Multidrug-resistant *Escherichia coli* from Apparently Healthy Children in Kenya

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Resistance to commonly available and affordable antimicrobials poses a major concern in the management of bacterial infections, especially in resource-poor countries\(^1\). Prudent practices in the use of antimicrobial agents in human medicine and for prophylaxis in animal husbandry contribute significantly to the emergence of multi-drug resistant (MDR) strains. In several studies worldwide, *Escherichia coli* from normal gut flora seem to constitute an important reservoir of antimicrobial resistance genes\(^2\), which can be transferred to potential pathogens\(^3\). The rising prevalence of resistance to antibiotics such as cotrimoxazole and ampicillin could reflect the flow of MDR genes amongst gut-associated bacteria which would make a formidable reservoir for antibiotic resistance genes. For instance, Bartoloni and co-workers\(^4\) used conjugation experiments to demonstrate that resistance to ampicillin, tetracycline, trimethoprim, sulphamethoxazole and chloramphenicol could be transferred en bloc among commensal microflora and potentially to other pathogenic bacteria. Thus surveillance and monitoring of antimicrobial resistance in *E. coli* from the gut and the environment is important as these data may be used to devise mechanisms to stem the emergence and subsequent spread of drug resistance. In the present study we report a high

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Better Diagnostics – A Means for Selecting More Effective Antimicrobial Agents

An interview with Mark Perkins, M.D.,
Chief Scientific Officer for FIND

This issue features an APUA interview with Mark Perkins M.D., Chief Scientific Officer for FIND, the Foundation for Innovative New Diagnostics. FIND is a leading non-profit organization dedicated solely to the development of rapid, accurate and affordable diagnostic tests for poverty-related diseases in the developing world. Its mission is driven by the conviction that good health is central to winning the war against poverty and that correct diagnosis is a crucial first step towards establishing health and thus efficient use of resources.

**Q: Is this an optimistic time in diagnostic development?**

**A: It is** an optimistic time, especially from a public health perspective. There is a lot of interesting technology out there now that is well suited for small footprint, point-of-care testing. The emergence of these technologies comes from a confluence of factors, including the maturation of the consumer electronics industry, the explosion of knowledge in materials and nano sciences, and because important new public sector funding is available from national biodefense investment and from charitable foundations to drive assay development. It is also driven by a shift in diagnostic markets. The developed world markets are relatively saturated, so it’s a challenging time for companies to maintain margins and to push new devices into existing testing sites. On the other hand, there is a huge, but as yet inadequately defined, developing world market, which the traditional diagnostic companies are trying to understand how to access. Traditional market approaches for big instrument makers, which may depend on reagent rental agreements or under-priced instrumentation and profitable reagent sales, have

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“**When considering research priorities and the tools needed to control neglected tropical diseases in developing countries, there is a tendency to focus on vaccine research and drug development. However, improved, quality-assured diagnostics are equally important for disease control. They provide the rational bedrock for the appropriate treatment of patients, for monitoring disease-control efforts and for enhancement of disease-surveillance capacity.**”

— Robert Ridley, Director of TDR, WHO

Net Rev Microbiol, S1 (Sept 2006) doi:10.1038/nrmicro1521

ONE-ON-ONE continued on page 2
often not been successful in settings where local manufacturers sometimes develop their own reagents. The larger diagnostic companies have tended to stick to known quantities in countries like India and China, marketing primarily to large hospitals and blood banks, and little to private practice doctors or public sector laboratory systems. One of the outcomes is that local companies, such as those in India, have come forward and started to fill those gaps, so you’ll see for disease areas such as malaria, or even for pregnancy testing, large numbers of small manufacturers meeting their internal markers’ needs. What is interesting about this process is that it should drive everyone to try to meet the very particular demands of the developing world markets, which means that tests have to be very robust (forget the standard “30 degree operating temperature”), be very cheap, simple to use, and yet highly accurate. So, in reaching out to capture these developing world markets, manufacturers will be forced—if adequate quality supervision exists—to make better products. My hope is that this will generate markets for these better products in established market economies, which will further drive the development of tests that are appropriate for diverse global markets.

