedical Engineering (Dr D. Boas) MIT/HST Martinos Center for biomedical engineering / Harvard Medical School  
August 2006- present Post-doc Biophysics (Prof B Hyman) MassGeneral Institute for Neurodegenerative Disorders / Harvard Medical School

### Professional Societies

2004-2006 Society for Neuroscience  
2005-2006 SPIE

### Editorial Activities

- Ad hoc Reviewer
  - Microscopy Research and Technique
  - Optical Engineering
  - Applied Optics

### Honors and Prizes

1994-1998 Local Education award scholarship  
1996-1997 Erasmus study and travel grant  
1998 Special achievement award / UMIST Highest score in final exams  
1998-2001 Research fellowship / Engineering physical science research fellowship  
1999-2001 Industrial fellowship / Council for Advancement and Support of Education Research

# Report of Funded and Unfunded Projects

## Funding Information

- Past projects

2004-2006 Co-Investigator 5 P50 NS010828-33 David Boas, Brad Hyman, Michael Moskowitz

The use of multimodal optical imaging to monitor changes in blood volume, flow and metabolism in the ischemic brain in mice and develop end point metrics for the evaluation of drug therapies using this platform. My role included the designing and building of the equipment, the writing of software to run the equipment, the taking, analysis and interpretation of data.

2005-2007 Co-Investigator 5 P50 NS010828-33 Brad Hyman, Brian Bacskai

The development of a high content screening tool for molecular interactions in a high throughput cell based platform. My role involved the development of a novel data processing and analysis strategy and the modification of existing equipment.

2006-2007 Co-Investigator 5 R01 AI068871-02A1 Roy Soberman

The nuclear membrane organization of leukotriene synthesis. My role involved the development of a novel analysis method for time-domain microscopy data allowing for the separation of complex overlapping populations of interacting molecules

- Current projects

2006-ongoing Co-Investigator 5 P50 NS010828-33 Brad Hyman

The measurement of protein-protein interactions and protein conformation *in situ*. This project has led to the development of a novel means of detecting and quantifying protein dynamics on a sub-molecular scale length. My role was in the development of a measurement strategy, a novel analysis method and the supervision of projects concerning protein dynamics of key Alzheimer disease related proteins in human and mouse histological tissue.

2008-2010 Co-Investigator 5 R01 AI068871-02A1 Roy Soberman

The detection and quantification of interaction of proteins in the inflammatory pathway in human lung tissue. My role involves the partial supervision and technical assistance of a post-doc.

## Current unfunded projects

2008-2011 Supervisor / Co-Investigator Brian Bacskai

The application of principle component analysis and single value deconvolution to spectral lifetime microscopy. The major aim is to develop a consistent and accurate method for separating the decay profiles of exogenous and endogenous fluorophores for using in detection of molecular interactions and protein conformation.

2008-ongoing Co-Investigator Pam McClean

Monitoring the missfolding and aggregation of  $\alpha$ -synuclein *in vivo*, as a model of Parkinson's disease. The major aim of this section of a larger research effort is to apply fluorescence correlation spectroscopy to determine the distributions of aggregate sizes for  $\alpha$ -synuclein-GFP fusion protein that has been incubated in living cells. My role is in the co-ordination of the research effort between Cornell and MGH, as well as the design and building of an FCS microscope at MGH.

## Report of Local Teaching and Training

### Laboratory and Other Research Supervisory and Training Responsibilities

2004-present	Informal teaching and guidance in Math, data analysis, and microscopy techniques to technicians and post-docs	as needed, approx 2 hours a week
2008-2001	Partial supervision of a PhD candidate	3 hours a week

### Local Invited Presentations

2008	Investigating protein dynamics under physiologically relevant conditions using FLIM and FCS.	Institute seminar
MassGeneral Institute for Neurodegenerative Disorders		None

## Report of Regional, National and International Invited Teaching and Presentations

### Regional, National and International Invited Presentations and Courses

Regional		
2005	Multimodal optical imaging for measurement of changes in cortical metabolic rate of oxygen consumption in rodents	Invited talk
Boston University department of Physics		None
International		
1999	Experimental investigations into Magnetohydrodynamic instabilities on the Compass-D tokamak	Inter-institute seminar
MIT Plasma Science and fusion Center		None
2007	Analysis of FLIM-FRET for biomedical applications	Workshop
1 <sup>st</sup> Boston Workshop on Advanced TCSPC Techniques		None
2008	Investigating protein dynamics under physiologically relevant conditions	Workshop
2 <sup>nd</sup> Boston Workshop on Advanced TCSPC Techniques		None

