ORTHOPAEDIC TRAUMA ASSOCIATION
Education •• Research •• Service
9400 West Higgins Road, Rosemont, IL 60018-4976
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Website: http://www.ota.org

SECTION 1

PROPOSAL RESEARCH GRANT APPLICATION

Application Detailed Instructions Link

Total Amount Requested: $ 50,000 DATE: July 31, 2017

This request is made by the undersigned, who also agree(s) to comply with the following:

(1) Funds granted as a result of the request are to be expended for the purposes set forth herein.
(2) All reports or original investigations supported by any grant made as a result of this request shall acknowledge support provided by the Orthopaedic Trauma Association.
(3) Reports will be made as required and necessary records and accounts, including financial and property controls, will be maintained and made available to the Orthopaedic Trauma Association.

NAME	TITLE	DEPARTME	SIGNATURE
Principal Investigator: Samuel Hailu	MD	Orthopaedics	 Phone: +251 911 34 77 32 E-mails: samuel.hailu@aau.edu.et samiethio@gmail.com
OTHER INVESTIGATORS ASSOCIATED WITH PROJECT:			
Biruk Lambisso	MD	Orthopaedics	Addis Ababa University Phone: +251 911 23 25 07 Email: lbiruklw@yahoo.com
Sandra Hobson	MD	Orthopaedics	Emory University Phone: 434 841 3236 E-mail: sandralhobson@emory.edu
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Institution Name and Address:
Black Lion Hospital, Addis Ababa University
11 Zambia St.
Phone: +251 115 52 29 95
Email: orthopedics.som@aau.edu.et

SECTION 2

ABSTRACT OF RESEARCH PLAN

PROJECT TITLE:

Effect of silver or bleach irrigation solution on prevention of infection following open tibia fractures: A randomized controlled trial

Abstract of research plan: Please provide an abstract of 250 words or less with 5 underlined phrases for a project summary. Please avoid summaries of past accomplishments and the use of the first person. The abstract is meant to serve as a succinct and accurate description of the proposed work when separated from the application.

Background: Early initiation of antibiotics, operative irrigation and debridement, and sterile dressing of open fractures are accepted measures taken to minimize infection of open fractures. However, the choice of irrigation fluid and postoperative dressing in a resource-limited setting remains controversial. In low-income countries, sterile normal saline is often very costly. Therefore, providers are often forced to choose between unsterile distilled water or a bleach solution.

Objective: The aim of this study is to determine the effectiveness of ionic colloidal silver solution irrigation and dressing in the prevention of infection after open tibia fractures.

Methodology: This is a three-arm randomized controlled trial comparing the use of colloidal silver solution, 0.025% bleach solution, and normal saline irrigation and dressing of open tibia fractures in adults. 255 adult patients with open tibia fractures excluding Gustilo-Anderson (GA) type IIIC will randomized into three grounds. The intervention will be identical for all treatment groups according to a standard protocol except for the irrigation and dressing solutions. The primary outcome of the study is the infection rate. Secondary outcomes include wound healing, fracture union, duration of hospitalization, number of unplanned reoperations in 6 months and quality of life measured using the EQ-5D. Each outcome will be assessed at 2 weeks, 6 weeks, 3 months, 6 months, and 1 year after the initial intervention. Ultimately, this research has the rare opportunity to impact a large portion of the world's population with a relatively low cost.

SECTION 3

FACILITIES – Laboratory Space and Major Equipment

Please provide an accurate description of laboratory facilities and major equipment available at the grantee's institution that will support this project. Please recall the list of supplies and support that the grantee's institution, or grant funds other than those from the OTA, are expected to provide:
click to see the list

The study will be conducted within the Department of Orthopaedic Surgery, Black Lion University Hospital (BLH), Addis Ababa University, Addis Ababa, Ethiopia. The hospital is also known by its local name Tikur Anbessa Hospital. It is 850-bed tertiary referral hospital serving the capital city of Ethiopia with a population of at least three million people.[1] BLH has over twenty departments providing specialty care. It is also the primary educational hospital and research center for Ethiopia, a country with a population of over 100 million people[2] – almost one-third of the population of the United States. The Department of Orthopaedic Surgery has a stand-alone building dedicated solely to orthopaedic surgeries, clinics, and research on the BLH campus. This building contains 75 beds and 4 operating rooms for dedicated orthopaedic use. Operating rooms are available for use 24/7. The hospital is equipped with 24/7 running central laboratory with well-equipped microbiology department with culture and sensitivity facility.

BLH currently owns two colloidal silver generators capable of producing sufficient quantity and concentration of silver solution for the purposes of this study. Both generators are in good working condition. BLH has adequate storage space within the orthopaedic building to store the generated solution material needed for this project. Finally, BLH has multiple working computers and computer laboratory space more than adequate to perform data collection and analysis relevant for this project.

BLH currently has the surgical capacity to appropriately surgically treat tibial shaft fractures for the purposes of this study, including a sufficient stock of relevant implants such as external fixators and SIGN intramedullary nails.

SECTION 4

RESEARCH PLAN

Click for Research Plan Instructions

A. SCIENTIFIC AIMS **(not exceed 400 words)**

The aim of this study is to assess the effect of colloidal silver irrigation and dressing and 0.025% bleach irrigation solution and dressing on infection rates of open tibia fractures compared to sterile normal saline. This study investigates this in the setting of a major tertiary academic referral hospital in a low-income country. The null hypothesis is that there is no significant difference in infection rate between the three groups.

In low-income countries, sterile normal saline is often very costly. Therefore, providers are often forced to choose between unsterile distilled water or a bleach solution. Additionally, many patients with open fractures have a delayed presentation or delayed time to initial irrigation and debridement. In this different setting, it is unclear whether the non-superiority of solutions containing additives over normal saline would remain valid.

The primary outcome of this study is infection, including both superficial and deep infections. Secondary outcomes include patient function and quality of life as measured by the EuroQol-5 Dimensions (EQ-5D); wound healing including time to complete healing, rate of change in wound area or volume, or both, or time to skin grafting[3]; nonunion; length of hospital stay; number of repeat operative irrigation and debridements; and re-operation within six months. Planned surgical revision will not be considered an adverse secondary outcome. Additionally, patient age, sex, length of time from injury to presentation, comorbidities, and time to administration of antibiotics will be recorded and considered as potential confounding variables. OTA-Open Fracture Classification (OTA-OFC) will also be collected.