**Q: In diagnostic technology, will it be “leapfrogs forward”, or incremental advances?**

**A:** It’s always harder to introduce revolutionary technologies than incremental ones. People have been saying for 20 years, “Five years from now the clinical microbiology lab will be fully molecular”, and for 10 years they’ve been saying “Mass spectrometry will take over routine laboratory testing.” Neither thing has happened. Instead a great number of incremental advances have taken hold and are employed widely. I think that reflects the nature of markets, the stubbornness of those who are in the field, and the fact that many technologies which appeared scintillating at “first pass”, only fizzled out further down the development path. When you start out with a technology perspective, you too often end up with a technology looking for an application. Reducing a fascinating and potentially powerful core technology to practice is far from simple, and proving that the new method yields substantial health or cost benefit is harder still. Multiplexing is a good example of an extremely powerful molecular technology that has yet to fulfill its potential in clinical applications. It seems obvious that multiplexed diagnostics could be ideally applied, for example, to resolve a syndrome like fever. But then you have to further parse the problem on the basis of sample matrix. Some pathogens may be in blood, others in sputum or in the pharynx, etc. There are also differences in the nucleic acids of the pathogens that may limit the flexibility of the amplifica-

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**Fig. 1. Return of chloroquine antimalarial efficacy in Malawi: comparisons of parasite clearance and fever resolution with two different treatments.** (reprinted with permission from NEJM 2006, 355:1959-66. Copyright © 2007 Massachusetts Medical Society. All rights reserved).
2ND WORLD CONGRESS

Devising Improved Methods for Identification and Treatment of Infectious Diseases

Boston, October 29-30th
Hyatt Regency Hotel

SIX TOPIC TRACKS

- Drug Policy & Economic Burden
- Diagnostics
- Infection Control
- Biodefense
- Immunomodulation
- Drug Innovation & Development

CONFIRMED SPEAKERS

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  Roche Applied Sciences
- Arturo Casadevall, MD, PhD
  Albert Einstein College of Medicine
- Carl Fuller, PhD
  GE Healthcare
- Janet Hindler, MCLS
  UCLA Medical Center
- Helen Lee, PhD
  University of Cambridge
- Eddie Power, PhD
  Schering-Plough
- Robert Yocher, MHS
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PUBLISHING

American Society for Microbiology
Mary Ann Liebert, Inc.
Clinical Infectious Diseases
Trypanosomiasis (Sleeping Sickness): Symptoms and Treatment

**Agents:** Trypanosoma brucei gambiense¹
Trypanosoma brucei rhodesiense²

**Vector:** Tsetse fly (Glossina spp)

**Control:** treatment success relies on decrease of tsetse fly population (i.e., bush clearing & insecticides), coupled with surveillance of populations at risk

### Clinical signs and symptoms

<table>
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<tr>
<th>General:</th>
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<tbody>
<tr>
<td>malaise, lassitude, irregular fevers</td>
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<tr>
<td>T. b. rhodesiense: rapid onset, &gt;80% fatal in 6 months</td>
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<tr>
<td>T. b. gambiense: chronic, with symptom-free periods for several years</td>
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both species 100% fatal if untreated

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<th>Early stage:</th>
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<td>(prior to CNS invasion)</td>
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<tr>
<td>fever, enlarged lymph glands and spleen progressing to headache, anemia, joint pains, swollen tissues</td>
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<th>Advanced stage:</th>
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<tr>
<td>(post CNS invasion)</td>
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<tr>
<td>neurological and endocrine disorders; parasites found in CSF; elevated WBC</td>
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### Treatment³

- **Early stage (prior to CNS invasion):**
  - Pentamidine: first choice for T. b. gambiense; administered IV; some parasite strains are resistant; low efficacy for T. b. rhodesiense; well tolerated
  - Suramin: useful for both subspecies, administered IV; adverse side effects and allergic reactions possible

- **Late stage (post CNS invasion; drugs administered IV):**
  - Melarsoprol: an older arsenic drug with high toxicity (3-10% mortality); useful for both species; resistance in T. b. gambiense approaches 30% in some foci
  - Efionthine (DFMO): newer anticaner agent effective only for T. b. gambiense; safer than melarsoprol

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¹animal reservoir = cattle, focused in eastern and southern Africa
²animal reservoir = cattle, focused in western and central Africa
³Recent advances have identified the human serum-resistance-associated (SRA) gene, which encodes for resistance of T. b. rhodesiense. Development of rapid tests for identification of SRA could facilitate species differentiation and optimize trypanosomal treatments in both humans and bovine carriers.

