

**Undergraduate. Research. Innovation. Creativity. Scholarship. (*URISC*)****Summer 2002 - Application Form**

**Submit 1 Original (*single-sided*) plus 10 copies (*double-sided*) of the completed application,  
Student Resume, and Letter of Support from Faculty Project Advisor to  
Research Office, 312 Kerr Administration Building no later than Monday, February 11, 2002 @ 5:00 pm**

*(All items must be completed for the proposal to be considered.)*

**1. Student Name:** Bory Kea **Major:** Bioengineering

**Expected Date of Graduation (mm/yy):** 06/02 **Current GPA:** 3.70

**X Yes O No Is a senior thesis or research project a graduation requirement for your program?**

**Mailing Address:** 1035 Garfield Ave **Phone:** 541-738-8383  
Corvallis, OR 97330 **Email:** keabo@engr.orst.edu

**2. Faculty Project Advisor:** Dr. Joseph McGuire **Department:** Bioengineering

**Phone:** (541) 737-6306 **Email:** mcguirej@engr.orst.edu

**3. Project Title:** Analysis of Cytokine and Sialidase Levels as Mediators of Preterm Delivery

**4. Does this proposal involve the use of human subjects?**

**X No O Yes If Yes,** approval must be received from IRB

**5. Does this proposal involve the use of live vertebrate animals?**

**X No O Yes If Yes,** approval must be received from IACUC

**6. Does this proposal involve the use of recombinant DNA molecules?**

**X No O Yes If Yes,** approval must be received from Environmental Health & Safety Office

**7. Does this proposal involve sources of ionizing radiation?**

**X No O Yes If Yes,** approval must be received from Radiation Safety Office

**8. Does this proposal involve the use of chemical carcinogens or agents/materials that are potentially pathogenic to humans?**

**X No O Yes If Yes,** approval must be received from Environmental Health & Safety Office

**9. Have you previously been awarded any undergraduate research support?**

**X No O Yes If Yes,** list dates, amounts, sources (e.g., URISC, DeLoach, HHMI)

**10. Funds are requested for (*check one*):**

**X O Summer Program**

**11. Total Budget Request:** (*Transfer amounts from Item 16*) **\$ 7,680.50**

**URISC FUNDS REQUESTED** (*refer to guidelines for award amounts*) **\$ 1,800.00**

**Matching Funds to be provided**

\$ 5,880.50

**Student Name:** Bory Kea

Source of other or matching funds: (*list source of match and proposed amount*)

Dr. Onderdonk will be responsible for identifying the main source of funds. He will provide a stipend, in addition to all supplies, equipment, and expendables, for the project. Any additional costs will be met by me.

**12. Department index number for budget transfer:** \_\_\_\_\_

(See the department accountant for this number)

(must have fund 001100 - 001399)

**13. Signatures**

| <b>Student</b> | <b>Date</b> | <b>Faculty Project Advisor</b> | <b>Date</b> |
|----------------|-------------|--------------------------------|-------------|
|----------------|-------------|--------------------------------|-------------|

**Project Advisor's Head of Department**      **Date**

**INSTRUCTIONS:** Please provide the information requested in the space below. Remember to attach a *copy of your resume* to the back of this application (including academic major, current academic standing, GPA), and a *letter of support* from the faculty member who will be overseeing your project or activity.

**14. Project Description:** Briefly describe the activity or project that is proposed or currently in progress.

Summarize the scholarly/creative aspects of the activity to be pursued and how this supports your educational objectives. What are the expected outcomes from this activity (*e.g., senior thesis, an art exhibit, or an increased understanding of research or scholarship*), and how will you achieve this outcome?

