# Abhishek Bhattacharya

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## EDUCATION

- **University of Michigan Medical School** 2019 – 2023 (expected)
  Doctor of Medicine (M.D.) – Innovation & Entrepreneurship Track
- **University of California, Santa Barbara** 2014 – 2018
  College of Creative Studies (Honors Program), B.S. Computer Science, B.A. Biology

## RESEARCH EXPERIENCE

**Machine Learning in Neurosurgery Lab, University of Michigan Medical School** 1/2020 – *Present*
*Advisor: Dr. Todd Hollon, MD, Assistant Professor, University of Michigan Dept. of Neurological Surgery*
**Study:** Single-cell phenotyping of intra-operative brain tumor biopsy images using artificial intelligence.

- Methods: Stimulated Raman Histology (SRH) allows for imaging tissue pathology specimens at the bedside in under a minute without need for histologic staining. I trained AI-based object detection models to analyze individual brain tumor cells from SRH biopsies collected from University of Michigan Neurosurgery patients. Also built a SRH single cell image annotation pipeline and dataset for deep learning. Additionally, created a Python-based SRH image processing library.
- Grants: Received funding from NIH Short Term Biomedical Research Training Program (SBRP)
- Abstract/Oral Presentation: **Bhattacharya A**., Alber D., Hollon T. Single-Cell Phenotyping Using Optical Imaging and Artificial Intelligence. Machine Learning for Healthcare (MLHC). August 2022.
- Peer-Reviewed Publication (Journal Cover): Jiang C, **Bhattacharya A**, et al, Rapid Automated Analysis of Skull Base Tumor Specimens Using Intraoperative Optical Imaging and Artificial Intelligence. Neurosurgery. 2022 Jun, PMID: 35343469.

**UCSF Department of Dermatology** 2/2021 – *Present*
*Advisor: Dr. Maria Wei MD, PhD*
**Study:** Understanding the role of artificial intelligence in healthcare and dermatology practice.

- Methods: Collaborated with UCSF medical students to conduct a systematic review of patient perceptions of AI within healthcare settings.
- Peer-reviewed Publication: Young AT, Amara D, **Bhattacharya A**, Wei ML. Patient and general public attitudes towards clinical artificial intelligence: a mixed methods systematic review. Lancet Digital Health. 2021 Sept 3. PMID: 34446266.
- Book Chapter: "AI in Clinical Medicine", Chapter: Artificial Intelligence in Dermatology (Wiley)

**University of Michigan Medical School Department of Surgery** 6/2020 – 9/2020
*Advisors: Dr. Christina Angeles MD, Dr. David Hanauer MD, Dr. Tasha Hughes MD*
**Study:** Building rare cancer patient cohorts using unstructured clinical notes from a large electronic medical record system. Part of a larger study looking at cutaneous leiomyosarcoma (cLMS), rare skin tumor, outcomes after lesion excision.

- Methods: Programmatically queried 2.1 million clinical notes (pathology, surgical, and radiology notes) at the University of Michigan to identify patients who were diagnosed with cLMS
- Invited Speaker: Academic Surgical Congress (2021)
- Abstract: **Bhattacharya A**, Hoff L, Harter C, et al. Using Electronic Medical Records Search Engine (EMERSE) to Improve Research Involving Rare Cancers. Oral Presentation. 16th Annual Academic Surgical Congress. Virtual Feb 2021.
- Manuscript: Hughes T, Mott N, Harter C, Hoff L, **Bhattacharya A**, et al. Rightsizing management for a rare malignancy: Examining excision margins and imaging surveillance for cutaneous leiomyosarcoma. Submitted to Journal of the American Academy of Dermatology (under review).

**UCSF Bakar Computational Health Sciences Institute (Hadley Lab)** 6/2015 – 6/2019
*Advisors: Dr. Dexter Hadley, MD, PhD; Dr. Maria Wei MD, PhD; Dr. Atul Butte MD, PhD*
**Study:** Using deep learning computer vision models trained on clinical dermatology images for real-world skin cancer detection.