**Q: What are other examples of where diagnostics are failing us?**

A: I’d like to focus on a New England Journal of Medicine article from November of last year that examines chloroquine resistance in Malawi. This article concluded that “Chloroquine, a safe and inexpensive treatment for malaria, is once again highly efficacious in Malawi, 12 years after it was withdrawn from use because of rates of treatment failure of more than 50%.” In this study of 105 children assigned to receive chloroquine for uncomplicated falciparum malaria, only one child failed treatment, whereas over half of the patients in the sulfadoxine–pyrimethamine group failed therapy (Fig. 1). What’s just so amazing about this is not that a drug that was taken off the market now works again (which might be reversed again quite quickly), but that people have been using SP, the standard regimen suggested by the government, for 12 years now with no firm idea how successful it was. This demonstrates what incredibly poor surveillance we have for drug resistance around the world and for a variety of pathogens.

Mark Perkins was interviewed by APUA Communications Manager, Christopher Spivey.
prevalence of MDR E. coli from apparently healthy children and from environmental samples from a rural population in Kenya.

Materials and methods. Between 1999 and 2003, we conducted two comparative studies in two Districts of Central Kenya where farmers grow food crops for subsistence and the majority keep less than 3 milking cows and goats, and 10-300 chickens for commercial purposes. In each study we evaluated resistance in E. coli from faeces of healthy children attending mother and child clinics in 3 hospitals and from the associated environments at their homes. In 1999-2000, a total of 188 non-duplicate E. coli strains were obtained from 256 fecal specimens of children below 5 years of age, while 286 strains were isolated from animal and environmental sources at the homes of index cases. The animal and environmental strains were from chicken droppings (214; 74.8%), rectal swabs of cattle (47; 16.4%), and from water sources (25; 8.7%) among which 18 strains were from boreholes and 4 were from rivers. In 2002-2003 a total of 344 non-duplicate E. coli were obtained from faeces of 387 apparently healthy children attending mother and child health clinics at the 3 study hospitals. Additionally 138 E. coli were obtained from chickens (102), cattle (24) and goats (12) from the homes of the index cases.

Isolation and characterization of E. coli were done using previously published methods\(^5\). Kirby-Bauer disk diffusion and E test susceptibilities were performed for 10 antimicrobials commonly available in Kenya and susceptibility data were interpreted according to guidelines of the Clinical and Laboratory Standards Institute\(^6\). The data were analysed using appropriate statistical packages including Chi-square and student t-tests.

Results and Conclusions. In the study conducted in 1999 -2000, E. coli isolates from children were less sensitive to the test drugs than the environmental isolates (p-value <0.001) (Tables 1 and 2). Of the E. coli isolates from children 164 (87.2%) were multidrug resistant, the commonest resistance pattern being to ampicillin, chloramphenicol, co-trimoxazole and tetracycline. In contrast, only 26% (p value <0.001) of E. coli isolates from children and none from cattle or water were multidrug resistant, usually to streptomycin and tetracycline. Resistance among E. coli isolates from chickens was mainly to tetracycline (72%), while the isolates were fully sensitive to most other antibiotics commonly used for treatment of patients. However, all isolates were fully susceptible to ceftriaxone and ciprofloxacin. MIC mode, MIC50 and MIC90 in the two groups of isolates for tetracycline were generally high (>64 µg/ml), while the MIC50 and MIC90 values for the rest of the antimicrobials were significantly higher for the fecal E. coli isolates from children (p <0.001).

In the second study conducted in 2002 - 2003, a total of 344 E. coli isolates from healthy children were analysed for susceptibility to the panel of commonly available antimicrobials. High prevalence of multidrug resistance (88.6%) was observed against trimethoprim-sulphamethoxazole, ampicillin and tetracycline and this did not differ from prevalence observed in the 1999-2000 study. Resistance to other antimicrobials such as nalidixic acid and ciprofloxacin was rare (Figure). In contrast, only 17.4% (24/138) of environmental isolates (18 of these being E. coli) were multidrug resistant.

