BIOGRAPHICAL SKETCH

NAME: Harriet W. Hopf

eRA COMMONS USER NAME (credential, e.g., agency login): HWHOPF

POSITION TITLE: Interim Associate Vice President for Faculty, Professor Anesthesiology, Adjunct Professor of Bioengineering, University of Utah

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Yale University, New Haven, CT	BA	05/1982	Biology
Dartmouth Medical School, Hanover, NH	MD	06/1986	Medicine
University of Minnesota, Minneapolis, MN	Intern	06/1987	Surgery
University of California, San Francisco, San Francisco, CA	Research Fellow	12/1988	Surgery
University of California, San Francisco, San Francisco, CA	Resident	12/1991	Anesthesiology
University of California, San Francisco, San Francisco, CA	Research Fellow	06/1992	Anesthesiology

A. Personal Statement

I have been dedicated throughout my career to providing the training and mentoring required to enable trainees to develop successful careers in interdisciplinary, collaborative, translational research that advances the science and practice of anesthesiology and perioperative medicine. My own research follows this model and has contributed to 1) advances in scientific understanding, specifically in the areas of wound healing and oxygen delivery and 2) advances in perioperative patient management, specifically related to surgical site infection prevention. While at UCSF I was funded by the NIH from 1989 -2005 through a collaborative, interdisciplinary P50 Center grant (GM RCG P50 GM27345) focused on Wound Healing, Infection, and Inflammation. I was Co-Investigator from 1989-1994 and PI of one of the projects from 1995-2005. I served as Associate Director of the Center Grant from 1995-2005 and Associate Director of the Wound Healing Laboratory from 1996-2006.

A second major focus of my career has been mentoring trainees and junior faculty—both in research and in career development—many of whom have gone on to successful academic careers. At UCSF, I served on the Surgery Department Trauma Training T32 as a mentor from 1992-2006 and on the Executive Committee from 1996-2006. I served as a mentor on the Department of Anesthesia's T32 from 2004-2006. In the University of Utah Department of Anesthesiology, I have focused on resident and medical student research training as the Director of Resident Research Training since 2009 and on career mentoring for junior faculty as the Vice Chair for Faculty Development since 2011. In the School of Medicine, my focus has been faculty career development as the Director of the Faculty Mentoring Program and the Women in Medicine and Science Program from 2009-2012, and as Associate Dean for Academic Affairs from 2012-2016. As Senior Special Assistant to the Office of Faculty from 2016-2018 and now as Interim Associate Vice President for Faculty, I have expanded my focus to the University of Utah as a whole. My mentoring contributions have been recognized locally and nationally: the inaugural UCSF Graduate Students Association Faculty Mentoring Award in 1999, election to the FAER Academy of Research Mentors in Anesthesiology in 2011, and the FAER Mentoring Excellence in Research Award in 2013. I have also been recognized as an educator: I was elected to the UCSF Academy of Medical Educators in 2004 and to the University of Utah Academy of Health Sciences Educators in 2014. I served on the (Educational) Research Committee for the Utah AHSE from 2014-2016 and as Chair of the (Educational) Mentoring Committee from 2016-2018.

B. Positions and Honors

Positions and Employment

1992 - 2006	Assistant Professor / Associate Professor / Professor in Residence, University of California, San Francisco, Departments of Anesthesia and Surgery, San Francisco, CA
1996 - 2006	Associate Director, UCSF Wound Healing Laboratory, San Francisco, CA
1998 - 2006	Faculty, UCSF / UCB Bioengineering Graduate Group, San Francisco, CA
2006 - Present	Professor, University of Utah, Department of Anesthesiology, Salt Lake City, UT
2006-2009	Director of Translational Research, University of Utah, Department of Anesthesiology
2006 - 2008	Medical Director, Intermountain Healthcare Urban Central Region Wound Care Services
2008 - Present	Adjunct Professor, University of Utah, Department of Bioengineering, Salt Lake City, UT
2009 - 2018	Director of Resident Research Training, University of Utah, Department of Anesthesiology
2009 - 2012	Director of Mentoring, Office of Faculty Administration, University of Utah SOM
2009 - 2013	Director of Women in Medicine and Science, University of Utah School of Medicine
2011 - 2018	Vice Chair for Faculty Development, Department of Anesthesiology, University of Utah
2012 – 2016	Associate Dean for Academic Affairs, University of Utah School of Medicine
2016 - 2018	Senior Special Assistant in the Office of Faculty, University of Utah
2018 – 2019	Interim Associate Vice President for Faculty, University of Utah