If these results demonstrate superiority of open fracture treatment with any single solution, this study could be repeated as a multi-center trial in collaboration with neighboring institutions. If bleach irrigation solution and dressing seems superior in this study, other institutions could adopt this method with relatively little increase in cost. Alternatively, if these results demonstrate that sterile saline is superior, then the effort of using bleach solution could be discontinued in good conscience. Finally, if silver with distilled water is superior, then a cost and feasibility analysis could be performed to see if this could be substituted for irrigation solution at intuitions with poor access to sterile normal saline.

Ultimately, this research has the rare opportunity to impact a large portion of the world's population with a relatively low cost.

B. BACKGROUND & SIGNIFICANCE **(not to exceed 400 words)**

Prevention of infection following open fractures has always challenged physicians and surgeons. Different established measures such as early initiation of prophylactic systemic and local antibiotics, prompt irrigation and debridement, fracture stabilization, and early soft tissue coverage are taken to prevent infection from developing. Despite all these measures, up to 50% of all Gustilo-Anderson (GA) type III fractures become infected.[4,5] Additionally, one study reported that post-operative infection rate following intramedullary nail fixation of open and closed fractures is higher with decreased country income level, meaning that patients in low-income countries are especially vulnerable.[6]

Effect of bacterial wound burden on wound healing has long been demonstrated.[7] Irrigation is used to supplement systematic and thorough debridement in removing foreign material and decreasing bacterial load.[8] However, choice of additives to the irrigation fluid is still controversial.[9] Use of antibiotic additives in irrigation solution has not been shown to be superior in human studies while it adds cost, promotes resistance, and carries risk of anaphylaxis. Antiseptics have concentration-dependent detrimental effects on the viability and function of host cells. Although some antiseptics can be diluted enough to be nontoxic to cells in culture while retaining some bactericidal activity, there is little information about their use in open fractures.[5,10]

Antiseptic solutions such as povidone iodine, bleach solution, and chlorhexidine have been used as additive of irrigation. But their effectiveness in lowering infection rates is still unclear in a low-income setting with a different environment and more delayed fracture presentation. Clinical studies have confirmed that bleach solution is bactericidal to organisms commonly encountered in open wounds.[11–13] Unfortunately, there exists substantial in vitro evidence that these solutions adversely affect the viability of host cells grown in cell culture. However, the detrimental effect of povidone iodine and bleach solution is concentration dependent.[7] Modified bleach solution in 0.025% concentration is proved to be safe.[11]

Electrically generated colloidal silver is another additive has been shown to have broad antimicrobial spectrum of action.[14–16] Not only it is effective alone but silver has also been shown to enhance susceptibility of bacteria to antimicrobials.[17,18] Silver dressings has been shown to significantly increase susceptibility of bacteria to systemic antibiotics.[17]

This work directly relates to the OTA's mission, vision, and value statements by investigating a potential substantial improvement in care for the injured patient, involving an international team of investigators, and potentially prompting a change in hospital or even country-wide policy regarding open fracture treatment.

C. PREVIOUS WORK DONE ON THE PROJECT **(Not to exceed 400 words)**

Faculty at BLH including investigators named on this study have performed previous work investigating fracture epidemiology and infection rates to better estimate the necessary sample size for this study. In an epidemiology study published in 2005, Ahmed et. al report that 1177 adult patients presented to BLH with a tibia fracture within a three-year period.[19] If averaged over one-month periods, this is approximately 32 to 33 tibia fractures of unknown type per month. A more recent follow-up study investigating tibia shaft fractures specifically revealed an incidence of 93 tibia fractures of unknown type within a three-and-one-half month period.[20] Of these, 35 were open tibial shaft fractures. Among these, 9/35 (25.7%) were Gustilo-Anderson type I, 8/35 (22.9%) were type II, 12/35 (34.3%) were type IIIA, 5/35 (14.3%) were type IIIB and 1/35 (2.9%) was type IIIC.[20] Additionally, some necessary equipment including the colloidal silver generators have already been obtained specifically for this project.

D. METHOD (**not to exceed 1200 words and 4 pages**)

Study Design: Three-arm single-blind randomized controlled trial

Null Hypothesis: There is no significant difference in infection rate among open fractures irrigated and dressed with either colloidal silver solution (CSS), 0.025% bleach solution (DBS), or normal saline solution (NSS).

Sample Size Estimation:

Sample size was estimated assuming the infection rate for the control intervention to be 30%. It was estimated that this intervention would reduce the rate by 20% with 90% confidence interval and 80% power. Therefore, 74 patients per group are needed based on power analysis alone. To account for potential loss to follow-up, each group will contain 85 patients.

Randomization:

This study aims for 255 patients total with 85 per arm. Patients will be randomly allocated to treatment groups using a computer-based random number generator. The treating surgeon can identify the solution type during use. Therefore, the patient will be blind to the intervention but the treating surgeon will not. Only one eligible fracture per patient will be included in the study. The study fracture will be the most severe fracture type based GA type if a patient has multiple eligible fractures.

Inclusion criteria:

Patients will be included if they meet all the following criteria: uninfected open fracture of the tibia; extra-articular fracture; less than seven days from injury to first operative debridement; open fracture without vascular injury requiring repair (GA type IIIC); aged 18 years or older.

Exclusion criteria:

Patients will be excluded if they meet any of the following criteria: GA type IIIC open fracture; active clinical infection on presentation; intra-articular fracture; open fracture with more than seven days to first operative debridement; history of previous wound infection or osteomyelitis in the affected bone or leg (knee to ankle); previous fracture with retained hardware; less than 18 years of age; immunocompromised states specifically diagnosis of HIV, diagnosis of diabetes mellitus, immunosuppressive medication within past six months, severe renal or hepatic impairment; current prisoners; and unable to provide informed consent.

Patient Recruitment and Screening:

Please see Figure 1: Study trial conduct procedure

Study tools and Method

The primary outcome of the study is the infection rate. Secondary outcomes include time to wound healing, time to fracture union, duration of hospitalization, number of unplanned reoperations in 6 months and quality of life measured using the EQ-5D. Each outcome will be assessed at 2 weeks, 6 weeks, 3 months, 6 months, and 1 year after the initial intervention. Additionally, each fracture will be classified according to the OTA-OFC on presentation.[21]

Standardized Intervention:

In all the groups standardized interventions listed below will be undertaken:

1. Wound will be dressed with sterile gauze and temporarily stabilized via splint in emergency department (ED).
2. Prophylactic IV antibiotics will be administered in ED: ceftriaxone for Gustilo-Anderson types I and II, ceftriaxone and gentamycin for Gustilo-Anderson type III, and ceftriaxone, gentamycin, and metronidazole for gross and farmyard contamination.