Our study observed that fecal E. coli from healthy children in Kenya showed higher resistance to commonly available antimicrobial agents than those from farm animals and environmental waters. The low prevalence of MDR strains from non-human sources may reflect the narrow range of antimicrobials used in poultry rearing and in other farming activities in Kenya. In our cross-sectional survey 70% of the farmers interviewed indicated that they obtained antibiotics such as...
tetracycline, penicillins and sulphonamides from pharmacies without prescription for the treatment of mastitis in cattle and diarrhea in chickens. However, tetracycline was the most commonly used antibiotic in rearing chickens. High resistance to tetracycline among environmental isolates can therefore be attributed to use of this drug for prophylaxis in animal husbandry. Compared to previous studies in the same region in 1993, prevalence of resistance to commonly available antimicrobials in *E. coli* from children has risen, but not significantly (from 85.5% in 1993 to 88.6% in 2003). In contrast, prevalence of MDR phenotype in *E. coli* from chickens declined from 26% in 1993 to 17.4% in 2003 (p-value <0.01), probably a reflection of fewer farmers using antimicrobials for growth promotion.

Considering that tetracycline is not widely used in the treatment of children, resistance showed by *E. coli* isolates from children suggests acquisition from other sources such as the adult population. In a study conducted in Kenya and in seven other developing countries, it was demonstrated that resistance to tetracycline and to newer antibiotics in the adult population was on the increase. Multiple resistance to commonly available antimicrobials such as ampicillin, co-trimoxazole and tetracycline is likely to have therapeutic implications in treating patients in resource-poor settings. In a study conducted recently in Kenya, 74% of persons with bloody diarrhea received antibiotics to which their isolate was not susceptible. Among the practices that contribute to emergence of MDR strains are the prolonged and unjustified use of antibiotics as well as non-investigation-based prescriptions. Such practices promote the spread of antibiotic resistance genes through the transfer of mobile genetic elements among bacterial strains.

There is a need for sustained surveillance and monitoring of antibiotic resistance in commensal *E. coli* from both humans and animals. Such studies would form a basis for the implementation of sound antibiotic-use policies. There is also a need to educate healthcare workers and the general population on the prudent use of available antimicrobials in order to maintain their effectiveness in resource-poor settings.

Acknowledgements

We thank the Director, Kenya Medical Research Institute for permission to publish this work.

References


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**Figure 1. Proportion of resistant *E. coli* strains from apparently healthy Kenyan children, 2002-2003.**

Trim-sulph, Trimethoprim-Sulphamethoxazole; Amp, Ampicillin; Tet, Tetracycline; Strep, Streptomycin; Amox, Amoxicillin; Cm, Chloramphenicol; NA, Nalidixic acid; Gent, Gentamicin; Cef, cefuroxime; Cip, ciprofloxacin; Ceft, ceftriaxone.

**Table 2. Antimicrobial susceptibility among commensal *E. coli* in Kenya.**

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<th>Children</th>
<th>Environmental*</th>
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<td>Proportion sensitive to 10 selected antimicrobials</td>
<td>11.2% (21/188)</td>
<td>36.4% (104/286)</td>
<td>&lt;0.001</td>
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<td>Resistance to at least one antimicrobial</td>
<td>5% (10/188)</td>
<td>31.3 (90/286)</td>
<td>&lt;0.001</td>
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<td>87.6% (164/188)</td>
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<td>&lt;0.001</td>
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<tr>
<td>Resistance to tetracycline</td>
<td>71% (134/188)</td>
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*animal feces and water sources

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APUA Solicits Annual Leadership Award Nominations

The Alliance for the Prudent Use of Antibiotics (APUA) has established its annual Leadership Award to acknowledge the valuable contributions of leaders who have had a major impact on containing antimicrobial resistance. We invite you, as an esteemed colleague, to participate in this process by nominating a candidate for the 2007 APUA Leadership Award. This award honors an individual or organization for extraordinary leadership in promoting the prudent use of antibiotics as a means to contain antibiotic resistance. Please submit your nomination by July 27 by fax, mail or email. Nominations must include nominee information, rationale for nomination, and nominator contact information. Thank you for your collaboration and your support in “preserving the power of antibiotics.”

Save the Date!
APUA 2007 Members and Friends Reception and Leadership Award at the 47th ICAAC, Tues. Sept. 18, Chicago, Illinois at 6:30 p.m.

APUA Welcomes New Board Members

APUA sincerely thanks its dedicated Directors and Advisors for their generous donations of time and talent, and in particular, retiring member, Dr. Harris Berman, for his exemplary service to the Board. His longstanding leadership on both the Executive and Strategic Planning Committees has been essential in promoting the vitality of the organization and ensuring its growth as a valuable global health resource for preserving the power of antibiotics. Dr. Berman will continue as an informal advisor.

