

EDUCATION

UNIVERSITY OF ARIZONA COLLEGE OF MEDICINE – TUCSON  
NIH Medical Scientists Training Program – MD/PhD student

Year Entered: 2022

UNIVERSITY OF CALIFORNIA, IRVINE | Irvine, CA  
Bachelor of Science - Biological Sciences; Minor in Health Informatics

June 2018

GRANTS & FELLOWSHIPS

National Cancer Institute (NCI) T32 Integrative Cancer Scholars (ICS) Training Program (CA009213)  
University of Arizona, September 2024 – August 2026

HONORS/AWARDS

- 2024 Graduate & Professional Student Council Basic Needs Microgrant, UA
- 2018 Graduated with honors (*Cum Laude*), UC Irvine
- 2018 Dean’s Honor List in the School of Biological Sciences, UC Irvine
- 2017 Robert Ernst Prize for Excellence in Research in the Biological Science, UC Irvine
- 2017 Excellence in Research in the School of Biological Sciences, UC Irvine
- 2017 Undergraduate Research Opportunities Program Awardee, UC Irvine
- 2016 Mentor of the month in the International Student Excellence Programs, UC Irvine

RESEARCH EXPERIENCE

Graduate Student | University of Arizona Cancer Biology Graduate Interdisciplinary Program  
Faculty Advisor: *Carlos Caulin, Ph.D.*

Tucson, AZ

03/2024 – Present

- Currently investigating the role of macrophages in head and neck squamous cell carcinoma, utilizing cell culture techniques to maintain and manipulate cancer cell lines, performing molecular biology assays such as PCR and Western blotting to assess gene expression and protein levels, performing intra-oral tumor implantation on rodents, conducting immunohistochemistry (IHC) and immunofluorescence (IF) staining on tissue samples, employing bulk and single-cell RNA sequencing techniques to generate expression profiles, analyzing results using Prism and R.
- Collaborating with lab members to interpret results and plan next steps, resending research findings at lab meetings and departmental seminars, and actively participating in discussions to refine experimental approaches and research hypotheses.

Research Assistant | Brenner Lab, Massachusetts General Hospital/Harvard Medical School  
Faculty Advisor: *Gary J. Brenner, MD, Ph.D.*

Boston, MA

07/2020 – 04/2022

- Investigated bacterial therapy for Neurofibromatosis Type 2 in a translational research lab
- Independently performed *in vitro* and *in vivo* experiments, conducting data analysis and lab administrative tasks
- Performed poster and oral presentations at conferences, lab meetings; trained new lab members

Junior Specialist | Baram Lab, UC Irvine School of Medicine  
Faculty Advisor: *Tallie, Z. Baram, MD, Ph.D.*

Irvine, CA

07/2018 – 06/2020

- Actively being involved in multiple projects, including investigating the role of microglia, how early-life adversity during sensitive periods of development affects the resident immune cells of the brain, and how early-life febrile seizures disrupt the maturation of hippocampal circuits and memory process; employ various techniques methods such as 3D reconstruction confocal microscopy and Golgi's method.
- Perform basic wet-lab techniques; conduct analysis and interpretation of results; prepare lab agents, chemicals, instruments and equipment; provide general technical support
- Assist in training and mentorship of junior-level researchers; assist in general lab maintenance and administrative tasks; prepare and maintain IACUC and IBC protocols; build and maintain the lab website

Undergraduate Research Assistant | Baram Lab, UC Irvine School of Medicine  
Faculty Advisor: *Tallie, Z. Baram, MD., Ph.D.*

Irvine, CA

09/2015 – 06/2018

- Gained hands-on experience of bench side lab works and trained other undergraduate students; mainly focused on the project of the role of microglia in synaptic rewiring by early-life adversity
- Contributed to multiple projects under supervision of a postdoc mentor and PI
- Awarded **Excellence in Research Finalist** in the academic year of 2016 – 2018: designed and performed an individual research project “The Effect of Early-Life Stress on Synapses in Males and Females”; finished a twelve-page paper, performed an oral presentation to faculty and other participants, gave a poster presentation to faculty judges from various departments of biological science; selected to the finalist from around 100 participants, and invited as a student panelist to the Excellence in Research workshop in the academic year of 2017-2018
- Participated in the **Undergraduate Research Opportunities Program**: designed and performed a group research project “The Role of Microglia during Early-life Stress in Males vs. Females”; awarded \$700 fund for the project; performed a poster presentation on May 20th, 2017 at the Undergraduate Research Opportunities Symposium at UC Irvine