## Report of Technological and Other Scientific Innovations

- Combined Multi-spectral and speckle imaging device for the measurement of blood flow and volume in small animal imaging, including software to control the instrument and analyze the data.
  - This development provided a framework that allows physiologists in the lab of Michael Moskowitz to monitor perfusion, blood flow and metabolism in the brains of mice which have an artificially induced ischemic trauma. The equipment and software together form a platform for the testing of neurovascular models of stroke and drug effectiveness in an intact living brain. I constructed a modified version of the instrument in the lab of David Boas for the study of neurovascular coupling.
- High throughput, high content cell based assay for monitoring protein-protein interactions and protein conformation.
  - While working in the Hyman Lab with an existing piece of equipment that was intended to be used for FLIM assays in 96-well plates, I modified the equipment and rewrote the analysis code to provide far more accurate and information rich data. This novel analysis paradigm allows the

detection and quantification of protein dynamics in a high-throughput platform, thereby reducing the amount of time required for such studies from several weeks to a matter of minutes.

- A suite of programs for the analysis of FLIM-FRET data under difficult conditions.
  - Between 2006-2009 I have written a suite of data analysis programs for the pre-processing, analysis and post processing of Fluorescence lifetime microscopy data. These programs together allow the analysis of data that was previously impenetrable; including data with multiple overlapping temporal spectra, samples with weak signal due to difficult staining conditions and samples with high autofluorescent background signals.

## Report of Scholarship

### Publications

#### Peer Reviewed Publications in print or other media

1. Studies of ETB evolution and stability on COMPASS-D tokamak AR Field, PG Carolan, NJ Conway, SJ Fielding, P Helander, PB Jones, HF Meyer, O Pogutse. J Plasma Fusion Res Ser, 4,pp 234-8. (2001)
2. [Synergy of multiviewing spectroscopic diagnostics on COMPASS-D](#) PG Carolan, NJ Conway, AR Field, PB Jones, H Meyer. Review of Scientific Instruments, 72, Issue 1, Part 11, January 2001. p.881-887
3. [Download Citation](#)[Inboard gas puffing and behaviour of H-mode edge parameters in COMPASS-D](#) M Valovic, PG Carolan, AR Field, SJ Fielding, PB Jones, B Lloyd, H Meyer, M Price, V Shevchenko, K Stammers, MJ Walsh, S You, COMPASS-D and ECRH Teams. Plasma Phys Control Fusion 44 A175-A181 (2002)
4. [Vasoconstrictive neurovascular coupling during](#) H K Shin, A K Dunn, P B Jones, D A Boas, M A Moskowitz C Ayata, J Cereb Blood Flow Metab, 26, 8, p1018-1030 (2006) [Download Citation](#)
5. [A time domain fluorescent plate reader for cell based protein-protein interaction and protein conformation assays](#) Jones P. B., Herl L., Berezovska O., Kumar A. N., Bacskai B. J. and Hyman B. T., Journal of Biomedical Optics, 11, (5), pp-054024, (2006) [Download Citation](#)
6. [Interaction between Presenilin 1 and Ubiquilin 1 as detected by fluorescence lifetime imaging microscopy and a high throughput fluorescent plate reader](#) Thomas AV, Herl L, Spoelgen R, Hiltunen M, Jones PB, Tanzi RE. Hyman BT and Berezovska O. J. Biol. Chem., 2006: p. M601085200 [Download Citation](#)
7. [Ubiquilin 1 Modulates Amyloid Precursor Protein Trafficking and Abeta Secretion](#) Hiltunen M., Lu A., Thomas A. V., Romano D. M., Kim M., Jones P. B., Xie Z., Kounnas M. Z., Wagner S. L., Berezovska O., Hyman B. T., Tesco G., Bertram L. and Tanzi R. E., Journal of Biological Chemistry, 281, (43), p32240-32253, (2006) [Download Citation](#)
8. [Impaired Spine Stability Underlies Plaque-Related Spine Loss in an Alzheimer's Disease Mouse Model](#) Spire-Jones TL, Meyer-Luehmann M, Osetek JD, Jones PB, Stern EA, Bacskai BJ, Hyman BT., Am J Pathol., 171(4): p. 1304-1311. (2007) [Download Citation](#)
9. [A multicompartment vascular model for inferring baseline and functional changes in cerebral oxygen metabolism and arterial dilation](#) Huppert, T. J., Allen, M. S., Benav, H., Jones, P. B. and Boas, D. A. J Cereb Blood Flow Metab, 27,6,p1262-1269. (2007) [Download Citation](#)
10. [Normobaric hyperoxia improves cerebral blood flow and oxygenation, and inhibits peri-infarct depolarizations in experimental focal ischaemia](#) Shin HK, Dunn AK, Jones PB, Boas DA, Lo EH, Moskowitz MA, Ayata C, Brain, 130, 1631-1642(2007) [Download Citation](#)
11. [Age-dependent cerebrovascular dysfunction in a transgenic mouse model of cerebral amyloid angiopathy](#) Shin H. K., Jones P. B., Garcia-Alloza, M., Borrelli, L., Greenberg S. M., Bacskai B. J.,