Board of Directors. APUA is pleased to welcome Dennis Signorovitch, Mark Nance and Dr. Sherwood Gorbach as the newest additions to APUA's Board of Directors.

Dennis Signorovitch is a communications strategist with 30 years of corporate experience. Since retiring from Honeywell Aerospace in Phoenix in 2002, he has served as a consultant for several major corporations. He is also a senior counsel to the Hawthorn Group, a public affairs consulting firm in Washington, and an adjunct professor at Mount St. Mary's College, Los Angeles where he offers courses in management communications and organizational behavior.

Mark Nance is the Chief Legal Executive for GE Medical Diagnostics where he is the lead executive for GE’s risk analysis project related to emerging therapeutics and pharmaceuticals. Prior to his posts at GE, Mark served as Vice President of Corporate Development at Integrated Nano-Technologies and has worked in the Office of the Chairman of Policy Planning at the United States Federal Trade Commission. Mr. Nance holds a BA in Political Science & Sociology from the University of Missouri and a law degree from Cornell Law School.

Dr. Sherwood Gorbach is well known globally for his work in infectious disease, oral rehydration research, and field studies—specifically in India and Bangladesh. He is a leading research scientist in the field of intestinal diseases and probiotics. Dr. Gorbach is Professor of Public Health and Family Medicine and Professor of Molecular Biology and Microbiology at Tufts University School of Medicine, and the Editor of Clinical Infectious Diseases.

Scientific Advisory Board. APUA’s African Chapter Initiative has established a presence in resource-limited countries, including sub-Saharan Africa. These local organizations provide evidence and guidance to control infectious diseases and guide the influx of antimicrobials. To further APUA’s African Chapter Initiative, APUA is pleased to announce the appointment of Dr. Ayoade M. J. Oduola and Dr. Samuel Mungai Kariuki to the APUA Scientific Advisory Board.

Dr. Ayoade M.J. Oduola serves as Coordinator for Strategic and Discovery Research and as a Manager for the Committee on Pathogenesis and Applied Genomics at the World Health Organization. He was born and raised in Nigeria and received his undergraduate training in Chemistry and Biology at Central State University and his M.S. from Western Illinois University, and his doctoral training in Pathology at the Medical University of South Carolina. Dr. Oduola has also earned many award and honors—including the Bailey K. Ashford Medal and the U.S. Army Research and Development Award, and has served on multiple international scientific and advisory committees.

Dr. Samuel Mungai Kariuki is the Principal Research Scientist for the Centre for Microbiology Research at Kenya Medical Research Institute. He has a Bachelor of Veterinary Medicine and a Master of Science in Molecular Biology and Microbiology at the University of Nairobi, and a Doctor of Philosophy in Medical Microbiology from the University of Liverpool.

APUA Impacting Public Policy: FDA Urged to Reject Cefquinomé in Agriculture

On December 1, 2006, APUA sent a letter to Dr. Andrew C. von Eschenbach, Acting Commissioner of the U.S. Food and Drug Administration to support the recommendation of the Veterinary Medical Advisory Committee (VMAC) to reject the use of cefquinomé, a fourth-generation cephalosporin antibiotic, for use in agriculture. Among other points the APUA letter stated:

“Cefquinomé exposure can result in resistance to other cephalosporin antibiotics, including the medically-important antibiotic cepfime. Decreased cefepime sensitivity and resistance is due, in large part, to extended-spectrum beta-lactamases (ESBLs), including CTM-X-15. These genetically mobile genes have been observed at clinically significant frequencies in many countries, and are increasing in frequency in the U.S. Cefquinomé use in agriculture, especially with no specific limitations on off-label use, will increase..."
the prevalence of these powerful antibiotic resistance genes.”

“Evidence outside of the U.S strongly indicates that this has already happened. For example, CTM-X-15 ESBLs have been isolated from Salmonella in Ireland and E. coli in Mexico. In Australia, resistance to older cephalosporins has occurred by a two-step process. First, an ESBL is acquired through gene transfer, and then followed by a very simple change in the bacterium’s ability to take up the antibiotic. There is no reason to think that this will not occur with cefquinome (and thus ceftazidime).” For the complete letter, see apua.org, or for more information please contact Michael.Feldgarden@tufts.edu.