## EXPERIMENTAL APPROACHES/TECHNIQUES

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- Microscopy techniques (confocal imaging and 3D reconstruction of triple-labeled cryostat sections)
- Immunohistochemistry, immunofluorescence, DAB/Golgi staining & Sholl analysis
- Molecular analyses for DNA and protein (i.e., PCR, electrophoresis, Western Blot, ELISA, cloning)
- Flow Cytometry (proficient in cell staining, multi-parameter analysis, and immunophenotyping)
- Cell culture techniques (maintenance, passaging, experimentation, CRISPR-mediated gene editing in cell lines)
- Bulk and Single-cell RNA Sequencing sample preparation and results analysis using R and additional packages
- Animal model development for manipulation of early-life experience/environment
- In vivo subcutaneous, intra-sciatic nerve, intra-oral tumor implantation, tumor measurement
- Rodent handling, subcutaneous/intraperitoneal injection, tissue harvest, survival surgery of EEG probe

## CLINICAL EXPERIENCE

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### Commitment for Underserved People (CUP) Student Run Clinic

University of Arizona College of Medicine – Tucson

Tucson, AZ

10/2022 – Present

- Perform medical interview and physical exam in person to local underserved community alongside another medical student, administer vaccines, perform in-house examinations, and present to the attending physician
- Clinics attended: Shubitz Family Clinic, Women’s Clinic, Kid’s Clinic, Integrative Medicine Clinic, Mobile Health Clinic, Sight Savers Ophthalmology Clinic, SHINE Family Clinic, LGBTQ+ Clinic, Integrative Medicine Clinic
- Total hours: 264

### General Member & Volunteer

*Flying Samaritans at UC Irvine*

Irvine, CA

03/2019 – 03/2020

- Travel to medical clinics located in the rural areas outside of Tecate, Mexico to provide free, quality healthcare to those who would otherwise lack access
- Work aside with physicians, dentists, optometrists, pilots, and other healthcare practitioners; assisted in administrating, translating, scribing, and taking vital signs

### Medical Assistant

Dr. Zhijun Wang’s Pediatric Office

Irvine, CA

06/2016 – 06/2018

- Interacted with patients directly and inquired their questions / concerns before seeing the doctor
- Recorded vitals, took newborn measurements, verified eligibility, billing, trained new staff
- Performed in-house tests i.e. UA, vision/hearing screenings, and allergy testing

## LEADERSHIP & COMMUNITY INVOLVEMENT

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### School Representative

MD-PhD Surgical Society

Tucson, AZ

04/2025 – Present

- Represent the University of Arizona College of Medicine-Tucson MD-PhD Program in a national initiative supporting physician-scientist trainees pursuing surgical careers.
- Promote local and national Society events to MD-PhD students and surgical interest groups.
- Recruit speakers and organize panels featuring surgeon-scientists to foster mentorship and career exploration.
- Support network-building among MD-PhD students, residents, and faculty with shared interests in academic surgery.

**Wellness Committee Member**

Medical Scientist Training Program at UA COM-T

Tucson, AZ

04/2025 – Present

- Contribute to planning and implementation of initiatives that support MD-PhD student well-being and mental health.
- Facilitate peer support, social events, and wellness programming across both medical and graduate school phases.
- Serve as a liaison between students and administration to advocate for wellness-related resources and policies.

**Founder & President**

Neurosurgery Interest Group (NSIG) at UA COM-T

Tucson, AZ

10/2024 – Present

- Lead a team of board members from various stages of medical school and undergraduates and oversee the operations of NSIG, coordinating events, meetings, and initiatives to engage students interested in neurosurgery and research.
- Organize seminars, guest lectures, hands-on workshops, shadowing opportunities, research meetings, and networking events with faculty, residents, and peer medical students to facilitate student involvement in the field, with collaboration with other clubs and student organizations from Tucson and Phoenix campuses of UA College of Medicine.