3. Operative irrigation and debridement will be performed by the on-call resident after the study team has randomly allocated the patient to specific study group.
4. The injured extremity will be prepared with iodine and draped using sterile technique. Irrigation protocol will be as explained on next page and adequate debridement will be made by removing all gross debris, contaminant and dead tissue (muscle, fat, fascia, skin and bone).
5. Irrigation volume will be according to GA classification (Type I - 3 L, Types II and III – 6 L)[3] of randomized solution then sterilely dressed with a dressing that has been gently soaked in the same solution.
6. External fixator or intramedullary nailing will be used for fracture management based on surgeon's choice.
7. Wounds will be irrigated and debrided every 2-3 days as deemed appropriate by the treating surgeon with the same irrigation solution as initially randomized.
8. Wounds will be closed primarily in GA types I and II; for GA types IIIA and IIIB the closure will be determined by the treating surgeon and may include acute or delayed primary closure, negative wound pressure therapy, split thickness skin graft, and/or fasciocutaneous or muscle flaps.

Standard intervention for patients who develop infection (see figure?)

1. Operative irrigation debridement will be performed every 2-3 days with the same irrigation solution as initial randomization
2. Twice daily dressing change will be done in the wards.
3. Cultures and sensitivities will be determined from intraoperative deep sample
4. Antibiotics will be given based on culture and sensitivities.
5. Implants will be retained unless it is difficult to control infection.
6. Fracture will be stabilized with external fixator if implants are removed or if not already stabilized by implants

Data collection and analysis

Data will be collected by either a trained research coordinator, trained resident, or trained physician in the emergency department, during hospitalization, and during subsequent clinic visits. A trained biostatistician will assist with statistical analysis. In short, an analysis of variance will be performed to determine if there is a significant difference between the study arms. Multivariate analysis will be used to identify potential confounding variables.

Timeline

The study designers anticipate a data collection period of approximately two years to recruit 255 patients with open tibial shaft fractures excluding GA type IIIC based on previously collected data.[19,20] The data collection period is scheduled for March 2018 through March 2020. Prior to data collection, a research coordinator will be recruited to oversee data collection and analysis. Once grant funding obtained in early 2018, this funding will be used to obtain additional necessary supplies as detailed in the budget. A preliminary mid-collection analysis will be conducted in March of 2019 to investigate whether there are significant differences between any groups. The final data analysis will be performed in April and May of 2020 with a plan to submit for publication by the summer of 2020.

Ethics regarding human subjects

The specific inclusion and exclusion criteria are described above. The anticipated characteristics of the subject population are primarily young adults with a higher male predominance. They will be almost exclusively of native Ethiopian background with the majority (approx. 80%) from within the greater Addis Ababa area and the remainder from surrounding regions.[19] General health status will likely be fair to good as patients with immunodeficient states will be excluded as described above.

This study has previously been approved by the BLH IRB at an earlier date. Because the PI left Ethiopia for fellowship, the study needed to be deferred. The PI has now returned and is well-established in Ethiopia, and this IRB is in the process of being renewed. Consent forms both in English and Amharic languages have been are prepared and will thoroughly be explained verbally to the patient and any individuals accompanying the patient. All questions will be answered. The issues of confidentiality (the participant name or address will be used privately only to contact them in case the need arises) and privacy (interviews will be undertaken in a private situation as much as possible) will be respected by all involved in the study. Additionally, participants will be informed that they have a full right to refuse or discontinue participating at any time and their action will not have any effect on the care they receive.

E. REFERENCES **(not to exceed 2 pages)**

1. Central Statistical Agency of Ethiopia. http://www.csa.gov.et/.
2. The World Bank Data: Ethiopia. http://data.worldbank.org/country/ethiopia.
3. Flow Investigators F. Fluid lavage of open wounds (FLOW): design and rationale for a large, multicenter collaborative 2 x 3 factorial trial of irrigating pressures and solutions in patients with open fractures. *BMC Musculoskelet Disord*. 2010;11:85. doi:10.1186/1471-2474-11-85.
4. Neubauer T, Bayer GS, Wagner M. Open fractures and infection. *Acta Chir Orthop Traumatol Cech*. 2006;73(5):301-312.
5. Hoff WS, Bonadies JA, Cachecho R, Dorlac WC. East Practice Management Guidelines Work Group: update to practice management guidelines for prophylactic antibiotic use in open fractures. *J Trauma*. 2011;70(3):751-754. doi:10.1097/TA.0b013e31820930e5.
6. Young S, Lie SA, Hallan G, Zirkle LG, Engesaeter LB, Havelin LI. Risk factors for infection after 46,113 intramedullary nail operations in low- and middle-income countries. *World J Surg*. 2013;37(2):349-355. doi:10.1007/s00268-012-1817-4.
7. Melvin JS, Dombroski DG, Torbert JT, Kovach SJ, Esterhai JL, Mehta S. Open tibial shaft fractures: I. Evaluation and initial wound management. *J Am Acad Orthop Surg*. 2010;18(1):10-19.
8. Anglen JO. Wound irrigation in musculoskeletal injury. *J Am Acad Orthop Surg*. 2001;9(4):219-226.
9. Anglen JO. Comparison of soap and antibiotic solutions for irrigation of lower-limb open fracture wounds. A prospective, randomized study. *J Bone Joint Surg Am*. 2005;87(7):1415-1422. doi:10.2106/JBJS.D.02615.
10. Giannoudis P V, Papakostidis C, Roberts C. A review of the management of open fractures of the tibia and femur. *J Bone Joint Surg Br*. 2006;88(3):281-289. doi:10.1302/0301-620X.88B3.16465.
11. Heggers JP, Sazy JA, Stenberg BD, et al. Bactericidal and wound-healing properties of sodium hypochlorite solutions: the 1991 Lindberg Award. *J Burn Care Rehabil*. 1991;12(5):420-424.
12. Lineaweaver W, Howard R, Soucy D, et al. Topical antimicrobial toxicity. *Arch Surg*. 1985;120(3):267-270.
13. McKenna PJ, Lehr GS, Leist P, Welling RE. Antiseptic effectiveness with fibroblast preservation. *Ann Plast Surg*. 1991;27(3):265-268.
14. Percival SL, Bowler PG, Russell D. Bacterial resistance to silver in wound care. *J Hosp Infect*. 2005;60(1):1-7. doi:10.1016/j.jhin.2004.11.014.
15. Berger TJ, Spadaro JA, Chapin SE, Becker RO. Electrically generated silver ions: quantitative effects on bacterial and mammalian cells. *Antimicrob Agents Chemother*. 1976;9(2):357-358.
16. Yu D-G. Formation of colloidal silver nanoparticles stabilized by Na+-poly(gamma-glutamic acid)-silver nitrate complex via chemical reduction process. *Colloids Surf B Biointerfaces*. 2007;59(2):171-178. doi:10.1016/j.colsurfb.2007.05.007.
17. Kostenko V, Lyczak J, Turner K, Martinuzzi RJ. Impact of silver-containing wound dressings on bacterial biofilm viability and susceptibility to antibiotics during prolonged treatment. *Antimicrob Agents Chemother*. 2010;54(12):5120-5131. doi:10.1128/AAC.00825-10.
18. Shahverdi AR, Fakhimi A, Shahverdi HR, Minaian S. Synthesis and effect of silver nanoparticles on the antibacterial activity of different antibiotics against Staphylococcus aureus and Escherichia coli. *Nanomedicine*. 2007;3(2):168-171. doi:10.1016/j.nano.2007.02.001.
19. Ahmed E, Chaka T. The pattern of orthopedic admissions in Tikur Anbessa University Hospital, Addis Ababa. *Ethiop Med J*. 2005;43(2):85-91.
20. Hailu S, Gebreselassie K, Fikre R, Biruk LW. Pattern of fracture at Tikur Anbessa University Hospital: Prospective study. *Ethiop Soc Orthop Traumatol Year B*. 2011;II(51).
21. Agel J, Evans AR, Marsh JL, et al. The OTA open fracture classification: a study of reliability and agreement. *J Orthop Trauma*. 2013;27(7):375-379. doi:10.1097/BOT.0b013e3182820d31.