- Methods: Created robust convolutional neural network models to identify benign versus malignant skin lesions; built and deployed an **iOS mobile application called Skin** in the Apple App Store for skin image collection and machine learning predictions used in UCSF dermatology clinics; launched a start-up called SkinIQ to help bring my research to patients.
- Grants: Received funding from Helen Diller Cancer Foundation through UCSF RAP Grant (2016).
- Invited speaker: American Medical Informatics (AMIA) Conference (2017)
- Awards: Best Student Paper and Talk at AMIA (2017), U.C. Santa Barbara Campus Excellence in Research Award Nomination (2018)

- Manuscript: **Bhattacharya A**, Young A, Wong A, et al., Precision Diagnosis Of Melanoma And Other Skin Lesions From Digital Images. AMIA Summits on Translational Science Proceedings. 2017. PMID: 5543387.

**Other contributions**: Deep learning on mammography images, Predicting pain from facial expression videos.

## ENTREPRENEURSHIP

**Founder**, OneClinic, Ann Arbor, MI 8/2021 – *Present*

*Advisor: Dr. Karandeep Singh, MD*

- Creating a digital social health platform for free clinics that provide healthcare to underserved patient populations. We are building a two-tiered web and mobile application that captures key social determinants of health information during clinic visits and intelligently recommends health campaigns to clinicians and patients. Recruited and led a team of five University of Michigan medical students and Ross business school students to develop a business plan around the idea. Collaborated with local free clinics, including University of Michigan Student Run Free Clinic.
- Launched through Sling Health, a student-run biotech incubator and business competition, and was part of the University of Michigan Sling Health 2021-2022 cohort.
- Awards: 3rd place at Sling Health Local Demo Day 2022, Accepted speaker at Sling Health National Demo Day 2022.

**Founder**, SkinIQ, San Francisco, CA 5/2015 – 2019

- Co-founded an AI medical diagnostics company with UCSF faculty, Dr. Dexter Hadley, and two physician scientist dermatologists, Dr. Maria Wei and Dr. Simone Stalling, to screen patients for skin cancer using mobile phone images and a non-invasive molecular diagnostic kit. Had meetings with Apple, L'Oréal, Illumina, and Obvious Ventures. Pivoted the company to build a deep learning algorithm for acne identification from face images and the prediction of the best off-the-shelf consumer products (Neutrogena, L'Oréal, etc.) tailored to the patient's skin. Integrated it into an iOS app called Clara and tested it with volunteers.
- Launched through the UCSF QB3 Startup In a Box program and was part of UCSF Entrepreneurship Lean Launchpad Cohort 2016.
- Awards: U.C. Berkeley Big Ideas Competition Honorable Mention (2016)

## HEALTH RELATED LEADERSHIP AND SERVICE

**University of Michigan Student Run Free Clinic (UMSRFC)**, *EMR-IT Director* 8/2019 – *Present*

- UMSRFC provides free medical services to low-income patients with no health insurance in Pickney, MI. I helped moderate the clinic's electronic medical record (EMR) system, called Practice Fusion, and the clinic website. Volunteered time to work with patient check-in and processing at the front desk. Worked to improve the digital infrastructure used by the clinic through collaboration with my company, OneClinic.

**MedECG,** *Team Member* 7/2020 – 9/2020

- MedECG is a medical student group that works on pro bono consulting projects with non-profit health care organizations in the local Ann Arbor and Metro Detroit community. I worked with a team of University of Michigan medical students to build a preliminary computational model of patient flow through the University of Michigan Emergency Department using discrete event simulation. Our goal was to identify operational bottlenecks and find mitigating solutions.
- Invited Speaker: MedECG Student Leadership Symposium 2020

## WORK EXPERIENCE

**Doc.ai**, *Bioinformatics Intern,* Palo Alto, CA 2/2019 – 6/2019

- Worked on the analysis of multi-omics data, such as lab tests, medications, and local environmental factors. Helped streamline data processing pipeline using Spark's distributed system and Databricks notebooks. Standardized incoming clinical data to Health Level Seven International (HL7)'s Fast Healthcare Interoperability Resources (FHIR) health-industry standard.
- Led an internal research project investigating the Centers for Disease Control (CDC) state-based Influenza Incidence Report trends against Environmental Protections Agency (EPA) data on local ozone air quality index.