**Recruitment Committee Member**

Medical Scientist Training Program at UA COM-T

Tucson, AZ

04/2024 – Present

- Responsible for the planning and coordination of recruitment activities surrounding interview days as well as outreach activities for a successful recruitment year.
- Worked closely with the admissions committee during application season.
- Organized First Look weekend as an opportunity for top candidates to experience campus life, meet with faculties and staffs, and interact with future peers in an intimate and informative setting.

**Retreat Committee Member**

Medical Scientist Training Program at UA COM-T

Tucson, AZ

10/2022 – 07/2023

- Oversaw and planned the annual summer retreat to be held prior to the start of each academic year.
- Responsible for budgeting costs of the retreat, selecting venues, speakers, and creating an agenda for the event.

**Research/Shadowing Coordinator**

Association of Women Surgeons at UA COM-T

Tucson, AZ

10/2022 – 11/2023

- Investigate and communicate research and shadowing opportunities to members.
- Facilitates relationships between members and faculty to promote research opportunities.
- Work with women surgeons for building network and mentorship opportunities.

**Patient Coordinator**

LGBTQ+ CUP Clinic at UA COM-T

Tucson, AZ

10/2022 – 11/2023

- Gather data regarding patient care issues and inquiries; assess patient well-being.
- Work with other team members to build a LGBTQ+ welcome environment at the student run clinic.

**Mentorship Committee Board member**

Postbaccalaureate Association (PBA) at MGB

Boston, MA

08/2020 – 04/2022

- Started the first-ever organization for post-baccalaureates at Massachusetts General Brigham with faculty counselors and many others on the same path.
- As a board member in the Mentorship Subcommittee, designed and made the first newsletter to announce PBA to the whole MGB community; now working on building an online platform to facilitate the bonding between mentors and mentees.

**Co-founder & Vice President**

Biological Sciences International Student Association at UCI

Irvine, CA

09/2017 – 06/2018

- Performed administrative tasks of the club, held board member meetings and general meetings; planned social, academic, community service, and fundraising events; collaborated with other on-campus and off-campus organizations.

**Mentor Coordinator**

UC Irvine Division of Undergraduate Education

Irvine, CA

09/2017 – 06/2018

- Lead 4 peer mentors with over 25 mentees as first-year international students in making smooth transitions to life at UCI and in the United States by providing both academic and social support
- Worked as a peer mentor for September 2016 – June 2017
- Involved as a mentee for September 2014 – June 2015

## TEACHING/MENTORSHIP EXPERIENCE

### STEP Siblings Program, Big Sibling

University of Arizona College of Medicine-Tucson

Tucson, AZ

06/2024 – Present

- As a medical student who passed Step 1, matched with second year medical students as a 1-on-1 peer mentor on: morale and emotional support, reassurance, study tips, scheduling, accountability and more.
- Worked towards the goals of the program to improve morale during dedicated, decrease feelings of isolation, increase cross-class-year connections, encourage early Step 1 preparation over the summer, decrease academic delays, and increase pass rates.

### Pre-Medical Mentor

American Physician Scientists Association (APSA) Mentorship Program

Tucson, AZ

09/2023 – Present

- Initiate and maintain regular mentor-mentee communication, using various platforms to provide support and advice
- Employ structured prompts and discussions to share relevant academic and career insights
- Encourage mentee's involvement in campus life, emphasizing their strengths and potential
- Contribute to program improvement by participating in feedback surveys and addressing non-responsive mentee situations

### Summer Anatomy TA

University of Arizona College of Medicine-Tucson

Tucson, AZ

06/2023 – Present

- Participate as a TA in a summer gross anatomy class aimed at premedical undergrads/graduate students, nurse anesthetists, and members of the accelerated master program
- Develop the teaching skills further, gain professional development in medical education related topics, and further cement anatomy knowledge while brushing up for STEP and clinical rotations

### BLS & AED Instructor Intern

The CPR Hero

Anaheim, CA

08/2018 – 09/2018

- Trained to assist in CPR, First Aid, and Basic Life Support classes alongside nurses, paramedics, and EMS personnel in the classroom & group training setting

### Private Tutor for Postbaccalaureate Students

Private tutor

Irvine, CA

06/2017 – 11/2017

- Assessed students needs, provided learning resources, and answered to inquires
- Hold review sessions with practice problems and/or one-on-one meetings upon needs