Frosch M. P., Hyman B. T., Moskowitz M. A., and Ayata, C. Brain, 130, (Pt 9), 2310-9(2007) [Download Citation](#)

12. [Mild Induced Hypertension Improves Blood Flow and Oxygen Metabolism in Transient Focal Cerebral Ischemia](#) Shin HK, Nishimura M, Jones PB, Ay H, Boas DA, Moskowitz MA, Ayata C, Stroke, Epub ahead of print, Mar 13(2008) [Download Citation](#)

13. [Simultaneous multispectral reflectance imaging and laser speckle flowmetry of cerebral blood flow and oxygen metabolism in focal cerebral ischemia.](#) Jones PB, Kyoung Shin , David Boas, Bradley Hyman , Michael Moskowitz , Cenk Ayata , Andrew Dunn. Journal of Biomedical Optics. 13(4) (2008). [Download Citation](#)

14. [Two post-processing techniques for the elimination of background autofluorescence for FLIM](#) Jones PB, Rozkalne A, Meyer-Luehmann M, Spires-Jones TL, Makarova A, Kumar AN, Berezovska O, Bacskai BJ, Hyman BT. Journal of Biomedical Optics. 13(1), pp-014008 (2008) [Download Citation](#)  
This article was featured in the [December 8th 2006 \(Vol 3 No 47\) issue of Cell based assay news.](#)

15. [In vivo imaging reveals dissociation between caspase activation and acute neuronal death in tangle-bearing neurons](#) Spires-Jones TL, de Calignon A, Matsui T, Zehr C, Pitstick R, Wu H, Osetek JD, Jones PB, Bacskai BJ, Feany MB, Carlson GA, Ashe KH, Lewis J, Hyman BT. J. Neurosci, 28(4): 862-867. (2008) [Download Citation](#)

16. [The nuclear membrane organization of leukotriene synthesis.](#) Mandal AK, Jones PB, Bair AM, Christmas P, Miller D, Yamin TT, Wisniewski D, Menke J, Evans JF, Hyman BT, Bacskai B, Chen M, Lee DM, Nikolich B, Soberman RJ. Proc Natl Acad Sci U S A. 2008 Dec 23;105(51):20434-9. Epub 2008 Dec 15. [Download Citation](#)

17. Mutations in amyloid precursor protein affect its interactions with presenilin/g-secretase, Lauren Herl, Anne V. Thomas, Christina Lill, Mary Banks, Amy Deng, Phill B. Jones, Robert Spoelgen, Bradley T. Hyman, and Oksana Berezovska. Molecular and Cellular Neuroscience (in Press)

### **Non-peer reviewed scientific or medical publications/materials in print or other media**

#### **Book Chapters**

1. [Biomedical applications of FRET-FLIM, Chapter 9, FRET & FLIM Techniques](#), part of Laboratory Techniques in Biochemistry and Molecular Biology series. ISBN-13: 978-0-08-054958-3 Elsevir, Amsterdam, The Netherlands, (2008)