**Computer Science Mentor,** U.C. Santa Barbara 1/2018–6/2018

- Held weekly office hours, graded exams, and homework for introductory computer science students at UCSB.

## HONORS, AWARDS, AND FUNDING

- **UC Santa Barbara Dean's List** 2015–2018
- **Big Ideas Competition Honorable Mention**, UC Berkeley 2016
  $2,500 award in Global Health Category for SkinIQ: Precision Melanoma Diagnostics using Mobile Imaging/Deep Learning
- **Best Student Paper/Talk at American Medical Informatics Association (AMIA)**, San Francisco, CA 2017
  Awarded for my talk on Precision Diagnosis Of Melanoma And Other Skin Lesions From Digital Images
- **Campus Excellence in Research Award Nomination**, UC Santa Barbara 2018
  Nominated by faculty for third year undergrads who have made exception research contributions to their field of study.
- **First Place Winner At Microsoft Cortana Hackathon**, UC Santa Barbara 2018
  Given for creating an emergency medical services voice assistant for 911 callers. Won an Xbox One and other goodies.
- **M0 Summer Impact Accelerator Program (SIAP)**, University of Michigan Medical School 2019
  $500 award given to incoming University of Michigan Medical Students to accelerate their research
- **University of Michigan Medical School Academic Scholarship** 2019–2023
  $100,000 tuition award across 4 years. Supported by: J. Grinswold and Margery Hopkins Ruth, Medical School Class of 1963, and The Saltman Family Scholarship Fund.
- **M1 Capstone For Impact Summer Impact Accelerator Program (SIAP),** University of Michigan Medical School 2020
  $1,000 award given to first year University of Michigan Medical Students to accelerate their research
- **NIH Short Term Biomedical Research Training Program (SBRP)**, University of Michigan Medical School 2022
  $4,000 award NIH funding given for my proposal "Single-cell phenotyping using optical imaging and artificial intelligence"
- **Third Place at Sling Health Business Competition**, University of Michigan 2022
  $500 award given to teams with best pitch. Winners are also nominated to present at National Sling Health Competition.
- **Alpha Omega Alpha**, University of Michigan Medical School 2022
  National medical honors society where 20% of the graduating class are chosen based on good academic standing and characteristics of excellent physicianship.

## PEER REVIEWED JOURNAL ARTICLES

1. **Bhattacharya A**, Young A, Wong A, Stalling S, Wei M, Hadley D. Precision Diagnosis Of Melanoma And Other Skin Lesions From Digital Images. *AMIA Jt Summits Transl Sci Proc*. 2017;2017:220-226. Published 2017 Jul 26, PMID: 28815132.
2. Young AT, Amara D, **Bhattacharya A**, Wei ML. Patient and general public attitudes towards clinical artificial intelligence: a mixed methods systematic review. Lancet Digital Health. 2021 Sept 3, PMID: 34446266.
3. Jiang C, **Bhattacharya A**, Hollon T, et al, Rapid Automated Analysis of Skull Base Tumor Specimens Using Intraoperative Optical Imaging and Artificial Intelligence. Neurosurgery. 2022 Jun, PMID: 35343469.
4. Hughes T, Mott N, Harter C, Hoff L, **Bhattacharya A**, et al. Rightsizing management for a rare malignancy: Examining excision margins and imaging surveillance for cutaneous leiomyosarcoma. Submitted to Journal of the American Academy of Dermatology **(Submitted)**

## PEER REVIEWED BOOK CHAPTERS

1. Young AT, Chen JY, **Bhattacharya A,** Wei ML. (2022). Artificial Intelligence in Dermatology. In M Byrne, Bagci U, Ahmad O, Xu Z, Chahal D, Parsa N, Greenhill A (Ed.), Artificial Intelligence in Clinical Medicine. New York: Wiley.