### Peer Tutor

UC Irvine Department of General Chemistry

Irvine, CA

09/2016 – 03/2017

- Hold weekly office hours for one-on-one or group help and posted weekly worksheets and keys
- Lead review sessions with review packets to prepare students for exams

### International Student Assistant

UC Irvine School of Biological Science

Irvine, CA

04/2016 – 05/2016

- Developed communication early with the admitted international student and their parents and address questions they have about UCI and the Ayala School of Biological Sciences

## VOLUNTEERING EXPERIENCE

### Student Instructor & Volunteer

Resuscitation Education and CPR Training Group (REACT), UA COM-T

Tucson, AZ

03/2023 – 03/2024

- Participates and actively serves as an student instructor in the student-led organization that teaches the community life saving skills including Chest Compression-Only CPR

## Volunteer

Habitat for Humanity

San Gabriel, CA  
09/2019 – 03/2020

- Helped people in need from local community build or improve a place they can call home
- Worked at the ReStore (thrift stores) to help fund the home building mission

## Team KiPOW volunteer

UC Irvine School of Medicine

Tustin, CA  
05/2017 – 03/2020

- Helped fifth graders in Title I Schools, who had the greatest proportion of overweight children, lacked adequate resources feasibly implement enlightened health policies that were designed to level the playing field for all children
- Led teaching and interactive sessions on healthy life style; lead recess activities

## OR Volunteer

UC Irvine Medical Center

Orange, CA  
06/2016 – 03/2020

- Volunteered at the Main OR (continuing), working aside healthcare professionals
- Volunteered at the Volunteer Office for 35 hours, assisting in discharge and lab delivery

## PUBLICATIONS

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- [8] [Elliott T\*, **Shao M\***], George DD, Goudman L, Morris D, Pilitsis JG. Spinal Cord Stimulation Guidelines and Consensus Statements: Systematic Review and AGREE-II Assessment. *Neuromodulation*. 2025. [Epub May 16th 2025].doi: 10.1016/j.neurom.2025.03.075. \*Co-first authorship.
- [7] George DD, **Shao M**, Brown JM, DiMarzio M, Weinand ME, Larson PS, Kasoff WS, Pilitsis JG. Exploring rates of functional neurosurgery procedures in the Hispanic population: A single-institution analysis from 2017 to 2024. *Neuromodulation*. 2025. [Epub May 1st 2025]. doi:10.1016/j.neurom.2025.03.075
- [6] Hall A, Kamei N, **Shao M**, Mun HS, Chen K, Chen Y, Baram TZ. Inhibition of Neuron Restrictive Silencing Factor (REST/NRSF) Chromatin Binding Attenuates Epileptogenesis. *eNeuro*. 2024 Apr 19;ENEURO.0006-24.2024. doi: 10.1523/ENEURO.0006-24.2024.
- [5] Ahmed SG, Oliva G, **Shao M**, Mekalanos JJ, Brenner GJ. Culture of Attenuated *Salmonella Typhimurium* VNP20009 in Animal-Product-Free Media Does Not Alter Schwannoma Growth Control. *Hum Vaccin Immunother*. 2023 Aug;19(2):2262639. doi: 10.1080/21645515.2023.2262639. Epub 2023 Oct 3.
- Shao M**. Physician Spotlight: Dr. Meredith Whittaker MD, PGY-5 General Surgery resident. Association of Women Surgeons at University of Arizona College of Medicine-Tucson February Newsletter. 2023.
- Shao M**. Physician Spotlight: Dr. Stephanie Worrell MD, FACS, Cardiothoracic Surgeon. Association of Women Surgeons at University of Arizona College of Medicine-Tucson January Newsletter. 2023.
- [4] Ahmed SG, Oliva G, **Shao M**, Wang X, Mekalanos JJ, Brenner GJ. Intratumoral Injection of Schwannoma with Attenuated *Salmonella Typhimurium* Induces Antitumor Immunity and Controls Tumor Growth. *Proc Natl Acad Sci U S A*. 2022 Jun 14;119(24):e2202719119. doi: 10.1073/pnas.2202719119.
- [3] Bolton JL\*, [Short AK#, Othy S#, Kooiker CL#], **Shao M**, Gunn BG, Beck J, Bai X, Law SM, Savage JC, Lambert JJ, Belelli D, Tremblay M, Cahalan MD, Baram TZ\*. Early Stress-Induced Impaired Microglial Pruning of Excitatory Synapses on Immature CRH-Expressing Neurons Provokes Aberrant Adult Stress Responses. *Cell Rep*. 2022 Mar 29;38(13):108511. doi: 10.1101/2021.07.21.453252. #These authors contributed equally. \*Corresponding Authors.
- [2] [Bolton JL\*, Schulmann A\*], Curran MM, Regev L, Chen Y, Kamei N, **Shao M**, Singh-Taylor A, Jiang S, Noam Y, Molet J, Mortazavi A, Baram TZ. Unexpected Transcriptional Programs Contribute to Hippocampal Memory Deficits and Neuronal Stunting After Early-Life Adversity. *Cell Rep*. 2020 Dec 15;33(11):108511. doi: 10.1016/j.celrep.2020.108511. \*Co-first authorship.
- [1] Garcia-Curran M, Hall A, Patterson K, **Shao M**, Elton N, Chen K, Dubé C, Baram TZ. Dexamethasone Attenuates Hyperexcitability Provoked by Experimental Febrile Status Epilepticus. *eNeuro*. 2019 Nov 4;6(6):ENEURO.0430-19.2019. doi: 10.1523/ENEURO.0430-19.2019.
- Shao M**. The effect of early-life stress on synapses in males and females. *J Undergrad Res Biol Sci*. 2016-2017; UC Irvine Ayala School of Biological Science.