Other Experience and Professional Memberships

2001 - 2013	Wound Healing Society BOD (2001-4, 2015-18), Secretary (2006-10), Vice President (2009-10), President-Elect (2010-11), President (2011-12), Past President (2012-13)
2009 - Present	Editorial Board, *Wound Repair and Regeneration*
2015 – Present	Associate Editor, *Anesthesiology*
2013 – Present	Board of Directors, Foundation for Anesthesia Education and Research (FAER)
2015 – 2018	Steering Committee, AAMC Group on Faculty Affairs

Honors

1999	UCSF Graduate Students Association Faculty Mentorship Award
2004 - 2006	UCSF Haile T. Debas Academy of Medical Educators
2008 - 2009	Fellow, Executive Leadership in Academic Medicine Program, Drexel University
2011 - Present	FAER Academy of Research Mentors in Anesthesiology
2013	FAER Mentoring Excellence in Research Award
2013	YWCA Utah Outstanding Achievement Award in Medicine and Health
2014 - Present	Fellow, University of Utah Academy of Health Science Educators
2017	Linda K. Amos Award for Distinguished Service to Women, University of Utah

C. Contributions to Science

The overarching theme of my research relates to the measurement and control of tissue oxygenation to optimize wound healing and resistance to infection. The first three areas outlined below represent a research thread that contributed to scientific understanding or advances in patient management in this area. The fourth outlines a new area of focus: sustainability in anesthesiology.

1) Methods of measuring wound oxygen. Control of tissue oxygen levels requires the ability to measure tissue oxygen and tissue perfusion. Our lab has investigated the accuracy, precision, feasibility, and usefulness of a number of minimally invasive and non-invasive devices and approaches to measuring

oxygen and perfusion. These include polarographic electrodes, optical electrodes (fluorescent oxygen quenching), near-infrared spectroscopy, electron paramagnetic resonance, fluorine-tuned MRI, orthogonal polarization spectral imaging, and laser Doppler flowmetry. Accurate and relatively convenient means of measuring oxygen enables all of the advances outlined below. Many of these studies were funded by NIH GM RCG P50 GM27345 from 01/01/89 - 12/31/05.

a. Rollins MD*, Conrad MB*, Hunt TK, **Hopf HW**. (2003). Accuracy of a polarographic electrode at high oxygen concentrations. *Adv Exp Med Biol*, *510*, 169-73.
b. **Hopf HW**, Hunt TK, Scheuenstuhl H, West JM, Humphrey LM, Rollins MD. (2004). Measuring oxygen in wounds. *Methods Enzymol*, *381*, 539-64.
c. Fife CE, Smart DR, Sheffield PJ, **Hopf HW**, Hawkins G, Clarke D. Transcutaneous oximetry in clinical practice: consensus statements from an expert panel based on evidence. Undersea Hyperb Med. 2009 Jan-Feb;36(1):43-53. [Cited by 72]
d. Liu S*, Shah SJ, Wilmes LJ, Feiner J, Kodibagkar VD, Wendland MF, Mason RP, Hylton N, **Hopf HW,** Rollins MD*. Quantitative tissue oxygen measurement in multiple organs using (19) F MRI in a rat model. Magn Reson Med. 2011 Dec;66(6):1722-30. PMCID: PMC3186821 [Funding: FAER Mentored Research Training Grant, 2006 – 2008].

