Updated: August 10, 2021

TIMOTHY FEENEY

Chapel Hill, North Carolina, United States

thefeeney.netlify.com @TFeend tpfeeney@gmail.com feeney@unc.edu tfeeney@bmj.com

BRIEF PERSONAL STATEMENT

I am currently a PhD student in the Epidemiology department of University of North Carolina, Chapel Hill. I have an MD with clinical training in general surgery and surgical critical care, a masters in clinical biochemistry, and an MPH with focus on epidemiology and biostatistics. My clinical interests are Acute Care/Trauma surgery, Surgical Oncology and Critical Care. My research interests are clinical epidemiology and the application of advanced epidemiological methods to observational studies to better understand bias an make causal inferences. Currently my focus is on the use of the use of doubly robust methods.

My interests outside of science and math involve my family (wife and daughters), visiting museums, reading and finding great bargains on used books, and SCUBA diving on deep wrecks and inside caves. I have also spent a large chunk of my life as a firefighter and an EMT, which will always hold a place in my heart.

CURRENT POSITION(S)

Research Assistant 01/2021-Present

Gillings School of Global Public Health-UNC-Chapel Hill, Chapel Hill, NC.

Causal inference in observational studies. Supported by R01AI157758

Advisor: Steve Cole, Jessie Edwards

PhD Student in Epidemiology

08/2020-Present

Dept. of Epidemiology-UNC Chapel Hill, Chapel Hill NC.

Graduate Advisor: Steve Cole

Focus on epidemiologic methods and clinical epidemiology, with particular interest in causal inference and bayesian methods

Research Editor 04/2019-Present

The BMJ-London, UK.

Editorial work involving decisions regarding publication in The BMJ.

Subject Matter Consultant

05/2021-Present

iHeed-Dublin, Ireland.

Subject matter expert in epidemiology and biostatistics for online course development.

EDUCATION

Master of Public Health May 2017

Harvard University T.H Chan School of Public Health, Boston MA.

Quantitative Methods; focus on Epidemiology and Biostatistics

Doctor of Medicine

May 2014

University of Maryland School of Medicine, Baltimore MD.

Master of Science May 2012

University of Maryland School of Medicine, Baltimore MD.

Medical Biochemistry

Bachelor of Science/Bachelor of Arts

May 2008

University of Maryland, College Park, College Park MD.

BS: Molecular Biology; cum laude

BA: Government and Politics; magna cum laude

High Honors in Chemistry and Biochemistry

Valedictorian Speaker for College of Chemical and Life Sciences Commencement

CLINICAL TRAINING

Tufts Medical Center, Boston, MA Residency, PGY2, General Surgery	7/2015-6/2016
Stamford Hospital, Stamford, CT Internship, General Surgery	7/2014-6/2015

PUBLICATIONS

First Authored

- Feeney, Timothy, Christine Park, Frederick Godley, Michael Cassidy, Teviah Sachs, David McAneny, Jennifer F. Tseng, and Frederick Thurston Drake. "Provider-Patient Language Discordance and Cancer Operations: Outcomes from a Single Center Linked to a State Vital Statistics Registry". en. In: World Journal of Surgery 44.10 (Oct. 2020), pp. 3324-3332. DOI: 10.1007/s00268-020-05614-y.
- Feeney, Timothy, Michael Cassidy, Yorghos Tripodis, David McAneny, Maureen Kavanah, Teviah Sachs, Jennifer F. Tseng, and Frederick Thurston Drake. "Association of Primary Language with Outcomes After Operations Typically Performed to Treat Cancer: Analysis of a Statewide Database". en. In: *Annals of Surgical Oncology* 26.9 (Sept. 2019), pp. 2684–2693. DOI: 10.1245/s10434-019-07484-8.
- Feeney, Timothy, Sabrina Elena Sanchez, Yorghos Tripodis, Tejal Sudhirkumar Brahmbhatt, Robert Schulze, Peter Burke, Tracey Dechert, and Frederick Thurston Drake. "The Association of Primary Language With Emergency General Surgery Outcomes Using a Statewide Database". en. In: *Journal of Surgical Research* 244 (Dec. 2019), pp. 484–491. DOI: 10.1016/j.jss.2019.06.082.
- **Feeney, Timothy**, Stephanie Talutis, Megan Janeway, Praveen Sridhar, Avneesh Gupta, Philip E. Knapp, James Moses, David McAneny, and Frederick Thurston Drake. "Evaluation of Incidental Adrenal Masses at a Tertiary Referral and Trauma Center". en. In: Surgery (Oct. 2019). DOI: 10.1016/j.surg.2019.07.034.
- Feeney, Timothy, Manuel Castillo-Angeles, John W. Scott, Stephanie L. Nitzschke, Ali Salim, Adil H. Haider, and Joaquim M. Havens. "The Independent Effect of Emergency General Surgery on Outcomes Varies Depending on Case Type: A NSQIP Outcomes Study". en. In: *The American Journal of Surgery* 216.5 (Nov. 2018), pp. 856–862. DOI: 10.1016/j.amjsurg.2018.03.006.
- Feeney, Timothy, Lori Lyn Price, Lilian Chen, Roger Graham, and Abhishek Chatterjee. "Resident and Fellow Participation in Thyroid and Parathyroid Surgery: An ACS-NSQIP Clinical Outcomes Analysis". en. In: *Journal of Surgical Research* 220 (Dec. 2017), pp. 346–352. DOI: 10.1016/j.jss.2017.07.030.