F. FIGURES (if figures added outside of the text pages – **not to exceed 1 page**)

Steps	**Procedure**	**Data collected**
Patient	Study explanation: information sheet History, Examination Investigation (Laboratory and imaging) Informed consent, if eligible ↓ Randomization ↓	Screening Form Informed consent
Intervention	Colloidal silver solution: ER sterile dressing, dipped in 10ppm OR irrigation with 10ppm OR sterile dressing dipped in 10ppm	Intervention Form
Comparison	Dakin's (Bleach) Solution: ER sterile dressing, dipped in 0.025% OR irrigation with 0.025% Or sterile dressing dipped in 0.025%	
Control	Normal saline(NS): ER sterile dressing, dipped in NS OR irrigation with NS OR sterile dressing dipped in NS ↓	
Follow up: 1 week 2 weeks 6 weeks 12 weeks 24 weeks	 Assessment of Outcome Assessment of Outcome Assessment of Outcome Assessment of Outcome Assessment of Outcome	 Follow up Form

Figure 1. Study trial conduct procedure

SECTION 5

BIOGRAPHICAL SKETCH

Not to exceed two pages for each person. Copy and paste below the two Bio-Sketch pages for each additional Investigator.

NAME: Samuel Hailu	TITLE: MD Asst. Prof Ortho Surg	BIRTHDATE: May 15, 1985
PLACE OF BIRTH: Gondar, Ethiopia	NATIONALITY: Ethiopian (has active US visa status)	SEX (right click on the check in box/properties/default value/checked **Male** ☒ Female ☐

EDUCATION

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Addis Ababa University, Addis Ababa, Ethiopia	MD	06/2009	Medicine
Addis Ababa University, Addis Ababa Ethiopia	Specialty certificate	02/2014	Orthopaedic Surgery
University of Toronto, Toronto Canada	Fellowship	12/2015	Orthopaedic Trauma/Arthroplasty

RELATIONSHIP TO PROPOSED PROJECT:	MAJOR RESEARCH INTEREST:
Principal investigator	Orthopaedic trauma, pelvic and acetabular injuries, hip/knee arthroplasty

HONORS:

2009: Outstanding graduate of class of 2009 Medical Graduates, University of Addis Ababa

2012: Young Enthusiastic Orthopaedic Surgeon of 2012, Ethiopian Society of Orthopaedics and Traumatology

March 2014: OTC Foundation 4-week orthopaedic trauma travel fellowship to Harborview Medical Center, University of Washington, Seattle, WA

Jan 2015: Prakash Foundation low income country surgical scholarship, University of Toronto, Canada

2017: Recognition award for Pelvic and acetabulum work contribution as the only fellowship trained pelvic surgeon in Ethiopia, Ethiopian Society of Orthopaedics and Traumatology

OTHER RESEARCH SUPPORT

RESEARCH AND/OR PROFESSIONAL EXPERIENCE:

1. **Samuel Hailu**, Mulugeta Naizgi, Selamawit Habte. Prevalence and Determinants of Breast Feeding in Oromia Region in The Year 2005G.C.

2. **S. Hailu**, R. Fikre, H. Yohannes, A. Daniel, L.W Biruk. Age determination at Tikur Anbessa University Hospital, Addis Ababa University. East Cent. Afr. J. surg.2011; Vol. 16(2):80-86
   http://www.bioline.org.br/request?js11033
   Presented it on 15th annual ESS conference, Hawassa, Ethiopia

3. **Samuel Hailu**, Eric Gokcen, Biruk Lambisso, Jakob Schenider, Daniel Admassie, Jemal Hussein. Adamantinoma of Tibia in Ethiopia: the first bone transplant in Ethiopia. Ethiop Med J. 2012. Vol 50(2):185-192
   http://www.emaethiopia.org/index.php?option=com_content&view=article&id=13&Itemid=3
   Presented on 10th SIGN annual conference, Richland, Washington, USA
   Presented on 2011 EMA annual conference Addis Ababa, Ethiopia

4. **Samuel Hailu**, Kibrom Gebreselassie, Robel Fikre, Biruk L. W. Pattern of Fracture at Tikur Anbessa University Hospital: Prospective study. Ethiopian society of Orthopedics and Traumatology. 2011:p51
   Presented on 6th annual ESOT meeting, Addis Ababa, Ethiopia

5. Surgical Treatment of Chronic Elbow Dislocation Allowing Early Range of Motion: Operative Technique and Clinical Results: accepted by JOT for publication

6. **Ongoing projects:**

    1. **Principal Investigator,** Biomechanics of associated both column acetabulum fixation options

    2. Principal Investigator: Pelvic and Acetabulum fracture Epidemiology and surgical outcomes in Addis Ababa

    3. **Local Principal investigator:** INternational ORthopaedic MUlticenter Study in Fracture Care (INORMUS)

    4. **Local Principal investigator:** Hipattck

Professional experience:

1. Lecturer, Department of Surgery, Black Lion Specialized Hospital, Addis Ababa University. June, 2009-January 2010.
2. Chief Resident, Department of Orthopedics, Black Lion Specialized Hospital, Addis Ababa University. January- December, 2013
3. Assistant professor of Orthopaedic Surgery, Black Lion Hospital, Addis Ababa University, Addis Ababa, Ethiopia. January 2014- present.