***trainee**

2) Wound Hypoxia and Surgical Site Infection. TK Hunt demonstrated in the 1960s that wound hypoxia was common, but studies of neutrophils suggested it was not sufficient to impair resistance to infection. Our lab demonstrated that wound / subcutaneous oxygen tension in well-perfused healthy volunteers was about 60-70 mmHg and that the k_m for oxygen for superoxide production by neutrophils (the mandatory first step for most bacterial killing) was 40-80 mmHg, suggesting that bacterial killing is oxygen limited (about half the maximal rate) in normal volunteers. Clinically, we demonstrated that postoperative wound hypoxia (pO2 <40 mmHg) was common and predicted surgical site infection (SSI). More recently, using the Utah Population Database, we demonstrated a genetic contribution to surgical site infection, although we have not yet identified the responsible genes / SNPs. Many of these studies were funded by NIH GM RCG P50 GM27345 from 01/01/89 - 12/31/05.

a. Allen DB*, Maguire JJ, Mahdavian M, Wicke C*, Marcocci L, Scheuenstuhl H, Chang M*, Le AX*, **Hopf HW**, Hunt TK. (1997). Wound hypoxia and acidosis limit neutrophil bacterial killing mechanisms. *Arch Surg*, *132*(9), 991-6. [Cited by 475]
b. **Hopf HW**, Hunt TK, West JM, Blomquist P, Goodson WH 3rd, Jensen JA, Jonsson K, Paty PB, Rabkin JM, Upton RA, von Smitten K, Whitney JD. (1997). Wound tissue oxygen tension predicts the risk of wound infection in surgical patients. *Arch Surg*, *132*(9), 997-1004; discussion 1005. [Cited by 676]
c. Wong VK*, Stotts NA, **Hopf HW**, Froelicher ES, Dowling GA. (2007). How heel oxygenation changes under pressure. *Wound Repair Regen*, *15*(6), 786-94.
d. Lee JP*, **Hopf HW**, Cannon-Albright L. Empiric evidence for a genetic contribution to predisposition to surgical site infection. Wound Rep Regen 2013 Mar;21(2):211-5. PMCID: PMC3594658

3) Preventing Surgical Site Infection. The observation that wound hypoxia is common in surgical patients led to the hypothesis that excess catecholamines in response to cold exposure / hypothermia, hypovolemia, pain, and stress decreases wound oxygenation and that prevention of sympathetic nervous system activation could reduce SSI. Both hypotheses were supported. In fact, we demonstrated that maintenance of normothermia in colon surgery patients significantly reduced SSI by about two-thirds. This finding led rapidly to guidelines recommending perioperative active warming of most surgical patients. Addition of supplemental oxygen has been controversial, although studies that carefully control sympathetic tone have generally shown benefit (including the original study in which wound oxygen was approximately significantly increased in the high inspired oxygen group) and there has not been strong evidence of harm.

a. Sheffield CW*, Sessler DI, **Hopf HW**, Schroeder M, Moayeri A, Hunt TK, West JM. (1996). Centrally and locally mediated thermoregulatory responses alter subcutaneous oxygen tension. *Wound Repair Regen*, *4*(3), 339-45. [Cited by 121] [Funded by NIH GM RCG P50 GM27345]
b. Kurz A, Sessler DI, Lenhardt R, for the Study of Wound Infection and Temperature Group [**Hopf HW**, et al.] (1996). Perioperative normothermia to reduce the incidence of wound infection and duration of hospitalization. *N Engl J Med*, *334*(19), 1209-1215. [Cited by 2581]
c. Greif R, Akça O, Horn EP, Kurz A, Sessler DI [**Hopf HW**, et al.] (2000). Supplemental Perioperative O2 To Reduce the Incidence of Surgical Wound Infection. *N Engl J Med*, (342), 161-7. [Cited by 1061]

d. Mackintosh M*, Gertsch MC*, **Hopf HW**, Pace, NL, White J, Morris R*, Morrissey C*, Wilding V*, Herway S*. (2012) High Intraoperative Inspired Oxygen Does Not Increase Postoperative Supplemental Oxygen Requirements. Anesthesiology. 117(2):271-279.
e. Akca O, Ball L, Belda FJ, Biro P, Cortegiani A, Eden A, Ferrando C, Gattinoni L, Goldik Z, Gregoretti C, Hachenberg T, Hedenstierna G, **Hopf HW**, Hunt TK, Pelosi P, Qadan M, Sessler DI, Soro M, Senturk M. (2017) WHO Needs High FiO2? Turk J Anaesthesiol Reanim. 45:181-192.
f. Jayathilake C, Maini PK, **Hopf HW**, McElwain S, Byrne HM, Flegg MB, Flegg JA. A mathematical model of the use of supplemental oxygen to combat surgical site infection. Journal of Theoretical Biology 2019; 466:11-23. doi: 10.1016/j.jtbi.2019.01.021. PMID: 30659823.