Co-Authored

- Talutis, Stephanie D., Ellen Childs, Anna L. Goldman, Philip E. Knapp, Avneesh Gupta, Cleopatra Ferrao, Tim Feeney, David McAneny, and Frederick Thurston Drake. "Strategies to Optimize Management of Incidental Radiographic Findings in the Primary Care Setting: A Mixed Methods Study". en. In: *The American Journal of Surgery* (Mar. 2021), S0002961021001732. DOI: 10.1016/j.amjsurg.2021.03.038.
- Bala, Wasif, Jackson Steinkamp, **Feeney, Timothy**, Avneesh Gupta, Abhinav Sharma, Jake Kantrowitz, Nicholas Cordella, James Moses, and Frederick Thurston Drake. "A Web Application for Adrenal Incidentaloma Identification, Tracking, and Management Using Machine Learning". en. In: *Applied Clinical Informatics* 11.04 (Aug. 2020), pp. 606–616. DOI: 10.1055/s-0040-1715892.
- Crable, Erika L., **Feeney, Timothy**, Joshua Harvey, Valerie Grim, Mari-Lynn Drainoni, Allan J. Walkey, Katrina Steiling, and Frederick Thurston Drake. "Management Strategies to Promote Follow-Up Care for Incidental Findings: A Scoping Review". en. In: *Journal of the American College of Radiology* (Dec. 2020), S1546144020312254. DOI: 10.1016/j.jacr.2020.11.006.