NAME: BIRUK L.WAMISHO	TITLE; Consultant Orthopaedic Surgeon, Associate Professor, Head of Department	BIRTHDATE (Mo., Day, Yr.) Aug 23, 1974
PLACE OF BIRTH **(**City, State. Country**)** Shashemene, Ethiopia	NATIONALITY (If non-US citizen indicate visa status**):** ETHIOPIAN	SEX (right click on the check in box/properties/default value/checked Male ☒ Female ☐

EDUCATION (Begin with baccalaureate training and include postdoctoral.)

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Gondar College of Medical Sciences, Ethiopia (1992-1999)	Degree of Doctor of Medicine	1999	Medicine (Human)
Addis Ababa University	Specialty Certificate in orthopaedics (2002-2006)	2006	Orthopaedics

RELATIONSHIP TO PROPOSED PROJECT:	MAJOR RESEARCH INTEREST:
CO-Investigator	Orthopaedic Trauma, General Orthopaedics, Cartilage

HONORS: Many

OTHER RESEARCH SUPPORT: MoST National grant for Disability Rating Project.

RESEARCH AND/OR PROFESSIONAL EXPERIENCE (Start with present position: list ALL experience relevant to project. Include publications.)

I have been a Medical Doctor in public service for the last 20 years. I treat orthopaedic patients, teach residents and conduct related researches. Interested & involved in Medical Ethics and leadership.

Current Research Projects in Progress:

- MSK tumors at Blacklion Hospital: three decades analysis of magnitude and trends
- Waiting List for Orthopaedic Surgery at Black-Lion Hospital. What is happening while waiting?
- Retrograde femur nailing in Adolescents: Experimental Animal Study on Sheep.
- Transfusion Practice at Black-Lion Hospital/ blood donation
- Impact of Saturday Free Surgery on a patient waiting list.
- Orthopaedic Case-Mix and 30 year trends in a single department
- Permanent Physical Disability Rating in Ethiopia: Developement of a Software.

SECTION 5 BIOGRAPHICAL SKETCH (continued)

More than 25 publications, recent ones:

1. Ethiop. J. Health Dev. 2010;24(1):61-63., Volume 24, No 1, 2010, 1 - 86

Title: Adult limb fractures in Tikur Anbessa Hospital caused by road traffic injuries: Half year plain radiographic pattern. Daniel Admassie, Tekle Yirga,Biruk L. Wamisho
Main author: Daniel A. Co-authors List: Biruk L.W, Tekle Yirga
Hard copy available:
Website: http://ejhd.uib.no/ejhd-v24-n1/ejhdv24-no1-cover.html

2. Publisher: East and Central African Journal of Surgery ASSOCIATION OF SURGEONS OF EAST AFRICA AND COLLEGE OF SURGEONS OF EAST CENTRAL AND SOUTHERN AFRICA ISSN: 1024-297X EISSN: 2073-9990 VOL. 12, NO. 1, 2007, PP. 33-41

Title: Chronic Osteomyelitis at Tikur Anbessa Hospital, Addis Ababa University, Ethiopia. Biruk, W.L. & Wubshet, K.
Main author: Biruk L.W. Co-author List: Wubshet, K. Type; Original article.
Website: http://www.bioline.org.br/abstract?id=js07005&lang=en

3. Pycnodysostosis with Epilepsy in a Malawian patient: A Case Report. East and Central African Journal of Surgery .VOL. 14, NO. 1, March/April 2009, PP. 98-102.Open access journal. Type: Case report. Main Author: Dr. Biruk L.W.; Co-author List: Bates, J.

Website: http://www.bioline.org.br/abstract?id=js09017&lang=en

4. Biruk Lambisso Wamisho (2006) Permanent musulo-skeletal disability following injury – seventeen year trends. *East and Central Africa Journal of Surgery*. Vol.11/1, pp. 41-48
5. Biruk Lambisso Wamisho and Woubalem Zewde (2006). Trends in major orthopaedic procedures. *East and Central Africa Journal of Surgery*. Vol.11/1, pp. 32-40.
6. Biruk L et al. Age determination at "Tikur Anbesa Hospital", Addis Ababa University. East and Central African Journal of Surgery, Vol. 16, No. 2, 2011, pp. 80-86
7. Biruk L. et al (2010). Bacteriology of compound (open) fracture wounds at "Tikur Anbesa" Specialized Hospital, Addis Ababa University, Ethiopia. *Ethiop. J. Health Biomed ci., 2010 Vol3, No.1*
8. *Referrals of Ethiopian Orthopedic Patients for Treatment Abroad B Bezabih, BL Wamisho.* COSECSA/ASEA Publication -East and Central African Journal of Surgery April 2013; Vol. 18 N0.1. http://www.bioline.org.br/pdf?js13001 or use http://www.ajol.info/index.php/ecajs/article/view/89918
9. Adamantinoma of tibia in Ethiopia: the first bone transplant in Ethiopia. Ethiop Med J. 2012 Apr; 50(2):185-92.
10. Bahiru Bezabeh, Biruk L. Wamisho, and Maxime J. M. Coles. Treatment of Adult Femoral Shaft Fractures Using the Perkins Traction at Addis Ababa Tikur Anbessa University Hospital: The Ethiopian Experience. Int Surg: January-March 2012, Vol. 97, No. 1, pp. 78-85. doi: http://dx.doi.org/10.9738/CC48.1
11. A-three decade Ethiopian Biomedical Research publication: International visibility trends on the largest medical database. East and Central African Journal of Surgery, Vol. 17, No. 2, 2012
12. Analysis of medical malpractice claims and measures proposed by the Health Professionals Ethics Federal Committee of Ethiopia: review of the three years proceedings. Ethiop Med J. 2015 Jan; 53 Suppl 1:1-6.
13. Review paper on research ethics in Ethiopia: experiences and lessons learnt from Addis Ababa University College of Health Sciences 2007-2012. Ethiop Med J. 2015 Jan; 53 Suppl 1:7-
14. Delayed presentation of a heteropagus (parasitic) twin: a case report of a 17-year-old patient. J Pediatr Orthop B. Nov 2015. http://www.uptosci.com/journals/eb49e705b6cc79047c9283ef6b7f2a10.html?&page=5
15. Epidemiology of Low Back Pain among Nurses Working in Public Hospitals of Addis Ababa, Ethiopia; East Cent. Afr. J. surg Vol 21, N0 1; March/April 2016.

