Infectious Disease and International Engagement: Responsible Bioscience for a Safe and Secure Society

Workshop Three

Report of a meeting on 31 October and 1 November 2011 in Tunis, Tunisia
Infectious Disease and International Engagement: Responsible Bioscience for a Safe and Secure Society

Workshop Three

Workshop Series Report

Summary of
31 October – 1 November 2011 Meeting
Tunis, Tunisia

Prepared by

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Disclaimer
The statements, challenges, and suggestions included in this report reflect the discussions at the workshop and do not necessarily represent the views of IPT, FST, or the AAAS Board of Directors, its Council, or the AAAS membership.

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About IPT
Established in 1893, The Institut Pasteur de Tunis (IPT) is a public health institution under the guardianship of the Ministry of Public Health. It has three missions; Research and training, diagnosis and public health, and production of vaccines and sera. IPT is internationally well established and collaborates with several foreign scientific institutions. The Institute is also member of the Institut Pasteur International Network that includes 32 institutes throughout the world. Institut Pasteur de Tunis is linked to the history of medicine in Tunisia and to the discoveries in the field of infectious diseases, especially, since Charles Nicolle’s Nobel Prize. For more information: http://www.pasteur.tn/

About Faculty of Science of Tunis, University El Manar
The Faculty of Sciences of Tunis (FST), truly called Faculty of Mathematical, Physical and Natural Sciences, was founded in 1960 in the premises of the Institute for Advanced Studies in Tunis, which depended on the University of Paris, since its inception in 1945. From its conception it trained its students to obtain undergraduate degrees (license in French) in various scientific disciplines, such as Mathematics, Physics, Chemistry and Natural Sciences. In 1978 FST created the first Department of Engineering program in North Africa. Relying on cooperation with foreign countries at first, FST started to gradually become self sufficient in some research areas, due in part to successful acquisition of heavy equipment, except for Biology, which was always the more advanced research areas of FST.

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Executive Summary

In today’s world where interconnectedness and interdependence affect many global challenges - from health issues, food availability, energy sources to economic stability and security - cooperation and advancement in the natural and social sciences are critical to addressing or reducing the burden of these global challenges. Collaboration among scientists within and among countries both regionally and internationally have contributed to strengthened capacity to deal with problems facing individual or groups of countries. Cooperation among scientists has offered lines of communication between countries where little or none existed before. Yet, despite the scientific and societal benefits provided by cooperation and collaboration, the manner in which some of these relationships were initiated and progressed raised concerns about the motivations of the researchers and funders, conduct (i.e., for mutual or unilateral benefit), and ethical and risk-based considerations of the research. As the nature of the problems the world faces change, as science continues to advance to address those challenges, and as public concern about ethical and risk-associated aspects of research increases, current and future generations of scientists face the enormous challenge of conducting socially-relevant research that is accepted by the public and can be translated to practical use.

The AAAS Center for Science, Technology, and Security Policy (CSTSP) initiated a series of discussion-based meetings in the broader Middle East and North Africa region, including Afghanistan and Pakistan (BMENA or “broader MENA”) to better understand critical issues that underlie international collaboration and scientific engagement in the biological sciences. This meeting was the third of four designed to address necessary components for successful collaboration among scientists between the BMENA countries and the United States. The first two meetings, held in Jordan in October 2010 and Kuwait in March 2011 respectively, focused on the state of scientific and human capacity in BMENA countries, national priorities to which existing biological research and biotechnology can contribute, the scientific capacity needed to address national priorities, and mechanisms (via development or through collaboration) by which countries can gain needed capacities, and ethical and risk-based considerations of biological research.

