

# Brian D. Holt

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## EDUCATION

- Carnegie Mellon University:** Pittsburgh, PA Sep 2009 – Present  
Doctor of Philosophy in Biomedical Engineering  
- Partially supported by (1) **National Defense Science and Engineering Graduate (NDSEG) Fellowship**  
(2) **Bertucci Graduate Fellowship**  
Advisors: Prof. Kris Noel Dahl  
Prof. Mohammad F. Islam  
Ph.D. Thesis: Single Wall Carbon Nanotubes: Characterization of Cellular Interactions and Applications in Drug Delivery  
Anticipated Graduation: May 2014
- Case Western Reserve University:** Cleveland, Ohio Sep 2005 – Aug 2009  
Bachelor of Science in Biomedical Engineering – May 2009 – Magna Cum Laude  
Specialization: Tissue Engineering

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## PUBLICATIONS

- [6] **Holt, Brian D.**; Shams, Hengameh; Horst, Travis; Basu, Saurav; Rape, Andrew; Wang, Yuli; Rohde, Gustavo; Mofrad, Mohammad; Islam, Mohammad F.; Dahl, Kris Noel. (2012). Altered cell mechanics from the inside: dispersed single wall carbon nanotubes integrate with and restructure actin. *Journal of Functional Biomaterials*, 3(2): 398-417.
- [5] **Holt, Brian D.**; Dahl, Kris Noel; Islam, Mohammad F. (2012). Cells Take up and Recover from Protein-Stabilized Single-Wall Carbon Nanotubes with Two Distinct Rates. *ACS Nano*, 6(4): 3481-3490.
- [4] Yaron, Peter N.; **Holt, Brian D.**; Short, Philip A.; Lösche, Mathias; Islam, Mohammad F.; Dahl, Kris Noel. (2011). Single wall carbon nanotubes enter cells by endocytosis and not membrane penetration. *Journal of Nanobiotechnology*, 9: 45.

- [3] **Holt, Brian D.**; Dahl, Kris Noel; Islam, Mohammad F. (2011). Quantification of Uptake and Localization of Bovine Serum Albumin Stabilized Single Wall Carbon Nanotubes into Different Human Cell Types. *Small*, 7(16): 2348–2355.
- [2] **Holt, Brian D.**; Short, Philip A.; Rape, Andrew; Wang, Yu-li; Islam, Mohammad; and Dahl, Kris. (2010). Carbon nanotubes reorganize actin structures in cells and *ex vivo*, *ACS Nano*, 4(8): 4872–4878.
- [1] **Holt, Brian D.** and Sen Gupta, Anirban. (2012). Streptokinase Loading in Liposomes for Vascular Targeted Nanomedicine Applications: Encapsulation Efficiency and Effects of Processing, *J. Biomater. Appl.*, 26: 509-527.
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## PODIUM PRESENTATIONS

- [8] **Holt, Brian D.**; McCorry, Mary C.; Boyer, Patrick D.; Dahl, Kris N.; Islam, Mohammad F. “Characterizing Protein Single Wall Carbon Nanotubes Dispersions and Rates of Cellular Uptake and Recovery”  
*American Institute of Chemical Engineers*, 2012 Annual Meeting, Pittsburgh, PA, USA, Oct. 30, 2012
- [7] **Holt, Brian D.**; Boyer, Patrick D.; Dahl, Kris N.; Islam, Mohammad F. “Engineering Single Wall Carbon Nanotubes for Sub-Cellular Delivery”  
*American Institute of Chemical Engineers*, 2012 Annual Meeting, Pittsburgh, PA, USA, Oct. 30, 2012
- [6] Boyer, Patrick D.; **Holt, Brian D.**; Islam, Mohammad F.; Dahl, Kris N. “Increasing Single Wall Carbon Nanotube Delivery to Macrophages by Independent Modifications of the Material and Cellular Activity”  
*American Institute of Chemical Engineers*, 2012 Annual Meeting, Pittsburgh, PA, USA, Oct. 30, 2012
- [5] **Holt, Brian D.**; Yaron, Peter N.; Short, Philip, A.; Lösche, Mathias; Islam, Mohammad F.; Dahl, Kris N. “Single Wall Carbon Nanotubes Enter Cells: Uptake, Sub-cellular Localization and Targeting”  
*Biomedical Engineering Society*, 2011 Annual Meeting, Hartford, CT, USA, Oct. 14, 2011
- [4] Yaron, Peter N.; **Holt, Brian D.**; Short, Philip, A.; Lösche, Mathias; Islam, Mohammad F.; Dahl, Kris N. “Single Wall Carbon Nanotubes Enter Cells by Endocytosis and Not Membrane Penetration”  
*AIChE (American Institute of Chemical Engineers)*, 2011 Annual Meeting, Minneapolis, MN, USA, Oct. 18, 2011.