## ABSTRACTS

1. Michael Kawczynski, Roy Harnish, Hari M Trivedi, **Abhishek Bhattacharya**, Albert T Young, Andrew Wong, Yunn-Yi Chen, Benjamin L Franc, Dexter Hadley. Computer-aided labeling of BI-RADS score via deep learning on mammographic images. Dahshu Data Science Symposium: Computational Precision Health 2017
2. Hari M Trivedi, Roy Harnish, Michael Kawczynski, Andrew Wong, Albert T Young, **Abhishek Bhattacharya**, Davison Dulin, Yunn-Yi Chen, Jae Ho Sohn, Benjamin L Franc, Dexter Hadley. Development of a robustly labeled pathology database for prediction of breast cancer through deep learning of mammographic images. Dahshu Data Science Symposium: Computational Precision Health 2017
3. **Bhattacharya, A.,** Hoff L, Harter C, et al. Using Electronic Medical Records Search Engine (EMERSE) to Improve Research Involving Rare Cancers. Oral Presentation. 16th Annual Academic Surgical Congress. Virtual Feb 2021.
4. Hoff, L. L., Harter, C. A., **Bhattacharya, A**., Olsen, E., Mott, N., Hughes, T., & Angeles, C. V. (2021, February). Should Imaging Surveillance be Used in Cutaneous Leiomyosarcoma?. Annals Of Surgical Oncology (Vol. 28, No. SUPPL 1, pp. S37-S37)
5. Harter, C. A., Hoff, L. L., Olsen, E., **Bhattacharya, A**., Mott, N., Angeles, C. V., & Hughes, T. (2021, February). Recurrence of Cutaneous Leiomyosarcoma-Resection Margin or Biology?. Annals Of Surgical Oncology (Vol. 28, No. SUPPL 1, pp. S130-S131)
6. **Bhattacharya A**., Alber D., Hollon T. Single-cell Phenotyping Using Optical Imaging and Artificial Intelligence. Machine Learning for Healthcare Conference (MLHC). August 2022.

## ORAL PRESENTATIONS

1. **Bhattacharya A**, Young A, Wong A, et al. Precision Diagnosis Of Melanoma And Other Skin Lesions From Digital Images American Medical Informatics (AMIA) Conference (2017)
2. **Bhattacharya A**, Friedland M, Das J, Arora A, Sievers M, Duffy B. Using Computational Modeling For Assessing and Improving Operational Management at Michigan Medicine Emergency Department. MedECG Student Leadership Symposium 2020.
3. **Bhattacharya A**, Hoff L, Harter C, et al. Using Electronic Medical Records Search Engine (EMERSE) to Improve Research Involving Rare Cancers. Oral Presentation. 16th Annual Academic Surgical Congress. Virtual Feb 2021.
4. **Bhattacharya A**, Harleen A, Vimalathas N, Hu M, Vejalla A, Rasheed H. OneClinic: A Digital Social Health Platform. Sling Health National Demo Day 2022.
5. **Bhattacharya A**. OneClinic: A Digital Social Health Platform. Innovation & Entrepreneurship Track Capstone Presentation. July 2022.
6. **Bhattacharya A**. Single-cell Phenotyping Using Optical Imaging and Artificial Intelligence. Machine Learning for Healthcare (MLHC). August 2022. Durham, North Carolina.

## SOFTWARE SKILLS

- **Languages:** *Python, C++, Swift, SQL, R*
- **Neural Network Frameworks**: *PyTorch, Tensorflow, Caffe*
- **Web Frameworks**: *Flask, Django, Ruby On Rail*