Based on these first two meetings, participants emphasized the need to educate early-career scientists (i.e., graduate students, scientists working at a post-doctoral level or equivalent, and junior faculty) about initiating and maintaining international scientific collaboration. In response to this, CSTSP in collaboration with the Institut Pasteur de Tunis and Faculty of Science Tunis, University of Tunis El Manar hosted the third meeting in Tunisia on 31 October to 1 November, 2011 to educate early-career scientists from the BMENA region about critical issues associated with international collaboration of infectious diseases. Our aim was to expand and build a network of early-career and well-established scientists from the BMENA countries and the United States to address important scientific and societal issues, develop a program on responsible research conduct at the institutional level, and provide opportunities for career development and peer mentorship. Senior scientists, administrators, and early-career scientists from Tunisia, Morocco, Egypt, Algeria, Jordan, Lebanon, Afghanistan, Pakistan, Kuwait,
Qatar, Yemen, United Kingdom, France, Brazil, and the United States were invited to participate in this meeting. The meeting also aimed to promote greater awareness among early-career scientists about how to initiate and maintain international collaboration and overcome obstacles that might arise during the collaboration. Sessions focused on the legal, methodological, and general ethical and risk-based issues that need to be considered during the design and conduct of joint research projects; ethical, environmental, safety, and security risks associated with infectious disease research; global networks for infectious disease research; and funding considerations and priority-setting for international collaboration projects. We incorporated case studies to help the early-career scientists better understand the factors that enable collaboration, those that pose challenges to collaboration, and ways in which the challenges were addressed. We also created and implemented a choice-based table top exercise to engage the early-career and senior scientists in considering important legal, ethical, and risk-based requirements, frameworks, or concerns during project design and/or communication.

The following themes emerged from discussions during the meeting:

- **Trust, respect, honesty, ability to adapt to different surroundings, listening skills, and culture** affect the success and sustainability of cooperative scientific relationships.

- **Differences between countries and institutions regarding regulations (e.g., animal welfare, human subjects research, genetic modification)** can be significant. Countries and institutions may differ significantly in their standards for and managing of ethical, safety, security, and environmental risks. Greater understanding and appreciation of these differences and development of ways to approach and bridge these differences are needed for a successful collaboration.

- **Project management** is an important part of research that must not be overlooked, especially in international collaborations. This includes factors, such as being clear about the goals and expectations of the project from the outset, managing intellectual property, managing data gained from collaboration, and regulatory compliance.

- **Scientific visits and exchanges** are important for learning more about the potential partner and his/her institution, which helps to address many legal, operational, and ethical and social issues that might arise during and after the course of a project.

- **Behavior of collaborating partners** may dictate the success and impact of the cooperative efforts. One way to gain greater insight about a potential collaborator’s behavior and ethical framework is by co-authoring a scientific article; the article could be a review article, an opinion article, or based on prior, complementary research.

- **Clear and open communication** among scientists, as well as between scientists and the public, is essential. Such communication should be in culturally and societally appropriate language that accurately conveys scientific and behavioral concepts (i.e., ethics and research integrity, safety, and security) and the potential of
scientific findings to address health, agricultural, social, and environmental concerns.

- There needs to be enhanced awareness of the challenges that scientists face, including for example: 1) legal, ethical, or operational obstacles that might arise during initiation and maintenance of collaborations; and 2) lack of necessary resources or support functions at institutions or in countries enable research and collaboration, and identify and minimize potential risks as they happen.

- Early-career scientists should be provided ample opportunities to conduct socially relevant research, collaborate with other scientists, and advance in their careers.

- Describing “dual use” as an ethical dilemma to reinforce the idea that biology should not be used to cause harm is clearer and more acceptable by the scientific community and therefore, the preferable way to describe this issue.
Meeting Report

The AAAS Center for Science, Technology, and Security Policy (CSTSP), the Institut Pasteur de Tunis (IPT), and Faculty of Science (FST) hosted “Infectious Diseases and International Engagement: Responsible Bioscience for a Safe and Secure Society” in the fall of 2012. The goal of the meeting was to educate early-career scientists from the BMENA region, Brazil, and the United States about the legal, methodological, and general ethical and risk-based issues that need to be considered during the design and conduct of joint research projects; ethical, environmental, safety, and security risks associated with infectious disease research; global networks for infectious disease research; and funding considerations and priority-setting for international collaboration projects.