4) Sustainability in Anesthesiology. Vapor anesthetic agents are greenhouse gases. Desflurane has ~12 times greater global warming potential than isoflurane and also costs ~25 times as much. A departmental initiative to reduce desflurane use in favor of isoflurane led to a one-year costs savings of $301,905 and a reduction in carbon emissions equivalent to driving 76 million fewer miles in a year. Our initial manuscript was rejected with the argument that slower wake-up from isoflurane would have negated the cost savings. Analysis of wake-up time over the year before and after the reduction of desflurane used demonstrated a statistically, but not clinically or financially significant difference in propensity weighted mean patient wakeup time: 7.1 minutes for desflurane vs. 7.8 minutes for isoflurane.
    a. Sherman JD, **Hopf HW,** Balancing Infection Control and Environmental Protection as a Matter of Patient Safety: The Case of Laryngoscope Handles. Anesth Analg (2018), epub, doi: 10.1213/ANE.0000000000002759.
    b. Warrier S, **Hopf H**. Reusable vs. Disposable Equipment in Anesthesia. ASA Monitor (2018), 82:22-24.
    c. Axelrod DA, Bradley D*, **Hopf HW**, Choudhary KJH, Adamson, KA, Baird PW, McKenna Q, Stuart AR, Cahalan C. Transition from Desflurane to Isoflurane Use: Impact on Cost, Greenhouse Gas Production, and Wake-Up Time**.** Under revision for Anesthesiology.

5) Genetic Contributions to Surgical Site Infection: In collaboration with Dr. Lisa Cannon-Albright (Genetic Epidemiology) and using the Utah Population Database, we demonstrated a genetic contribution to SSI. Our next step is to obtain funding to identify and characterize candidate genes. Genomic identification of high risk patients could lead to targeted interventions to prevent SSI.
    a. Lee JP*, **Hopf HW,** Cannon-Albright L. (2013) Empiric evidence for a genetic contribution to predisposition to surgical site infection. Wound Rep Regen 21:**211-5**.

6) A New View of Perioperative Temperature Management: Most patients are now actively warmed during surgery; hypothermia (T<36C) at the end of surgery is uncommon. Intraoperative hypothermia remains common, however, although it could, in theory, be prevented by *preoperative* active warming. A recent analysis of a large EMR database (Cleveland Clinic) demonstrated a greater area under the curve for intraoperative hypothermia was associated with increased risk for transfusion and prolonged hospital stay. Cleveland Clinic does not use preoperative active warming; we instituted a preoperative warming policy in 2009. Analysis of our EHR database demonstrated a lower rate and reduced duration of intraoperative hypothermia, suggesting preoperative active warming is effective. We are currently collaborating with Dr. Ram Nirula (Surgery) to combine the EHR data with outcomes data from our National Surgical Quality Improvement Program (NSQIP) database to evaluate the effect of intraoperative hypothermia on a wide range of surgical outcomes.
    a. Editorial: **Hopf, HW.** Perioperative Temperature Management: Time for a New Standard of Care? Anesthesiology (2015) 122:229-30.
    b. Pingree R*, Butts K*, Dangerfield J*, **Hopf HW**, Pace NL. Intraoperative Core Temperature Patterns in Patients with Preoperative and Intraoperative Forced Air Warming. In preparation for Anesthesiology.

Complete List of Published Work in My Bibliography (87)

https://www.ncbi.nlm.nih.gov/labs/bibliography/1VavbS7V4H25O/bibliography/public/