- Nguyen, Minh-Thuy, **Feeney, Timothy**, Chanmin Kim, F. Thurston Drake, Suzanne E. Mitchell, Magdalena Bednarczyk, and Sabrina E. Sanchez. "Patient-Level Factors Influencing Palliative Care Consultation at a Safety-Net Urban Hospital". en. In: *American Journal of Hospice and Palliative Medicine* (Dec. 2020), p. 104990912098176. DOI: 10.1177/1049909120981764.
- Castillo-Angeles, Manuel, Tarsicio Uribe-Leitz, Molly Jarman, Ginger Jin, **Feeney, Timothy**, Ali Salim, and Joaquim M. Havens. "Transferred Emergency General Surgery Patients Are at Increased Risk of Death: A NSQIP Propensity Score Matched Analysis". en. In: *Journal of the American College of Surgeons* (Jan. 2019). DOI: 10.1016/j.jamcollsurg.2019.01.014.
- Nguyen, Minh-Thuy, **Feeney, Timothy**, Chanmin Kim, F. Thurston Drake, Suzanne E. Mitchell, Magdalena Bednarczyk, and Sabrina E. Sanchez. "Differential Utilization of Palliative Care Consultation Between Medical and Surgical Services". en. In: *American Journal of Hospice and Palliative Medicine* (Aug. 2019), p. 104990911986790. DOI: 10.1177/1049909119867904.
- Drake, Frederick Thurston, Toni Beninato, Maggie X. Xiong, Nirav V. Shah, Wouter P. Kluijfhout, **Feeney, Timothy**, Insoo Suh, Jessica E. Gosnell, Wen T. Shen, and Quan-Yang Duh. "Laparoscopic Adrenalectomy for Metastatic Disease: Retrospective Cohort with Long-Term, Comprehensive Follow-Up". en. In: Surgery (Dec. 2018). DOI: 10.1016/j.surg.2018.11.008.
- Ghuman, Amandeep, S.W. de Jonge, Simon D. Dryden, **Feeney, Timothy**, Daniel H. Buitrago, and P. Terry Phang. "Prophylactic Use of Alpha-1 Adrenergic Blocking Agents for Prevention of Postoperative Urinary Retention: A Review & Meta-Analysis of Randomized Clinical Trials". en. In: *The American Journal of Surgery* 215.5 (May 2018), pp. 973–979. DOI: 10.1016/j.amjsurg.2018.01.015.
- Jang, Yoon J., Abigail L. LaBella, **Feeney, Timothy** P., Nancy Braverman, Mendel Tuchman, Hiroki Morizono, Nicholas Ah Mew, and Ljubica Caldovic. "Disease-Causing Mutations in the Promoter and Enhancer of the Ornithine Transcarbamylase Gene". en. In: *Human Mutation* 39.4 (Apr. 2018), pp. 527–536. DOI: 10.1002/humu.23394.
- Laser, Adriana, Brandon R. Bruns, Joseph A. Kufera, Andrew I. Kim, Feeney, Timothy, Ronald B. Tesoriero, Margaret H. Lauerman, Clint W. Sliker, Thomas M. Scalea, and Deborah M. Stein. "Long-Term Follow-up of Blunt Cerebrovascular Injuries: Does Time Heal All Wounds?" en. In: Journal of Trauma and Acute Care Surgery 81.6 (Dec. 2016), pp. 1063–1069. DOI: 10.1097/TA.000000000001223.
- Lauerman, Margaret H., **Feeney, Timothy**, Clint W. Sliker, Nitima Saksobhavivat, Brandon R. Bruns, Adriana Laser, Ronald Tesoriero, Megan Brenner, Thomas M. Scalea, and Deborah M. Stein. "Lethal Now or Lethal Later: The Natural History of Grade 4 Blunt Cerebrovascular Injury". en. In: *Journal of Trauma and Acute Care Surgery* 78.6 (June 2015), pp. 1071–1075. DOI: 10.1097/TA.00000000000000654.
- Pho, Nam, Dino R C Magri, Fernando F Redigolo, **Feeney, Timothy**, and CJ Patel. "Data Transfer in a Science DMZ Using SDN with Applications for Precision Medicine in Cloud and High-Performance Computing". en. In: Supercomputing '15: ESnet SDN Workshop. Austin, TX, 2015, p. 4.
- LaBella, Abigail Leavitt, **Feeney, Timothy**, Sandra Heibel, Mendel Tuchman, and Ljubica Caldovic. "Analysis of Urea Cycle Gene Transcription Regulation Using Bioinformatic Software and Patient Sequences". In: *The FASEB Journal* 25.1_supplement (2011), pp. 564.8–564.8. DOI: 10.1096/fasebj.25.1_supplement.564.8.
- LaBella, Abigail Leavitt, Feeney, Timothy, Sandra Kirsch Heibel, Mendel Tuchman, and Ljubica Caldovic. "Comprehensive Bioinformatic Analysis of Urea Cycle Gene Transcription Regulation Using Cis-Element over Representation (CLOVER) Software and Patient Sequences to Identify Disease Causing Mutations". In: *Molecular Genetics and Metabolism*. Vol. 102. 2011, pp. 297–297.

PRESENTATIONS

Podium

A Simplified Method to Account for Multiple Case Adjustment in Regression Modeling. 15th Annual Academic Surgical Congress Podium Presentation. Orlando, Florida, Feb. 2020.