- [3] **Holt, Brian**; Short, Philip; Dahl, Kris; and Islam, Mohammad  
“Purified Single Wall Carbon Nanotubes Reorganize the Actin Cytoskeleton”  
*Biomedical Engineering Society*, 2010 Annual Meeting, Austin, TX, USA, Oct. 8, 2010
- [2] **Holt, Brian**; Short, Philip; Dahl, Kris; and Islam, Mohammad  
“Purified Single Wall Carbon Nanotubes Alter Actin Structures and Cell Function”  
*World Congress on Biomechanics*, Singapore, Aug. 4, 2010
- [1] Tashman, Scott; Anderst, William; **Holt, Brian**; Kolowich, Patricia.  
“Altered Tibio-Femoral Joint Contact Patterns During Running After ACL  
Reconstruction”  
*Orthopaedic Research Society*, 55<sup>th</sup> Annual Meeting, Las Vegas, USA, Feb. 23, 2009.  
One-page abstract: *Transactions of Orthopaedic Research Society*, **34**: Paper No. 230.
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## POSTER PRESENTATIONS

- [2] Yaron, Peter N.; **Holt, Brian**; Short, Phillip A.; Lösche, Mathias; Islam, Mohammad F.;  
Dahl, Kris N.  
“Phase association and binding energetics of SWCNTs into phospholipid Langmuir  
monolayers”  
*Biophysical Society*, 55th Annual Meeting, Baltimore, MD, USA, Mar. 7, 2011.
- [1] **Holt, B.**; Short, P.; Rape, A.; Islam, M.; Wang, Y.; and Dahl K.N.  
“Alteration of Actin Structures with Single Wall Carbon Nanotubes”  
*The American Society for Cell Biology*, 50<sup>th</sup> Annual Meeting, Philadelphia, PA, USA,  
Dec. 13, 2010.
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## GRADUATE FELLOWSHIPS

- National Defense Science and Engineering Graduate (NDSEG) Fellowship
- Bertucci Graduate Fellowship

## UNDERGRADUATE SCHOLARSHIPS

- Case Western Reserve University President’s Scholarship
  - Case Alumni Association Jr./Sr. Scholarship
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## ACADEMIC HONORS AND AWARDS

- National Science Foundation Graduate Research Fellowship Program – Honorable Mention

- Case Western Reserve University Department of Biomedical Engineering Research and Academic Achievement Award
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## PROFESSIONAL SOCIETIES

- Biomedical Engineering Society
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## AFFILIATIONS

- NSF IGERT (Educating and the Interface: Nanomaterial Environmental Impacts and Policy) – Affiliate Trainee
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## HONOR SOCIETIES

- Alpha Eta Mu Beta – Biomedical Engineering Honor Society
  - Tau Beta Pi – The Engineering Honor Society
  - Golden Key International Honour Society
  - Who's Who Among Students in American Universities and Colleges
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## RESEARCH EXPERIENCE

### Graduate Researcher:

Carnegie Mellon University (Pittsburgh, PA) Sep 09 – Present

Department of Biomedical Engineering

Ph.D. Candidate

Sep 10 – Present

Advisors: Prof. Kris Noel Dahl

Prof. Mohammad F. Islam

Ph.D. Thesis: Single Wall Carbon Nanotubes: Characterization of Cellular Interactions and Applications in Drug Delivery