While scientists can forge long-term relationships based on their mutual scientific interests irrespective of culture and country, the legal realities of conducting international research collaborations may pose specific challenges. This meeting was intended to discuss the scientific, legal, and behavioral issues that affect the initiation, success, and sustainability of research collaborations. The meeting was both educational and policy relevant, with several important issues emerging from the discussions.

The report starts with a brief list of concepts upon which the meeting was based. Following this list, the important issues that emerged from the discussion are categorized in the four specific sections - legal considerations of international collaboration; ethical, environmental, safety, and security risks; integrating scientists into the global scientific network, and suggestions. The report also includes three appendices: the meeting agenda, participant list, and description of the choice-based exercise.

Core Concepts of Collaboration

- Science benefits many aspects of society, including health and agriculture, economic growth, environmentally safe energy sources, and national and international security.

- Scientists should use their expertise and skills to help people and their societies, and not misuse knowledge for personal gain\(^1\) or to cause harm to people, animals, and environment.

\(^1\) In this report, “personal gain” in the context of misuse refers to an individual who benefits from the project because he or she was not forthcoming and transparent about his or her intentions and actions. The
Collaborative efforts must be based on mutual understanding and responsibility.

Diverse expertise and team-makeup, including both senior and junior scientists from natural and/or social science disciplines, encourage creative and high-quality research environments.

- Multidisciplinary teams of life scientists and physical scientists, as well as natural and social scientists, may provide more opportunities and depth of expertise to address challenging issues by bringing to bear a diverse set of expertise and experiences.
- Including groups – such as women or early-career scientists – that tend to be underrepresented in collaborative efforts may enhance how scientific questions may be addressed.

Addressing differences in operational, ethical, safety, security, and environmental standards between collaborating partners may occur one step at a time until the practices become institutionalized at the research facility. Those individuals and institutions that have greater experience with international collaboration may have already dealt with certain challenges and developed procedures and policies to minimize the effects of those challenges and enable collaboration, whereas institutions that are less experienced with collaboration may not have processes in place to address challenges and have to manage risks and problems as they are encountered.

Awareness of key issues and challenges involved in initiating and maintaining collaborative efforts should not deter scientists from collaborating, but rather should strive to overcome the challenges to ensure the success of research projects and scientific relationships. Small collaborative projects can lead to large, long-lasting collaborative efforts.

Before the start of a collaboration, scientists may not be able to anticipate all challenges they could face during the course of the project or after the project has been completed, but researchers can work together to address challenges and minimize risk as they are encountered.

Workforce is a critical component of collaboration.

- While not the only component of a strong scientific relationship, including early-career scientists in research and collaborative activities is important for building and sustaining creative thinking and strong collaborative activities.

term does not necessarily describe intellectual property protection. As described later in the report, collaborating partners should discuss how they will handle protect intellectual property of equities brought to the project and gained from the project at the outset of the collaboration.
Training senior and junior scientists about ethical and safety issues associated with research, regulatory aspects of research, and processes to develop and maintain collaborations is important to promoting research environments that enable internationally recognized, responsible science and collaborative activities.

Senior scientists play an important role in sharing their experiences with minimizing potential risks with early-career scientists.

Scientific visits and exchanges and study abroad programs can contribute to enhancing one's knowledge of scientific advancements and building scientific relationships.

Senior scientists can provide opportunities for the early-career scientists they mentor to build their expertise and skill and join global scientific networks.

Political will and an enabling political system are important for encouraging workforce development of individuals from urban and rural areas of countries.

- Philanthropic organizations often develop their funding priorities based on their leadership, social need, and/or assessments from experts
  - Qatar Foundation supports Qatar by ensuring an alignment between the research agenda and the capacity of the country. The Foundation also encourages scientific entrepreneurship.²
  - U.S. National Institute of Allergy and Infectious Diseases (NIAID) working with G8 countries to develop research objectives for health.