- Challenges in the Management of Adrenal Incidentalomas: One Year at an Urban Level I Trauma Center. 14th Annual Academic Surgical Congress Oral Presentation. Houston TX, Feb. 2019.
- The Effect of Primary Language on Emergency General Surgery Outcomes: A Statewide Database Study. 14th Annual Academic Surgical Congress Oral Presentation. Houston, TX, Feb. 2019.
- Non-English Language and Outcomes in Emergency General Surgery. Oral Presentation at Massachusetts State American College of Surgeons Committee on Trauma. Worcester MA, 2018.
- The Effect of Trainee Involvement on Patient Outcomes in General Surgery Cases Over Time. 13th Annual Academic Surgical Congress Oral Presentation. Jacksonville FL, Jan. 2018.
- Resident and Fellow Participation in Thyroid and Parathyroid Surgery: An American College of Surgeons NSQIP Clinical Outcomes Analysis. 63rd Annual New England Surgical Society Annual Meeting Oral Presentation. Boston MA, Sept. 2016.
- Hemoperitoneum Due to Traumatic Avulsion of a Single Leiomyoma Following a Motor Vehicle Collision. Oral Presentation at The Connecticut American College of Surgeons Annual Meeting, New Haven, CT, 2014.
- Through the Looking Glass: Telemedicine as a Potential Cure for the Community Intensivist Shortage. Paper Presented at University of Maryland School of Medicine Clinical Capstone Research Project Finalist Presentation Symposium, Baltimore MD. 2014.
- Investigation of miRNA-Directed Control of LDL Receptor Expression. 32nd Annual UMSOM Medical Student Research Day Oral Presentation. Baltimore, MD, 2009.
- Mutations in an Ornithine Transcarbamylase Regulatory Region as a Possible Cause for Reduced Expression in Patients with Ornithine Transcarbamylase Deficiency. Honors Thesis Defense. 2008.

Poster

- **Feeney, Timothy**, Stephanie Vaughn, Jacob Nudel, Donald T Hess, Brian J Carmine, Cullen O Carter, Luise I Pernar, and Frederick Thurston Drake. *Limited English Proficiency Is Not Associated with Worse Outcomes after Bariatric Surgery*. Boston, MA, Dec. 2019.
- **Feeney, Timothy**, M Cassidy, D McAneny, M Kavanah, T Sachs, JF Tseng, and FT Drake. *Effect of Limited English Proficienty on Outcomes Following Cancer Operations*. Poster Presentation. 2018.
- **Feeney, Timothy**, M Cassidy, Y Tripodis, D McAneny, M Kavanah, T Sachs, JF Tseng, and FT Drake. *The Effect of Primary Language on Outcomes Following Cancer Operations Using a Statewide Database*. Poster Presentation. 2018.
- **Feeney, Timothy**, S Talutis, M Janeway, P Sridhar, A Gupta, P Knapp, J Moses, D McAneny, and FT Drake. *Epidemiology of Incidental Adrenal Masses at an Urban Tertiary Referral and Trauma Center*. Poster Presentation. 2018.
- **Feeney, Timothy**, M Castillo Angeles, S Nitzschke, A Salim, A Haider, and J Havens. *Morbidity and Mortality of Emergency General Surgery Based on National Burden*. Poster Presentation. 2017.
- **Feeney, Timothy**, H Morizono, and L Caldovic. *Genetic Regulation of OTC in the Urea Cycle*. Poster Presentation. 2009.

Co-Authored

Min-Thuy Nguyen, **Timothy Feeney**, Chanmin Kim, Frederick Thurston Drake, S.E Mitchell, M Bednarczyk, and Sabrina E. Sanchez. *Race as a Determinant of Palliative Care Consultation at a Safety-Net Urban Hospital*. Podium Presentation. Orlando, Florida, Feb. 2020.

Frederick Godley, **Timothy Feeney**, Christine Park, Michael Cassidy, Teviah E Sachs, David McAneny, Jennifer F Tseng, and Frederick Thurston Drake. *The Association of Primary Language with Outcomes after Cancer Operations at a Single Tertiary Referral Center and Safety Net Hospital*. Poster Presentation. Montral QC Canada, Sept. 2019.

Linda Salazar, **Timothy Feeney**, Chelsea Vigna, Avneesh Gupta, Philip Knapp, and F. Thurson Drake. *Improving Communication and Evaluation of Incidental Adrenal Findings*. Poster Presentation. Boston Medical Center, Nov. 2019.

Susanna W de Geus, Kurt S. Shultz, **Timothy Feeney**, Sing Chau Ng, Frederick Thurston Drake, David McAneny, Jennifer F Tseng, and Teviah E. Sachs. Surgical and Oncologic Outcomes of Open Versus Laparoscopic Distal Pancreatectomy in a Low-Volume Setting. Poster Presentation. Montral QC Canada, Sept. 2019.