Preterm delivery (PTD) is the leading cause of infant morbidity and mortality in the United States. Premature ruptures of membranes are attributed to an infection in the mother's genital tract or the presence of an altered vaginal microflora during pregnancy (i.e., bacterial vaginosis). The microflora of the vagina include numerous bacteria and proteins that support pregnancy, yet at times they can also cause harm. Preventing PTD requires additional study of vaginal microflora during pregnancy and postpartum. While many papers have been published about bacterial vaginosis and PTD, the specific organisms responsible for these are still largely uncharacterized. My project will support efforts to understand the microbiological origins of PTD, through measurement of the cytokine or sialidase levels present in cervical vaginal lavage (CVL) specimens and correlation of these to known microbiological findings. A CVL specimen is obtained by washing the vaginal vault with saline for cells and secretions. Possible mediators of PTD have been tracked to enzymes produced by bacterial microflora, such as sialidase. Furthermore, tissue inflammation is triggered by increased cytokine levels and may link to PTD.

During the period of the URISC award, much of my contribution to this project will take place at the Channing Laboratories of Brigham and Women's Hospital, an affiliate of Harvard University (Harvard Medical School). My interest in combining advances in medical science with engineering applications to improve human health led me to seek this training opportunity. In particular, a research experience at NIH (Genetic Disease Research Branch, National Human Genome Research Institute) on the Bethesda, MD, campus in summer 2001 involved me in sequencing genes of families that had phenotypes of Pallister Hall or Greig cephalopolysyndactyl syndrome, and discerning the locations of mutations that express these phenotypes. I was also able to attend some of the patients that were on the protocols, and this experience hardened my resolve to become a physician practicing clinical research. Through connections fostered during my stay at NIH, I was able to correspond with Dr. Andrew Onderdonk of Harvard. Upon comparing common interests related to human microbial flora and its role in health and disease, he offered me the opportunity to join his group for the summer of 2002.

The ideal learning environment for me is one that integrates "book learning" with laboratory research as well as field experience. Furthermore, I am interested in understanding the connections and correlations between clinical studies and affected populations. These attributes are met well with this project, with an opportunity to work on research relevant to the affects of vaginal microflora on preterm deliveries.

My career objective is to obtain a MD/Ph.D. and take an active role in clinical research relevant to women's health issues. The elements of a Harvard training opportunity answer my desire for experience, knowledge, networking, and contributing to the benefit of society, and securing such an opportunity is the next logical step in meeting my career goals.

**PLEASE LIMIT YOUR RESPONSE TO THE ABOVE QUESTION  
TO THE SPACE PROVIDED ON THIS PAGE.**

**Student Name:** Bory Kea

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- 15. Synergy:** What is there about the activity that will help to ensure a real, collaborative learning experience between you and the project advisor? What are the leveraging opportunities in this activity? In other words, will the project lead to additional opportunities for either you or the project advisor (*e.g., new or additional funding for the work, or professional/creative opportunities that might not otherwise be developed*), or is the activity being used as a mechanism to fund a program requirement (*e.g., senior thesis*)?

This collaborative learning experience involves two project advisors as well as myself. The research itself will be based at the Channing Laboratories of Brigham and Women's Hospital (Harvard Medical School), and my specific project for the summer will be under the direction of Dr. Andrew Onderdonk. My Oregon State University advisor is also my senior thesis advisor, Dr. Joe McGuire. While the research will not be used for a thesis, it nevertheless provides an opportunity for career development as well as personal enrichment in respect to my long-term focus of becoming a knowledgeable physician.

Since the research will take place outside of OSU, I will be gaining another perspective at a fundamental level that is consistent with my advisor's goals. Dr. McGuire's main research objective is to provide direction for the preparation of interfacial coatings and derivatizations that will impart safe, efficacious function to implantable biomaterials. A "biomaterial" is any natural or synthetic material that performs or supports a natural function or a needed intervention. The OSU focus has been on materials and devices for interventional approaches for the treatment of cardiovascular and heart disease, such as occlusive and aneurysmal disease in blood vessels, as well as other conditions treated using intravascular devices, including catheters and endovascular stents.