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### NIH training programs and fellowships, few programs highlights

The National Institutes of Health (NIH) Visiting Program provides opportunities for foreign scientists to train and conduct collaborative research at the NIH. [http://dis.ors.od.nih.gov/visitingprogram/01_vpmain.html](http://dis.ors.od.nih.gov/visitingprogram/01_vpmain.html)

The Fogarty International Center and its partners throughout the NIH are working to build sustainable research capacity in low- and middle-income countries. One specific program discussed at the meeting was the Global Infectious Disease Research Training Program (GID). [http://www.fic.nih.gov/Programs/Pages/infectious-disease.aspx](http://www.fic.nih.gov/Programs/Pages/infectious-disease.aspx)

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² Scientific entrepreneurship encourages translation of basic research into products that can be commercially used, which is important to many countries. An example of programs that encourage entrepreneurship that is not related to the Qatar Foundation is the U.S. Department of State’s BioIndustry Initiative (BII). This program used entrepreneurship to reduce the risk of deliberate misuse of biology for harmful purposes by providing opportunities for former Soviet life scientists to make commercial products to address their countries’ health needs. [http://216.109.75.138/e_research/source_docs/us/department_state/press_releases_fact_sheets_reports/54.pdf](http://216.109.75.138/e_research/source_docs/us/department_state/press_releases_fact_sheets_reports/54.pdf).
Important Factors for Collaboration

- Successful collaboration requires mutual understanding, trust, and joint responsibility of research partners and their sponsor(s). Trust between partners to use biological materials appropriately (i.e., to not misuse materials for personal gain or to cause harm) and ensure that all ethical, legal, and procedural requirements will be addressed is critical to sustain any collaboration.

- Transparency of research expectations will have a positive effect on the success and sustainability of the cooperation.

- Research on problems of mutual concern, particularly challenges that significantly affect local populations, provide a solid basis for collaboration. Examples of these problems include infectious disease surveillance and public health capacity, antimicrobial resistant pathogens, vector-borne diseases, “One Health,” and biorisk management.

- Collaborations that help build local research capacity to address social needs, such as vaccines and drugs effective against local strains of pathogens, provides opportunities to build trust and longer-term relationships between partners, improve local response to national and regional challenges, and develop processes to resolve or minimize barriers to collaboration.

- Research capacity and workforce development (including education and training in science and behavioral principals) may have to be strengthened before a joint project can be initiated. However, on occasion collaborative activities can enhance scientific and human capacity of partners.

- In addition to the principal investigators, their scientific teams should be involved in the project from the initial project development stage through final communication of results. Projects that involve all contributing partners and equitably distribute workload, responsibility, and recognition among partners have a higher likelihood of developing strong, long-term cooperative relationships.

- Defining the roles and responsibilities of each collaborating partner - including responsible communication of research results, authorship of papers and presentations, ownership of intellectual property, handling of research tools and results, and access to data – before initiating a collaborative project enables the development of productive scientific relationships and research programs.

- Communication skills are important in international partnerships.
  - Understanding cultural nuances and use of language are critically important to ensure effective communication between partners on project expectations; ethical, legal, and social issues; and methodological and operational issues.

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3 “One Health” is the concept that the health of animals, plants, humans, and the environment are interconnected and should be addressed with equal importance.
Language and communication skills are also important to identify and/or resolve any problems that might arise before, during, and after the cooperation.

Information technology tools, such as the internet (i.e., online video conferencing and electronic mail), could facilitate communication between partners.

- Successful collaborations involve well-trained, skilled scientists; research priorities that are appropriate for the regional context and capacity; partners with complementary expertise, skills, and/or capacity; partners who understand and comply with regulations; and effective processes for project and risk management.

- Publication is often used as a metric for assessing the skills and abilities of scientists. Therefore, publication in solid, peer-reviewed journals and the quality and number of publications are important factors in assessing the knowledge, skills, and research interests of potential partners.

- Reputation of the researcher and research institution are often used to determine the quality and capability of potential partners and their institutions.

- Gaps that often exist in cooperative research programs include management of risk, data, research, and finances; processes to deal with ethical, environmental, safety, and security risks; and a responsible communication plan.