APUA Promoting Accelerated Drug and Diagnostics Development

APUA is exploring partnerships and opportunities to accelerate diagnostics and antibiotic development in order to improve the use of antibiotics and to avoid major gaps in the antibiotic pipeline. In 2006, APUA convened major industry and public health stakeholders to begin to explore the potential of establishing a not-for-profit screening library.

In a related activity, APUA Executive Director, Kathy Young, participated in a January 11-12 symposium coordinated by Doctors Without Borders in New York. Participants developed a call to action which included the following directives:

1. The “Not-for-profit sector needs to be guaranteed access to professional pharmaceutical services. Mechanisms must be established to ensure public access to compound libraries, particularly novel and natural products.”
2. “There is an immediate priority to shorten the time of clinical drug development; Drug trials should seek to integrate studies of potential new diagnostics.”
3. “The lack of TB drug development is a result of the failure of current profit-driven drug research and development method. There is a need for the WHO coordinated framework for global R & D prioritization and funding.”

For more information contact Christopher Spivey at Christopher.Spivey@tufts.edu.

APUA Household Hygiene Project

The Hygiene for a Healthy Household project advisory board convened for its third meeting on April 18. This multidisciplinary group of experts discussed current hygiene guidelines available to consumers and the problems that public health groups often encounter when attempting to change health-related behaviors in the general public. It was decided that the project focus should be on the development and implementation of novel, effective methods for helping consumers to become engaged with information on proper hygiene practices and household products.

APUA and the Hygiene for a Healthy Household advisory board also developed and recommended three questions to be included in the Massachusetts Behavioral Risk Factor Surveillance System (MBRFSS) survey conducted by the Mass. Department of Mental Health. These questions are currently being fielded to Massachusetts residents via telephone interview, and results will provide important information regarding current consumer behavior with relation to several hygiene practices.

This project is supported by an unrestricted educational grant from Clorox.

Consumer Attitudes and Knowledge about Antibiotics

On May 3, APUA presented a poster at the Northeast Regional Nurse Practitioner Conference in Westford, Massachusetts. The presentation is part of a national outreach campaign to demonstrate how results of APUA’s national survey on consumer antibiotic use patterns in the U.S. can help nurse practitioners and other clinicians to develop communication strategies that will reduce patient expectations for antibiotics in situations in which they are unnecessary.

This project receives unrestricted financial support from Pfizer.

For more information on these projects, contact Stephanie Boyd at Stephanie.Boyd@tufts.edu.

Three ROAR Research Projects Completed

The Reservoirs of Antibiotic Resistance (ROAR) project, funded by the National Institute of Allergy and Infectious Diseases and coordinated by APUA, is an unprecedented effort to improve scientific understanding of the role of commensal bacteria in the spread of antibiotic resistance. On an annual basis ROAR has funded research projects that examine aspects of resistance in commensals. The following three projects were recently completed:

- “High Throughput Molecular Genotyping of Environmental and Human Staphylococci Carrying Class I Integrons” by Dr. Anne Summers (University of Georgia)
- “The Potential of Streptococcus mitis biovar 1 as a reservoir for Streptococcus pneumoniae” by Dr. Susan Hollingshead (University of Alabama), and
- “Possible Emergence of a Plasmid-Mediated Reservoir of Resistance Genes Among the Escherichia coli of poultry” by Dr. Lisa Nolan (Iowa State University).

These projects have resulted in at least nine presentations, two refereed publications, and three publications in preparation. For more information about the projects and their results, see http://www.roarproject.org/ROAR/html/projects.htm. ROAR staff and APUA president Stuart Levy hosted the annual ROAR Steering Committee Meeting on May 22 in Toronto, Canada, to review project results and discuss future directions of ROAR.

For more information, to join the ROAR Scientific Network listserv, or to submit commensal isolate data to the ROAR database, please see www.ROARProject.org.
APUA International Participates in a Call-to-Action National Workshop on Antimicrobial Resistance Containment

Adama, Ethiopia. On November 16-18, 2006, APUA Director of Global Chapter Network, Dr. Anibal Sosa, introduced the APUA chapter network to the AMR Task Force and discussed ways to contribute to the AMR advocacy and containment process in Ethiopia. He also met with interested leaders of Ethiopia to begin the development of the APUA-Ethiopia chapter.