Emily Palmquist, **Timothy Feeney**, Abhishek Chatterjee, D. Nepomnayshy, and Lilian Chen. *Medical Student Perceptions Following Participation in a Surgical Boot Camp – A Qualitative Analysis*. English. Houston TX, Feb. 2018.

Manuel Castillo-Angeles, Tarsicio Uribe-Leitz, Molly Jarman, **Timothy Feeney**, Ali Salim, and Joaquim M Havens. *Transferred Emergency General Surgery Patients Are at Increased Risk of Death*. English. Podium Presentation. Portland, Maine, Sept. 2018.

INVITED PRESENTATIONS

2020 Efforts to Increase Evidence Based Follow-up of Incidental Adrenal Masses at BMC and Beyond.

Presented at: The Boston Medical Center Surgery Research Conference

2019 The association of limited English proficiency with outcomes after cancer operations; perspectives from a large database and single center study

Presented at: The Boston Medical Center Annual Mozden Visiting Professorship Conference

2019 Hierarchical/Multilevel Modeling: An Introduction

Presented at: BU Surgery Resident Research Seminar

2019 Conceptual Models for Regression Analysis in Observational Data: Confounding, Mediation, and Effect Modification

Presented at: BU Surgery Resident Research Seminar

PROFESSIONAL ACTIVITIES

2021 - Present: Gillings school student government Epidemiology Representative

2019 - Present: MDEpiNet Executive Operations Committee

2019 - Present: Society for Epidemiologic Research-Communications Committee

HONORS AND AWARDS

2018	Winner of the Annual MA ACS Committee on Trauma Resident/Fellow Paper Competition
2017	UC Berkeley Social Sciences Research Transparency and Reproducibility (BITSS-RT2) Scholarship
2016	Tufts Annual Resident Research Day Finalist
2014	Medical School Capstone Research Project Finalist
2014	Clinical Honors: Acute Care Surgery, Trauma Surgery, Anesthesia, and Community Medicine
2008	Cell Bio and Molecular Genetics Program Distinguished Graduating Student
2008	University of Maryland, College Park Senior Marshal
2005-2008	Distinguished Deans List
2007-2008	College of Chemical and Life Sciences Outstanding Student

STUDENT MENTORSHIP

Christine Park-BU Medical Student, Boston MA

2018-2019

Project: Association of Language with Operative Outcomes at a Tertiary Safety Net Hopsital-A Single Center Study Ouptut: Manuscript under review Current Position: Internal Medicine Resident, Weill Cornell

Gus Godley-BU MD MBA Student, Boston MA

2018-2020

Project: The association of primary language with outcomes after cancer operations at a single tertiary referral center and safety net hospital.

Output: Podium Presentation at the American College of Surgeons 2019 Annual Meeting Poster Presentation at the New England Surgical Society 2019 Annual Meeting

Current Position: General Surgery Resident, Univ of Chicago

Minh-Thuy Nguyen - BU Medical Student, Boston MA

2018-2020

Project: Disparities in the utilization of palliative care consultations

Output: Differential Utilization of Palliative Care Consultation between Medical and Surgical Services—manuscript published

Output: Patient-Level Factors Influencing Utilization of Palliative Care Consultation at a Safety-Net Urban Hospital-abstract submitted to 2020 Academic Surgical Congress

Andrea Alonso - BU Medical Student, Boston MA

2019-2020

Project: Bariatric surgery and language outcomes

Project: Systematic Review of Language Discordance and Outcomes in Inpatient, Emergency, and Surgery Settings Current Position: General Surgery Resident, Boston University

TEACHING EXPERIENCE

Teaching Fellow- EPID711 Clinical Measurement and Evaluation, UNC-CH, Chapel Hill NC Fall 2020 Duties; Delivered causal inference lecture, grading, leading office hours, content reviews

Resident Instructor, Tufts Medical Center, Boston MA

2014-2016

Taught medical students about patient care, general surgery and critical care

Math and Science Tutor, Baltimore MD

2008-2010

Tutoring high school students from disadvantaged Baltimore area schools

Course Instructor: Weill-Cornell Youth Scholars Program, New York NY

2008

Summer program to mentor less advantage underrepresented minority high school students in STEM

Undergraduate Teaching Assistant, College Park, MD

2006

Taught General Microbiology

PREVIOUS RESEARCH EXPERIENCE

Research Assistant 08/2020-01/2021

Dept. of Medicine-UNC Medical Center, Chapel Hill, NC.