#### **Conference proceedings**

1. [H-mode edge investigations in the COMPASS-D Tokamak](#) PG Carolan, H Meyer, NJ Conway, AR Field, SJ Fielding, B Lloyd, PB Jones, MJ Walsh. FC 4730, June 2001. 28th EPS Madeira

2. [ELM control in COMPASS-D](#) SJ Fielding, RJ Buttery, AR Field, PB Jones, H Meyer, M Valovic, HR Wilson, COMPASS-D and ECRH Teams. FC 4725, June 2001. EPS Madeira

3. [Investigation of the influence of edge parameters on L-H mode transitions on COMPASS-D](#) H Meyer, PG Carolan, NJ Conway, AR Field, SJ Fielding, P Helander, PB Jones. 27th European Physical Society Conference on Controlled Fusion and Plasma Physics Conference Proceedings, FC EPS 2000, 225

4. [Multimodal optical imaging of mouse Ischemic cortex.](#) Jones PB, Shin HK, Dunn AK, Hyman BT, Boas DA, Moskowitz MA, Ayata C. (2005) In: Optical Methods in Drug Discovery and Development (Analoui M, Dunn DA, eds): SPIE, p 60090X [Download Citation](#)

#### **Thesis**

Jones PB, [An experimental investigation into tokamak edge magnetohydrodynamic behaviour](#), University of London (2003)

## **Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings:**

Measuring ApolipoproteinE and Tau tertiary structure using FLIM in tissue slices with significant autofluorescence. Jones PB, Rozkalne A, Spires-Jones TL, Berezovska O, Bacskai BJ, Hyman BT. Annual meeting of the Society for Neuroscience, San Diego, 890.2, (2007)

## **Narrative Report**

Having begun my scientific career as a Plasma physicist, I moved to the vibrant and fascinating field of biophysics after my PhD. It is my research goal to apply the rigor and quantitative skills that were an integral part of my physics training to the problem of protein dynamics and intrinsically disordered proteins in disease processes.

In the Martinos center for Biomedical imaging, under joint mentorship of Drs Boas, Moskowitz and Hyman. I designed and built a combined multispectral and speckle imaging instrument for measuring changes in hemodynamic parameters and oxygen metabolism due to function activation and stroke in rodent model. During this work, I made several novel observations about hemodynamic events during focal cerebral ischemia. Most notably, I observed spontaneous cortical spreading depressions that acted as intrinsic functional activation, allowing for observations of the neurovascular unit. I also measured oxygen metabolism upon reperfusion, which does not return to baseline levels under normal circumstances, however, the topical application of a neuroprotective agent (MK-801) rescued this deficit. This aspect of the work provides a functional readout of stroke mitigation strategies.

In the laboratory of Dr Hyman, I have created several novel protocols, strategies and analytical tools for the analysis of time domain spectroscopy and microscopy data. This work has allowed me to publish the first successful application of a time domain plate reader to quantify protein interaction and conformation in cells. My methods have also allowed me to measure *in situ* changes in protein conformation in human and animal histological brain slices. This type of measurement has been previously thought to be highly limited. I have characterized the isoform specific differences in Apolipoprotein E conformation in senile plaque bound protein, thereby answering one of the longest running controversies in the Alzheimer field. I have gone on to apply the technique to changes in time dependant tau protein conformation in neurofibrillary tangles using a transgenic mouse model that overexpress tau. The new work will help describe the pathway by which this intrinsically disordered protein, that is vital for cellular function, becomes a major pathological hallmark in Alzheimer disease and other tauopathies.

Most recently, I am applying the technique of Fluorescent Correlation Spectroscopy (FCS) to the question of protein aggregation. I am presently looking at the aggregation pathway of  $\alpha$ -synuclein, which aggregates and forms Lewy bodies, the major pathological hallmark of Parkinson's disease.

In the future, I plan to combine the techniques of FLIM and FCS and to broaden the scope of my work in terms of techniques and biological problems, while still maintaining a high level of scientific integrity and rigor, in a concerted effort to better understand the role of intrinsically disordered proteins and protein dynamics in human disease processes.