## POSTERS & PRESENTATIONS

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- Shao M**, George DD, Brown JM, DiMarzio M, Weinand ME, Larson PS, Kasoff WS, Pilitsis JG. Exploring Rates of Functional Neurosurgery Procedures in the Hispanic Population: Single-Institution Analysis. *Univ Ariz Coll Med-Tucson Global Health Res Day 2025; 2025; Tucson, AZ.*

Sheldon BL, **Shao M**, Aguilar-Salinas P, Avery MB. A Novel, Multimodal Non-Opioid Postoperative Pain Regimen Following Craniotomies for Vascular and Tumor Pathologies: Retrospective Analysis of a Single Neurosurgeon's Experience. Am Assoc Neurol Surg 2025 Annu Meet; 2025; Boston, MA.

**Shao M**, Caulin C. Interaction Between Tumor Cells and Tumor-Associated Macrophages in p53-Mutated Oral Squamous Cell Carcinoma. 2025 Ginny L. Clements Breast Cancer Research Institute Annual Symposium; 2025; Tucson, AZ.

[Elliott T\*, **Shao M**\*], George DD, Goudman L, Morris D, Pilitsis JG. Spinal Cord Stimulation Guidelines and Consensus Statements: Systematic Review and AGREE-II Assessment. North Am Neuromodulation Soc 2025 Annu Meet, 2025; E-Poster. \*Co-first authorship.

George DD, **Shao M**, Brown JM, DiMarzio M, Weinand ME, Larson PS, Pilitsis JG. Exploring Rates of Functional Neurosurgery Procedures and Complications Based on Ethnicity: A Single-Institution Analysis From 2017 to 2024. North Am Neuromodulation Soc 2025 Annu Meet; 2025; Orlando, FL.

**Shao M**, Caulin C. Crosstalk Between Cancer Cells and Tumor-Associated Macrophages in p53-Mutated Oral Squamous Cell Carcinoma. Univ Ariz 2024 Grad Interdiscip Res Showcase; 2024; Tucson, AZ.

**Shao M**, Caulin C. Crosstalk Between Cancer Cells and Tumor-Associated Macrophages in p53-Mutated Oral Squamous Cell Carcinoma. Univ Ariz Cancer Cent 2024 Annu Sci Retreat; 2024; Tucson, AZ.

**Shao M**, Caulin C. Orthotopic and Immunocompetent Mouse Models for Oral Squamous Cell Carcinoma. 39th MD-PhD Natl Student Conf; 2024; Breckenridge, CO.

**Shao M**, Conrad H, Harris T, Partha M, Sridhar P, Worrell SG. The Impact of Fibrinolytic Therapy Prior to Surgical Decortication in Treatment of Empyema. Univ Ariz Coll Med-Tucson Res Day 2024; 2024; Tucson, AZ.