- Materials Techniques
  - Dispersing single wall carbon nanotubes (SWCNTs)
  - UV-Vis-NIR spectroscopy
  - Raman spectroscopy and imaging
- Biological Techniques
  - Mammalian cell culture
  - Bacterial transformation
  - Transient transfection
- Microscopy Techniques
  - Single- and multi-photon fluorescence confocal

- Fluorescence lifetime imaging (FLIM)
- Widefield fluorescence, brightfield, phase contrast, differential interference

Undergraduate Researcher:

Case Western Reserve University (Cleveland, OH)

Jan 07 – May 09

Department of Biomedical Engineering

Advisor: Prof. Anirban Sen Gupta

Research Areas:

- Developing and testing targeted “stealth” liposomes
- Peptide synthesis and purification by HPLC
- Quantifying streptokinase encapsulation within liposomes
- Modeling theoretical encapsulation volume/efficiency
- Tested blood/material interactions under shear using Rotating Disk System and fluorescence microscopy

Summer Intern:

Pittsburgh Tissue Engineering Initiative

Jun 08 – Aug 08

University of Pittsburgh (Pittsburgh, PA)

Advisor: Prof. Scott Tashman

Research Areas:

- Developed a MATLAB program to compile and process databases of joint kinematics data
- 3D-rendering of results using VRML (virtual reality modeling language)
- Statistical analysis using SPSS
- Full podium presentation of results – Orthopaedic Research Society 55th Annual Meeting: “Altered Tibio-Femoral Joint Contact Patterns During Running After ACL Reconstruction”

Summer Research Fellow:

University of Pittsburgh (Pittsburgh, PA)

May 07 – Aug 07

School of Medicine, Department of Pharmacology

Advisors: Prof. Billy Day

Prof. Jack Yallowich

Research Areas:

- Operated triple quadrupole tandem mass spectrometer
- Separated metabolites using HPLC coupled to tandem MS
- Developed a novel LC-MS/MS method to quantify etoposide and its metabolites from cell lysates
- Understood etoposide’s potential to cause treatment-related myeloid leukemias

## TEACHING EXPERIENCE

Graduate Teaching Assistant

Jan 11 – May 11

Carnegie Mellon University (Pittsburgh, PA)  
Department of Biomedical Engineering  
Class: Biomedical Engineering Design Project (42-402)  
Profs: Conrad M. Zapanta and James F. Antaki

Graduate Teaching Assistant

Aug 10 – Dec 10

Carnegie Mellon University (Pittsburgh, PA)  
Department of Biomedical Engineering  
Class: Foundations of Biomedical Engineering Design (42-401)  
Profs: Conrad M. Zapanta and James F. Antaki

Graduate Teaching Assistant

Jan 10 – May 10

Carnegie Mellon University (Pittsburgh, PA)  
Department of Biomedical Engineering  
Class: Introduction to Biomedical Engineering (42-101)  
Profs: Gustavo K. Rohde and Gabriela Mustata

Undergraduate Teaching Lab

Feb 08 – Apr 09

Case Western Reserve University (Cleveland, OH)  
Department of Biomedical Engineering  
Class: BME Laboratory I & II (EBME 318, 319)  
Laboratory Techniques Taught:

- FTIR-ATR (Fourier Transform Infrared Spectroscopy – Attenuated Total Reflectance)
- Contact Angle Goniometry
- UV-Vis Spectroscopy
- Rotating Disk System
- Immunofluorescence Microscopy and Imaging

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## STUDENTS MENTORED

Mary Clare McCorry – Summer REU undergraduate

Worcester Polytechnic Institute

May 11 – Aug 11

Travis Horst – Undergraduate, Biomedical and Chemical Engineering

Dec 10 – May 12

Katherine Elfer – Summer REU undergraduate, Louisiana Tech University

May 10 – Aug 10

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## OUTREACH

Reviewed coursework and active learning tutors for Open Learning Initiative (OLI) Anatomy and Physiology course – Carnegie Mellon University – May 2011