But controlling biological interactions with natural and synthetic materials is of great importance to the design of temporary (resorbable) membrane barriers to the development of unwanted "surgical adhesions" as well—a major problem involving adhesion of dissimilar tissue sections, leading to inflammation and fibrosis. Compromised membrane integrity (leading to rupture) through infection or the action of "altered" vaginal microflora during pregnancy, along with a number of relevant interfacial phenomena, are described by fundamentally similar molecular and cellular events. Thus, while my summer project is in a different context it will support a similar goal. At another institution, I will learn techniques relevant to projects based at OSU. Furthermore, this collaboration will facilitate interdisciplinary communication and open dialogue for other opportunities.

The opportunity to do research at one of the most prestigious hospitals in the world will not only broaden my research knowledge but also greatly enhance the pool of mentors and contacts available to me. With my commitment to attend medical school, this research project and its location could not have been more ideal.

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| <b><i>PLEASE LIMIT YOUR RESPONSE TO THE ABOVE QUESTION<br/>TO THE SPACE PROVIDED ON THIS PAGE.</i></b> |
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Student Name: Bory Kea**16. BUDGET WORKSHEET INSTRUCTIONS:**

- ✓ **REFER TO GUIDELINES** for complete instructions on Use of Funds and Award Amounts.
- ✓ **PLEASE ITEMIZE** and provide detailed justification of requested budget
- ✓ **ROUND FIGURES TO THE NEAREST DOLLAR**
- ✓ **TRANSFER TOTAL BUDGET REQUEST** to Page 1 of Application.

**COMPLETE THIS SECTION for SUMMER PROGRAM ONLY**

**NOTES:** 1) Student compensation from this program is in the form of wages. The income is taxable, and we are required to pay benefit costs (OPE). This is required to address University liability issues; 2) We recommend that the majority of requested funds be devoted to student wages. However, we recognize that some projects may have very different demands and will allow for some flexibility in developing budgets.

**Student Wages** (calculate at \$7.50/hr x 400 hours).....(a) \$ 3000

**OPE Costs**.....(b) \$ 340.50

- Registered for summer session credit? Multiply WAGES line by **0.05**
- NOT Registered for summer session credit? Multiply WAGES line by **0.1135**

**Travel Expenses**.....(c) \$ 2340

(List destination, and purpose of travel, and itemize estimated expenses).

Boston, MA, is where the research will take place.

Round Trip Airline Ticket: \$800 to and from Portland to Boston

Living Allowance: \$1540 = (\$4540-\$3000)

While my wages will supplement this amount, the cost of living in Corvallis is much cheaper than in Boston. The living allowance figure of \$4540 is estimated with reference to Harvard Medical School Budget for three months ([http://www.hms.harvard.edu/finaid/html/harvard\\_medical\\_school\\_2001-20.html](http://www.hms.harvard.edu/finaid/html/harvard_medical_school_2001-20.html)).

Housing: \$1850.00

Food: \$1603.00

Transportation: \$212.00

Misc. Expenses (e.g., clothing, recreation, laundry, uninsured med/dent, other): \$875

**Supplies, Equipment Rentals, and Expendables**.....(d) \$2000

(List all items and estimated expenses)

This is the cost of using materials and solutions to perform measurements of cytokine levels from cervical vaginal lavage specimens. It will be covered by Dr. Andrew Onderdonk.

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|---|-------------------|
| <b>TOTAL BUDGET REQUEST</b> ( <i>a + b + c + d</i> )  | \$ <u>7680.50</u> |
| <b>URISC Funds Requested</b>  | \$ <u>1800</u>    |
| Academic Yr Program – \$500 for 1 Term; \$800 for 2 Terms; \$1000 for 3 Terms                       |                   |
| Summer Program - ≤ 60% of Total Budget Request, not to exceed \$1,800                               |                   |
| <b>Matching Funds to be provided</b>  | \$ <u>5880.50</u> |
| Academic Yr Program – None required   |                   |
| Summer Program - ≥ 40% of Total Budget Request up to \$3,000 and 100% of funds in excess of \$3,000 |                   |