- Scientific visits and exchanges are important for learning about how potential partners address many of the operational and behavioral issues that might arise during the course of and after completion of a project. Exchanges can be used to clarify the roles and responsibilities of potential partners, and institutional missions and capabilities to meet expectations and objectives of the joint project.

- Longer commitments for collaboration will ensure greater success in the project and for sustainability of the relationship

**Legal Considerations of International Collaboration**

- Objectives and expectations need to be aligned and clear from the outset. This involves a legal review prior to collaboration as well as continued review of ongoing projects.
• Project activities dictate the applicable legal compliance requirements. This includes regulations on research with human subjects, animal subjects, and human tissues; biosafety, biosecurity, and other ethical concerns; export controls and other material and controls; and taxation, payment agreements, and other financial contractual issues. Clear understanding of these regulatory requirements by all partners and countries is important because the requirements that apply to the specific project may affect the development and interpretation of the objectives and expectations of collaborating partners.

• Differences in regulatory and legal infrastructure between countries may vary on ethical, risk-based, methodological, operational and other relevant issues, which may affect the oversight and conduct of the scientific collaboration. These differences may not be as stark as differences in scientific capacity between research institutions.

• The inherent conflict between intellectual property rights and access to products or results may affect the expectations and success of a collaborative project. Intellectual property rights generated in a joint project tend to be held by entities in high-income countries, but the burden of infectious diseases is often in low-income countries. These issues should be addressed prior to the start of a project.

• Things to look for before initiating a scientific collaboration:
  o Partner expectations, mutual interest, and shared benefit
  o Roles and responsibilities of each partner
  o Scientific knowledge and skills of the scientists
  o Project management skills of the scientists
  o Complementary skills, equipment, and facilities of the partner and his/her institution
  o The institution’s legal standing and ability to support the scientist
  o Restrictions on the research question or experimental design
    ▪ Acceptance of the studies by the local population
    ▪ Experimental procedures that are either illegal or require approval

GURRR report on international collaboration

The Government-University-Industry Research Roundtable, at U.S. National Academy of Sciences, published a workshop report on international collaboration. The report stated that “one of primary goals of the workshop [was] to better understand the risks involved in international research collaboration for organizations and individual participants, and the mechanisms that can be used to manage those risks. Issues addressed in the workshop included the following: (1) Cultural Differences and Nuances; (2) Legal Issues and Agreements; (3) Differences in Ethical Standards; (4) Research Integrity and the Responsible Conduct of Research; (5) Intellectual Property; (6) Risk Management; (7) Export Controls; and (8) Strategies for Developing Meaningful International Collaborations.” The full report is available at:

http://www.nap.edu/catalog.php?record_id=13192#toc
Procedures for scientists to seek institutional and/or national approval to commence collaborative projects

Public or private entity and associated policies, procedures, requirements, and laws under which the institutions are subject

Procedures for regulatory compliance

Contracting procedures
  - The responsible person for signing the contact and overseeing compliance of the project
  - The lead researcher responsible for the project

Study review or evaluation procedures at the start of and throughout the lifetime of the project

Ethical, environmental, safety, and security risk management policies, procedures, standards, and training

Communication strategies, including communication between partners, use of language, cultural or social nuances, and authorship on manuscripts, abstracts, presentations, patents, and other relevant documents

Intellectual property protection, including issues related to patents, copyrights, and trade secrets that are being brought to the collaboration and those that are generated as a result of the collaborative project

Technology transfer procedures

Procedures for identifying and resolving export control issues in a manner that balances academic freedom with risk of misuse of technology

Institution safety and security of faculty, students, and staff

Other issues such as employment provisions, technical expectations, and anti-trust issues

Knowing the intent, motivations, regulations, and practice of partners for sharing of materials, knowledge, and pathogens that could be misused is extremely important for promoting successful and transparent collaboration.

This applies to products, laboratory materials, biologics, and knowledge, and may apply to export controls, technology transfer and intellectual property protection, and authorship and credit.

This applies to people who may

“There has to be a dialogue or understanding of why you are setting up the relationship and what would be the context for the experiments and expectations for the science; once this is understood you are much better off than you are with simply a list of agents and where these agents are being going to be kept.” - David Relman, Stanford University
want to misuse the materials for harm or personal gain.