NAME Sandra Hobson	TITLE MD	BIRTHDATE (Mo., Day, Yr.) August 17, 1987
PLACE OF BIRTH **(**City, State. Country**)** Lynchburg, VA, USA	NATIONALITY (If non-US citizen indicate visa status**)** US	SEX (right click on the check in box/properties/default value/checked Male ☐ Female ☒

EDUCATION (Begin with baccalaureate training and include postdoctoral.)

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Virginia Tech; Blacksburg, VA, USA	B.S.	2009	Chemical Engineering, GPA 4.0
University of Virginia; Charlottesville, VA, USA	MD	2014	
Emory University, Atlanta, GA, USA	Resident	2019	

RELATIONSHIP TO PROPOSED PROJECT	MAJOR RESEARCH INTEREST
Resident co-investigator	Access to orthopaedic and spine care in US and abroad

HONORS

Alpha Omega Alpha, Gold Humanism Honors Society, Phi Beta Kappa, Tau Beta Pi

Virginia Tech 2009 First in Class with class rank 1st of 6562

OTHER RESEARCH SUPPORT

None at current time

RESEARCH AND/OR PROFESSIONAL EXPERIENCE (Start with present position: list ALL experience relevant to project. Include publications.)

Select Ongoing Research, Publications, and Presentations

Yablanski V, Hobson S, Mardjetko S, Clements D, Ananthakrishnan D. Impact of seed implant donation on availability of spine surgical services in Bulgaria.

Garrard EC, Braly B, Simpson A, Hobson S, Heller JG. "A retrospective radiographic review of fusion rates at 3 months for one and two level anterior cervical diskectomy and fusion with and without recombinant Bone Morphogenetic Protein-2."

Spiegel DA, Droti B, Relan P, Hobson SL, Cherian MN, O'Neill K. Retrospective review of surgical availability and readiness in 8 African countries. *Accepted, pending publication.*

Hobson SL, Valeev EF, Stanton JF, Császár AG. Is the adiabatic approximation sufficient to account for the post-Born-Oppenheimer effects on molecular electric dipole moments? Molecular Physics 2009;107:1153-1159

International Experience

Addis Ababa, Ethiopia 02/2/17 – 02/26/17
Visiting Resident Orthopaedic Surgeon, Black Lion University Hospital

Accra, Ghana 05/1/16 – 05/08/16
Visiting Resident Orthopaedic Surgeon, FOCOS Orthopaedic Hospital with Dr. Boachie-Adjei

Sophia, Bulgaria 04/27/15 – 05/01/15
Visiting Resident Orthopaedic Surgeon, Scoliosis Research Society

Geneva, Switzerland 04/2014 – 05/2014
Intern, World Health Organization, Programme for Emergency and Essential Surgical Care (EESC)

Kigali, Rwanda 02/2014
Visiting Medical Student, Centre Hospitalier Universitaire de Kigali (CHUK)

Copenhagen, Denmark 07/2008 – 08/2008
Student, Technical University of Denmark

Paris, France 05/2007 – 06/2007
Student, Alliance Française

Professional Society Leadership and Board Positions

Emory University Department of Orthopaedics
Selection committee member for visiting rotating medical student selection 2016 – present
Resident advisor to medical student orthopaedic interest group 2015 – present
Interviewer for orthopaedic residency interviews 2014 – present

Ruth Jackson Orthopaedic Society
Committee Member, Scientific Committee 06/2017 – present

American Academy of Orthopaedic Surgeons (AAOS)
Committee Member, Resident Practice Management Committee 03/2015 – 03/2016

American Medical Association (AMA) and Medical Society of Virginia (MSV) Leadership Positions
Director to the Board of Directors, MSV Foundation 08/2013 – 07/2014
Associate Director to the Board of Directors, MSV Foundation 08/2012 – 07/2013
Delegate to the AMA Medical Student Section (AMA-MSS) for UVASOM 06/2012, 06/2013
Committee Member, AMA-MSS National Committee on Long-Range Planning (COLRP) 01/2012 - 07/2012
Student Representative to the Board of Directors, MSV Political Action Committee 07/2011 – 07/2012

NAME Lewis G Zirkle	TITLE MD	BIRTHDATE (Mo., Day, Yr.) 7/23/40
PLACE OF BIRTH **(**City, State. Country**)** Pittsfield, Massachusetts, US	NATIONALITY (If non-US citizen indicate visa status**)** **US**	SEX (right click on the check in box/properties/default value/checked Male ☒ Female ☐

EDUCATION (Begin with baccalaureate training and include postdoctoral.)

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Davidson College	BS	1962	Biology – chemistry
Duke University Medical Center	MD	1966	Medicine

RELATIONSHIP TO PROPOSED PROJECT	MAJOR RESEARCH INTEREST
Participant and research	Fracture treatment in developing countries

HONORS humanitarian award – Duke University Medical Center and AAOS
John W. Kuykendal award, Davidson College

OTHER RESEARCH SUPPORT
None

RESEARCH AND/OR PROFESSIONAL EXPERIENCE (Start with present position: list ALL experience relevant to project. Include publications.

Pres. and founder – SIGN fracture care international

Agarwal-Harding K, Von Keudell A, Zirkle L, Meara J, Dyer G. Understanding and Addressing the Global Need for Orthopaedic Trauma Care. Journal of Bone and Joint Surgery, 2016 November 02,Volume 98, Issue 21, P 1844-1853.