Bolton JL, Short AK, Othy S, Kooiker C, **Shao M**, Gunn BG, Beck J, Bai X, Law SM, Savage JC, Lambert JJ, Belelli D, Tremblay ME, Cahalan MD, Baram TZ. Defining the Role of Microglia in the Synaptic Rewiring of CRH+ Neurons in the Developing Hypothalamus During Early-Life Adversity. 26th Annu Soc Behav Neuroendocrinol Meet; 2022; Atlanta, GA.

**Shao M**, Ahmed S, Brenner G. Treatment of Benign Nervous System Tumors Using Attenuated Bacteria. 2021 Sci Advis Comm Virtual Poster Sess, Massachusetts Gen Hosp; 2021; Boston, MA.

Bolton JL, Short AK, Othy S, Kooiker C, **Shao M**, Gunn BG, Beck J, Bai X, Law SM, Savage JC, Lambert JJ, Belelli D, Tremblay ME, Cahalan MD, Baram TZ. Impaired Microglial Pruning of Excitatory Synapses on Developing CRH-Expressing Hypothalamic Neurons Exacerbates Stress Responses Throughout Life. 60th Annu Am Coll Neuropsychopharmacol Meet; 2021; San Juan, PR.

Ngozi Z, Short AK, Othy S, Kooiker C, **Shao M**, Gunn BG, Beck J, Bai X, Law SM, Savage JC, Lambert JJ, Belelli D, Tremblay ME, Cahalan MD, Baram TZ, Bolton JL. Impaired Microglial Pruning of Excitatory Synapses on Developing CRH-Expressing Hypothalamic Neurons Exacerbates Stress Responses Throughout Life. 51st Annu Soc Neurosci Meet; 2021; Chicago, IL (changed to virtual).

Law SM, **Shao M**, Othy S, Beck J, Bai X, Kooiker C, Short A, Parker I, Cahalan MD, Baram TZ, Bolton JL. Microglia Control Hypothalamic Excitatory Synapse Number and Their Function Is Inhibited by Early-Life Adversity. UC Irvine Conte Cent Annu Symp; 2021; Irvine, CA.

Bolton JL, **Shao M**, Othy S, Beck J, Bai X, Kooiker C, Parker I, Cahalan MD, Baram TZ. The Role of Microglia in the Sculpting of Developing Stress Circuits by Early-Life Adversity. 58th Annu Am Coll Neuropsychopharmacol Meet; 2019; Orlando, FL.

Bolton JL, **Shao M**, Othy S, Beck J, Bai X, Kooiker C, Parker I, Cahalan MD, Baram TZ. The Role of Microglia in the Sculpting of Developing Stress Circuits by Early-Life Adversity. 49th Annu Soc Neurosci Meet; 2019; Chicago, IL.

**Shao M**, Majorkiewicz E. The Role of Microglia During Early-Life Stress in Males vs. Females. Conte Cent @UCI 5th Annu Symp; 2018; Irvine, CA.

Bolton JL, Othy S, **Shao M**, Majorkiewicz E, Chen Y, Cahalan MD, Parker I, Baram TZ. The Role of Microglia in Synaptic Rewiring by Early-Life Stress. Gordon Res Conf: Neuroimmune Commun Health Dis; 2017; Ventura, CA.

**Shao M**, Majorkiewicz E. Synaptic and Microglial Density During Early-Life Stress in Males vs. Females. Undergrad Res Opp Program Symp, Univ Calif-Irvine; 2017; Irvine, CA.

**Shao M**. The Effect of Early-Life Stress on Synapses in Males and Females. Excellence in Res Symp (Poster and Oral Presentation), Univ Calif-Irvine; 2017; Irvine, CA.

## PROFESSIONAL MEMBERSHIPS

- American Association for Cancer Research (AACR), associate member (member ID 1312871)
- American Association of Neurological Surgeons (AANS), student member

- Congress of Neurosurgery (CNS), student member
- The Society of Asian Academic Surgeons (SAAS), student member

## **CERTIFICATES & SKILLS**

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- Certificates: CPR and AED; BLS Provider
- Language: Chinese (native)
- Computer: Prism, ImageJ, Final Cut Pro, R
- Interests: Brazilian Jiu Jitsu, badminton, acrylic painting