APUA Promotes Coordination of EU and US AMR Containment Initiatives

APUA Executive Director, Ms. Kathy Young met with several key European leaders, including Drs. Anna Lönroth, Orto Carrs and Ian Gould to discuss ways to coordinate AMR containment initiatives in the EU with those of APUA and US public health and regulatory agencies in order to have a stronger global impact. The EU is one of the largest funders of AMR research through its EU 7th Framework programme supporting research and technology development. The seventh framework foresees a 7-year duration with a budget of EUR 50 billion total for all research and technology development with a sizeable portion of this allocated for AMR initiatives. Several of APUA’s chapters are working on AMR projects sponsored by the EU.

In addition, Ms. Young met with Dr. Otto Carrs, leader of REACT and STRAMA, to explore APUA’s proposal to re-categorize antibiotics as a special drug category for regulatory purposes both through EMEA and FDA. They also considered ways to strengthen WHO’s resources and role in containing AMR. Dr. David Heymann is coming back as associate director of Communicable Diseases and is a strong advocate for AMR control programs. This May, the World Health Assembly will consider progress made by its member countries in improving use of antimicrobials and preserving the power of first line agents in their countries. In addition, Ms. Young discussed with Ian Gould ways to coordinate APUA and International Society of Chemotherapy (ISC) initiatives to accelerate antibiotic development in order to address increasingly resistant infections and to fill the near empty pipeline. Follow-up action between EU and APUA is planned at APUA’s 2nd World Congress Oct. 29 and 30, 2007 (see page 3).

APUA International Inaugurates New Chapters

APUA-Azerbaijan

On December 1, 2006 Dr. Adalyat Abdulayev was elected as the chapter leader for APUA-Azerbaijan. APUA International welcomes members of the new chapter.

APUA-The Gambia

Members of the new APUA-The Gambia, Dr. Adama Sallah, Dr. Thomas Manly-Rollings and Dr. Chidi Nweneka inaugurated the new APUA-Gambia chapter by presenting its first AMR Symposium in Banjul, The Gambia on January 18th, 2007. Members were addressed by the Deputy Permanent Secretary of State for Health, Dr. Alhaji Sahou Janneh. APUA’s Dr. Anibal Sosa attended the event.

APUA at the 17th European Congress of Infectious Diseases and Clinical Microbiology (ESCMID).

APUA Executive Director, Kathy Young and Dr. Anibal Sosa, Director of the International Program, attended the 17th ESCMID in Munich, Germany. They met with chapter leaders, including Emma Keulyan of Bulgaria who is working on innovative infection control efforts at her medical center. A poster of the APUA Africa chapter network was displayed at the European Network Corner. (See p.10.)

APUA- Italy

Congratulations are extended to APUA-Italy’s new chapter leader, Dr. Guiseppe Cornaglia, who is also president-elect of ESCMID.

APUA-Brazil Unveils New Website

Chapter leader Dr. Julival Fagundes Ribeiro has announced the unveiling of the new APUA-Brazil website. It can be found at http://www.apuabrasil.org.br/.

For more information on APUA’s international activities, contact Anibal Sosa at anibal.sosa@tufts.edu.
The Alliance for the Prudent Use of Antibiotics (APUA) conducts global research, education, and technical assistance programs in conjunction with over 55 country-based chapters, including 27 in the developing world. Through this unique global network, APUA supports country-based activities to control and monitor antimicrobial resistance (AMR) by tailoring interventions to local needs, customs, and practices.

Typically associated with antibiotic overuse in industrialized nations, antibiotic resistance in the developing world, paradoxically, is linked to lack of access and improper use—not nearly enough antibiotics are being used for the treatment of life-threatening infections. Worse, this under-use of antibiotics is at the root of tragically high rates of death from infectious disease among young children. Treatable acute respiratory infections (ARI) kill nearly two million children under the age of 5 years worldwide every year, and nearly one million of these deaths occur in Africa.[1]

APUA chapters have been established in 9 African countries with an additional 7 chapters in development. Chapter activities demonstrate their capacity as catalysts for change impacting both clinical practice and health policy.

**Local Impact on clinical practice:**

**APUA-Kenya**: Collaborating with Kenya Society for Microbiology to establish a laboratory quality assurance (QA) program focused on identification and susceptibility testing of key pathogens in clinical microbiology. At present, 8 laboratories are involved in this QA challenge.