Stephens, Kyle R. DO; Shahab, Faseeh MBBS; Galat, Daniel MD; Anderson, Duane MD; Shahabuddin MBBS, FCPS (Ortho); Whiting, Paul S. MD; Lundy, Douglas W. MD; Zirkle, Lewis G. MD. Management of Distal Tibial Metaphyseal Fractures with the SIGN Intramedullary Nail in 3 Developing Countries. Journal of Orthopaedic Trauma. December 2015. Volume 29, Issue 12, P e469- e475.

Global Survey of Orthopaedic Surgeons at SIGN Hospitals. Paper presented at: Orthopaedic Trauma Association 2015 Annual Meeting. Proceedings of the International Trauma Care Forum Podium Presentation; 2015 October 7; San Diego, California.

Zirkle, L.G.: SIGN Starts Three Beta Sites on East Africa Trip. Orthopaedic Product News, November/December 2009.

Roth J., Shearer D., Johnson A., Zirkle L., LaBarre P., Tencer A., Van Lew B. and Harvey D. Design and Validation of a Hip Joint Fatigue Test Frame for the Biomechanical Evaluation of Hip Fracture Constructs. Journal of Investigative Medicine, Vol.57 (1), #490, 2009

Zirkle, L.G., Dillner, J.: Distracter for correction of fractures that have healed with overlapped fragments. Orthopaedic Product News, March/April 2010.

Zirkle, L.G., Dillner, J.: Preparing for Disaster Response. Orthopreneur, May/June 2010.

Zirkle, L.G., Dillner, J.: Disaster Response Innovations; Bone Zone, 2010.

Zirkle, L.G.: Understanding the Impact of Our Creativity; Orthopreneur, July/August 2010

Clough, J.F.M, Zirkle, L.G., Robert Schmitt: The Role of SIGN in the Development of Global Orthopaedic Trauma Database; Clinical Orthopaedics and Related Research, Volume 469, October 2010.

Roth, J., Shearer, D., Zirkle, L., Johnson, A.; LaBarre P., Faultersack, F. Design, Biomechanical Evaluation And Early Clinical Experience of a Novel Extracapsular Hip Fracture Construct For Use In The Developing World. Poster session presented at: 115th Annual Conference of the American Osteopathic Association held in conjunction with the American Academy of Osteopathic Orthopedics Annual Meeting; 2010 October 24-26; San Francisco, CA.

Zirkle, L., Dillner, J.;Diversity Trumps Ability. Orthopreneur, Nov/Dec 2010.

Zirkle, L.G.: Equality Through an Emerging Hunch. Orthopreneur, July 2011.

Sekimpi, P.;Okike, K.; Zirkle, L.; Jawa, A.: Femoral Fracture Fixation in Developing Countries: An Evaluation of the Surgical Implant Generation Nework (SIGN: Intramedullary Nail. The Journal of Bone & Joint Surgery, October 2011.

Paul DeVasConCellos; Susmita Bose; Haluk Beyenal; Amit Bandyopadhyay; Lewis G. Zirkle.: Antimicrobial Particulate Silver Coatings on Stainless Steel Implants for Fracture Management.
Elsevier

Young S, Lie SA, Hallan G, et al. Low infection rates after 34,361 intramedullary nail operations in 55 low- and middle-income countries. Acta Orthopaedica 2011; 82(6):737-743.

Patrick Sekimpi, Kanu Okike, Lewis Zirkle, Andrew Jawa; Fe,pra; Fracture Fixation in Developing Countries. Journal of Bone and Joint Surgery Inc. 2011

Sven Young, Stein Atle Lie, Geir Hallan, Lewis G. Zirkle, Lars B. Engesæter, Leif I. Havelin. Risk factors for infection after 46 113 intramedullary nail operations in low- and middle-income countries. World Journal of Surgery 2012.

Lewis Zirkle. Patent for Humanitarian Cause: SIGN Fracture Care International. Technology and Innovation, Vol. 16, 2014.

Christian W. Ertl, David Royal, Humayoon A. Arzoiey, Azizullah Shefa, Salim Sultani, Mohammed O. Mosafa, Safiullah Sadat, Lewis Zirkle. A Retrospective Case Series of Surgical Implant Generation Network Placement at the Afghan National Police Hospital, Kabul, Afghanistan. Military Medicine, 2014.

Whiting P, Anderson D, Galat D, Zirkle L, Mir H. The State of Pelvic and Acetabular Surgery in the Developing World

NAME: Cizik, Amy M.	TITLE: Research Assistant Professor	BIRTHDATE (Mo., Day, Yr.)
PLACE OF BIRTH **(**City, State. Country**)**	NATIONALITY (If non-US citizen indicate visa status**)**	SEX (right click on the check in box/properties/default value/checked Male ☐ Female ☒

EDUCATION (Begin with baccalaureate training and include postdoctoral.)

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of Missouri-Kansas City, Kansas City, MO	BA	07/2001	Chemistry
University of Missouri-Kansas City, Kansas Ctiy, MO	BA	07/2001	Psychology
University of Kansas, Kansas City, KS	MPH	05/2004	Public Health and Epidemiology
University of Washington, Seattle, WA	PhD	12/2016	Health Economics and Outcomes Research

RELATIONSHIP TO PROPOSED PROJECT:	MAJOR RESEARCH INTEREST: health economics and outcomes researches with a clinical focus in orthopaedics
Coinvestigator and biostatistician	

HONORS

2001	Certificate of Appreciation presented by the American Cancer Society
2002	Kansas Health Institute Summer Internship Program
2003	University of Kansas Graduate Student Travel Scholarship
2011	Eli Lilly Pre-doctoral Endowed Fellowship Stipend
2012	Thomas Francis, Jr. Global Health Travel Fellowship
2014	Graduate School Fund for Excellence and Innovation Travel Award
2016	University of Washington, School of Pharmacy, Reducing Barriers for the Ambitious Scholarship

OTHER RESEARCH SUPPORT

1R21 AR068632 Flum (PI) 09/15/2015-08/31/2018
Topical Antibiotic Treatment for Spine Surgical Site Infections.
This grant supports several pilot and feasibility studies that are necessary to enable the execution of a cluster randomized controlled trial (cRCT) of in-wound antibiotics for spine fusion surgery.
Role: Co-Investigator (0.10 FTE)

R21AR068009 Flum (PI) 07/01/2015-06/30/2018
Understanding Non-Response in Spine Fusion Surgery.
This study aims to identify and address modifiable factors may improve spine fusion surgery outcomes.
Role: Co-Investigator (0.10 FTE)