Investigating outcomes using CNICS multicenter data.

Post Doctoral Research Fellow

11/2017-07/2020

Dept. of Surgery-Boston University/Boston Medical Center, Boston MA.

Advisor: F. Thurston Drake

Clinical Epidemiology and Bio-statistics Researcher, Project Supervisor

Designed, implemented, and analyzed longitudinal prospective quality improvement initiative

Performed multiple large observational database studies using both Frequentist and Bayesian methods

Study design and analysis consulting

Brigham and Women's Hospital, Boston, MA

11/2016-11/2017

Post Graduate Researcher

Advisor: Joaquim Havens

Investigating surgical clinical outcomes using NSQIP database

Extensive use of SAS, R and Stata

Tufts Medical Center, Boston, MA

11/2015-05/2016

Resident Researcher

Advisor: Abhishek Chatterjee

Investigating resident impact on surgical outcomes

R. Adams Cowley Shock Trauma Center, Baltimore, MD

11/2013-5/2014

Student Clinical Researcher

Evaluated outcomes of patients with blunt cerebrovascular injury

University of Maryland School of Medicine, Baltimore, MD

2009-2010

Department of Biochemistry and Molecular Biology

Researched miR10 and its role in Pediatric Leukemias

Techniques used: PCR, Real-time PCR, RNA extraction/isolation,

Cell Culture, Western Blotting, Agarose Gel extraction and electrophoresis,

bacterial cloning.

Children's National Medical Center, Washington DC

2006-2008

Undergraduate Research

Research on the Urea Cycle

Techniques used: PCR, PCR, Sanger Sequencing, Bioinformatics

(BLAST, CLUSTALW, alignment manipulation, Transfac database and

transcription factor binding site prediction modeling)

LEADERSHIP

2009-2010	Vice-President, Medical Student Journal Club
2009-2010	Research Vice-President, Infectious Disease Interest Group
2009-2011	Student Council Representative, UMSOM MD/PhD Student Council
2008	Site Manager and Program Coordinator, Weill-Cornell Youth Scholars Program
2007-2008	Student representative, UMD CFLS Dean's Advisory Board
2003-2004	Apparatus Engineer, Community Volunteer Fire Co. No. 1

PREVIOUS SELECTED ACTIVITIES

2004 - 2007	Firefighter/EMT, Bladensburg Volunteer Fire Department, PGFD
2002-2005	Firefighter, Community Volunteer Fire Company No. 1
2003-2005	Emergency Medical Technician, West Milford First Aid Squad
2010-2012	MSTP Advisory Board Student Representative
2009-2011	MSTP Curriculum Design Committee
2009-2012	Science Editor, Dual Decree MD/PhD Program Newsletter
2008-2010	Webmaster, UMD AMA Student Section

AD HOC PEER REVIEW

JAMA Surgery, SURGERY, Society for Epidemiologic Research, Journal of Surgical Research, American Journal of Surgery, World Journal of Surgery

PREVIOUS GRANT EXPERIENCE

2007 Howard Hughes Medical Institute Undergraduate Research Fellowship

CERTIFICATIONS

2015 Advanced Trauma Life Support (ATLS)

2014 Fundamentals of Critical Care Support (FCCS)

Firefighter I, Firefighter II, Vehicle Rescue Technician, Ice Rescue Technician, Incident Management 100, 200, and 700, Federal Wildland Firefighter, AHA CPR, GUE Technical Trimix Diver, GUE Full Cave Diver, International Conflict Management

SKILLS AND INTERESTS

R Statistical Software: intermediate to advanced skill with data visualization, descriptive statistics, multivariable regression, and simulation

SAS statistical software :intermediate skill with data visualization, descriptive statistics, multivariable regression, macro coding

STATA statistical software: intermediate to advanced skill with data visualization, descriptive statistics, multivariable regression

Python: basic skill

Git: basic skill; clone commit push pull

LATEX: basic skill

Microsoft Office Suite: Advanced

Interests:

Surgery (Trauma and Acute Care), Critical Care, Causal Inference, Bayesian Methods, Biochemistry, Mathematical Biology, and Molecular Biology