**APUA-Nigeria**: Publication of Antibiotic resistance trends in Escherichia coli from apparently healthy Nigerian students, and Antibiotic-resistant cell-detaching Escherichia coli strains from Nigerian children. Both papers underscore the need for routine monitoring of antibiotic resistance to help guide clinical therapy and provide essential data to promote control of AMR.

**APUA-Senegal**: Conducted trainings for health workers and pharmacy sellers about the use of antibiotics in respiratory and diarrheal diseases according to the national treatment guidelines in association with Ministry of Health (MOH)

**APUA-South Africa**: Chapter leader, Prof. Sabiha Essack published article on Antibiotic use and resistance in public hospitals in KwaZulu-Natal. Efforts to influence decision makers in the public and private healthcare sectors, identify international donors to fund critical activities, and to inform South African professional associations, government stakeholders and consumers on AMR are currently underway.


**APUA-Zambia**: Collaborated with the Ministry of Health and others to develop standard treatment guidelines. Funded by the USAID, the chapter coordinated training for clinical microbiology staff on AMR Basic Research ethnologies.

**Local Impact on health policy:**

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• Prioritization of the most pressing issues to facilitate research that will identify baseline data and assist clinicians and policy-makers in instituting corrective measures as needed;

• Data collection on antimicrobial use and the extent of AMR in the country;

• Fostering scientific exchange and network development via meeting coordination and electronic discussion group formation;

• Increasing publicity on AMR;

• Development, translation, and distribution of educational materials; and mentorship to other country chapters.

APUA chapters are the “local champions” providing a multi-disciplinary approach for containing AMR by incorporating expertise in infectious disease medicine, microbiology, pathology, clinical pharmacology, and AMR surveillance. APUA country chapters serve these vital functions:

• Coordinate stakeholder communities within a country to address the growing problem of AMR and to promote the appropriate use of antimicrobials, raising awareness locally and country-wide

• Strengthen local capacity to bolster and sustain research and educational activities in the area of antimicrobial use and resistance; Establish channels for AMR surveillance efforts promoting the collection and dissemination of AMR data;

• Raise awareness at the local and country levels about the problem of resistance, the dangers of incorrect antimicrobial use, and the importance of the appropriate use of antimicrobials;

• Facilitate local research on antimicrobial use and resistance issues specific to the country, in order to raise awareness among local policy makers, to plan appropriate clinical and public health interventions, and to inform national policies;

• Provide local leaders with regular networking opportunities to enhance AMR knowledge and program effectiveness

**Introduction and Purpose**

The APUA chapters in Africa: Integrating Clinical and Research Resources in Locally Sustained Interventions to Reduce the Burden of Infectious Disease

**Abstract**

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**Results**

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This issue acknowledges several of APUA’s key corporate supporters for FY2007 whose financial contributions have helped promote efforts towards “preserving the power of antibiotics.”

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The AB BIODISK name, company spirit and reputation are based on the highest standards of science. Since its inception in the early 1950s, the company has remained focused in the field of antimicrobial susceptibility testing and has developed new concepts for MIC testing. Etest® is an example of a highly acclaimed innovative gradient technique introduced by AB BIODISK in 1988. Significant resources are dedicated to research and development and different in vitro susceptibility testing projects are conducted in collaboration with other laboratories throughout the world. These include studies on new antimicrobial agents, testing of difficult and fastidious organisms such as H. pylori and C. difficile, detection of resistances such as vancomycin resistance in staphylococci (VRE, VISA) and epidemiologic surveillances.

**APUA is pleased to acknowledge its corporate sponsors, collaborators, and project partners for their generous support and invaluable collaboration in “preserving the power of antibiotics.”**
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Founded in 1981 as a nonprofit organization, APUA is the only organization in the world solely
dedicated to strengthening society’s defenses against infectious diseases through research and education on
antibiotic use and antibiotic resistance. APUA’s mission is to improve infectious disease treatment
and control worldwide through promoting appropriate antibiotic access and use and reducing antibiotic
resistance. With members in over 100 countries and over 55 affiliated country chapters, APUA
provides a unique network to support country-based activities and facilitate international planning and
communication. APUA’s resources include an international scientific advisory board with members of
national academies of medicine and science and a professional staff with specialized expertise. APUA’s
global network of affiliated chapters serves to tailor interventions to local customs and practices.

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