Surgical Dynamics Chair, University of Washington Chansky (Chair) 2014 – 2017
The goal of this chair is to provide research support to surgical faculty members in the field of spine research.
Role: Staff Scientist, Clinical Research Administration

Synthes Endowed Fund, University of Washington Chansky (Chair) 2009 – 2017
The purpose of this endowment shall be to set patient-centered standards of care for the surgical solutions to spinal disorders. The fund will provide support to bring together spine surgeons, clinical researchers and basic scientist in this effort.
Role: Staff Scientist

RESEARCH AND/OR PROFESSIONAL EXPERIENCE

1. Ehlers AP, Khor S, Shonnard N, Oskouian RJ Jr, Leveque JC, Cizik AM, Lavallee D, Flum DR. Use of Patient-Reported Outcomes and Satisfaction for Quality Assessments: A Report from Washington State's SCOAP-CERTAIN Collaborative. The American Journal of Managed Care. October 2017. In Press, Manuscript ID: AJMC-2016-05-0178.R2.
2. Gundle KR, Cizik AM, Jones RL, Davidson DJ. Quality of life measures in soft tissue sarcoma. Expert Rev Anticancer Ther. 2015 Jan;15(1):95-100. PubMed PMID: 25377073.
3. Gundle KR, Cizik AM, Punt S, Conrad EU, Davidson DJ. Validation of the SF-6D Health State Utilities Measure in Lower Extremity Sarcoma. Sarcoma. 2014;2014:450902. doi: 10.1155/2014/450902. Epub 2014 Mar 19. PMCID: PMC3977426
4. Dailey EA, Cizik A, Kasten J, Chapman JR, Lee MJ. Risk factors for readmission of orthopaedic surgical patients. J Bone Joint Surg Am. 2013 Jun 5;95(11):1012-9.
5. Cizik AM, Lee MJ, Martin BI, Bransford RJ, Bellabarba C, Chapman JR, Mirza SK. Using the spine surgical invasiveness index to identify risk of surgical site infection: a multivariate analysis. J Bone Joint Surg Am. 2012 Feb 15;94(4):335-42. PubMed PMID: 22336972; PubMed Central PMCID
6. Ehlers AP, Khor S, Shonnard N, Oskouian RJ Jr, Sethi RK, Cizik AM, Lee MJ, Bederman S, Anderson PA, Dellinger EP, Flum DR. Intra-Wound Antibiotics and Infection in Spine Fusion Surgery: A Report from Washington State's SCOAP-CERTAIN Collaborative. Surg Infect (Larchmt). 2016 Apr;17(2):179-86. PubMed PMID: 26835891; PubMed Central PMCID: PMC4790200.
7. Manoso MW, Cizik AM, Bransford RJ, Bellabarba C, Chapman J, Lee MJ. Medicaid status is associated with higher surgical site infection rates after spine surgery. Spine (Phila Pa 1976). 2014 Sep 15;39(20):1707-13. PubMed PMID: 24983931; PubMed Central PMCID: PMC4161632.
8. Lee MJ, Cizik AM, Hamilton D, Chapman JR. Predicting surgical site infection after spine surgery: a validated model using a prospective surgical registry. Spine J. 2014 Sep 1;14(9):2112-7. PubMed PMID: 24456678.
9. Cizik AM, Lee MJ, Martin BI, Bransford RJ, Bellabarba C, Chapman JR, Mirza SK. Using the spine surgical invasiveness index to identify risk of surgical site infection: a multivariate analysis. J Bone Joint Surg Am. 2012 Feb 15;94(4):335-42. PubMed PMID: 22336972; PubMed Central PMCID: PMC3273877.
10. **Cizik, AM**, Babigumira, J, Davidson, DJ, Devine, EB, Garrison, LP. Surgical Treatment Strategies in Soft Tissue Sarcoma: Are Surgeons Good Agents for Patients and Society? Dissertation 2016. Manuscript Submission in Progress.
11. **Cizik, AM**, Davidson, DJ, Devine, EB, Babigumira, J, Garrison, LP. Surgeons' Ratings of Health State Utilities Related to the Treatment of Soft Tissue Sarcoma. Dissertation 2016.
12. **Cizik, AM**, Devine, EB, Davidson, DJ, Babigumira, J, Garrison, LP. Developing Health State Vignettes for Estimating Health State Utility Values in Soft Tissue Sarcoma: Methods, Lessons, and Implications Dissertation 2016.
13. **Cizik, AM.** Variations in Surgeon Treatment Preferences for Soft Tissue Sarcoma: A Markovian Cost Utility Model for Soft Tissue Sarcoma. Program in Health Economics and Outcomes Methodology (PHEnOM) Seminar Series. University of Washington, Seattle. February 2, 2016.

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/sites/myncbi/1VYCb62kNGV5m/bibliography/40000710/public/?sort=date&direction=descending

Professional Experience
2007-15 Abstract Reviewer and Session Moderator, Undergraduate Research Symposium, University of Washington
2010-14 Scholar Member, Institute of Translation Health Sciences
2011-13 Student Member, International Society for Pharmacoeconomics and Outcomes Research
2014-17 Associate Member, Orthopaedic Research Society

SECTION 6

RESEARCH SUPPORT, SUBMISSIONS

Please combine the information on this page for PI and Co-PI. Add additional lines and pages as needed, there is no word limit in this section.

Prior OTA Funding to Principal Investigator or Co-P.I.:			
SOURCE OF SUPPORT	TITLE OF PROJECT	AMOUNT	PERIOD OF

None at this time.

Research Support to Principal Investigator or Co-PI Relevant to THIS Project Past 5 Years (Include That From Own Institution):			
SOURCE OF SUPPORT	TITLE OF PROJECT	AMOUNT	PERIOD OF

None at this time.

Support To Principal Investigator or Co-PI for OTHER Research Projects:			
SOURCE OF SUPPORT	TITLE OF PROJECT	AMOUNT	PERIOD OF

None at this time.

Previous Research:			
SOURCE OF SUPPORT	TITLE OF PROJECT	AMOUNT	PERIOD OF

Please see above descriptions.

Current Research:			
SOURCE OF SUPPORT	TITLE OF PROJECT	AMOUNT	PERIOD OF

Please see above descriptions.

Submissions Of This Or Similar Project To Other Agencies**:**

SUBMITTED**:**
None at this time.

PLANNED:
None at this time.