- In many cases, permission is needed to share samples and the pertinent governing or overseeing bodies differ by sample, subject, country, and institution.

- Scientists should know with whom they are sharing materials, why the person is requesting the materials, and what the person plans to do with the materials before sharing.

- Since pathogens are found naturally in the environment (in humans, plants, animals, or other infectious disease carriers), scientists should be aware that people with questionable intent may still gain access to harmful pathogens even if measures exist to restrict pathogen-sharing.

- Handling of, security of, transfer of, and access to data are important issues related to sharing of knowledge and materials in a joint research project. Transportation of pathogens, storage materials (e.g., dry ice), and/or other biologics (e.g., vaccines, drugs, and human samples) is regulated by countries differently and may affect the research method developed by researchers.

**Ethical, Environmental, Safety, Security Risks**

- Balancing the quest for knowledge and academic freedom with addressing societal concerns is currently and will continue to be a critical part of the pursuit of quality, socially relevant, and collaborative science.

- The relationship between the principal investigator and her/his scientific team is important and could affect implementation of high-level principles and practices at an institution and laboratory.

- All scientists involved in a collaborative project are responsible for minimizing or preventing misuse or adverse use (e.g., accidental contamination) of biology and knowledge, and for ensuring that the facilities and equipment are used properly and institutional guidelines are followed. However, interpretation of ethical issues associated with particular research activities may not be shared by all collaborating partners.

- Focusing on biosecurity alone detracts from the promise of science, the range of issues associated with science, and ethical and behavioral issues impacting intent.
  - Describing “dual use” as an ethical dilemma to reinforce the idea that biology should not be used to cause harm is clearer and more acceptable to the scientific community and therefore, the preferable way to describe this issue.
  - “Dual use” is currently communicated in a manner that does not fully convey the underlying concept, which is to minimize the risk of misuse of knowledge or materials to cause harm. The problem is not in translation of the words but in how the concept is described. “Dual use” tends to be
understood as multiple or mutual benefit and security is associated with personal or individual security.\(^4\)

- Regulatory, procedural, and facility-specific differences in biosafety and biosecurity between countries and institutions may affect collaboration. Increased awareness of biosafety and potential biosecurity risks associated with infectious disease research may help scientists minimize those risks in practice. Examples of differences identified in the table top exercise (Appendix Three) include:
  - Genetic modification of an organism is illegal in at least one of the countries represented at the meeting.
  - Several countries have guidelines for genetically modifying organisms.
  - Shipping dry ice is not permitted in one country.
  - Laboratories in some countries are not allowed to have certain equipment.
  - Some countries have strict controls over research with dangerous pathogens.
  - One country requires country approval to import drugs.
  - Transfer of antimicrobial resistance is not allowed in some countries and would require approval.
  - Some countries ban shipping of blood out of the country.

- Ethical considerations and regulation of research including human subjects and animal subjects differ among countries.
  - Human subjects research:
    - Some countries have national review boards for human subjects research while others do not have such committees.
    - Some countries that lack review committees are interested in developing them.
  - Animal subjects research:
    - Some countries have no laws dictating how animals are used in research.
    - Some countries have very stringent laws regulating research with animals.
    - Some countries have laws on animal welfare, but those are ignored by researchers and institutions.
    - Some countries have no laws on animal welfare, but research institutions have implemented guidelines with which scientists are expected to comply.

Independent review committees provide scientists with greater opportunity to identify and address ethical challenges. Several countries have dedicated ethics committees at the institutional or national levels and Institutional Biosafety Committees.

Environmental risks of research may differ based on the socio-economic situation of the country and social need for the research results.

The pressure to deal with urgent social issues – i.e., in health, agriculture, environmental fitness, and energy - may impose ethical challenges for conflict of interest, differences in expectations for research results, and legal, ethical, safety, security, and environmental risks of the research.

Conflict of interest may be a major ethical and practical challenge for collaborating scientists and their institutions. The actual research project may be a secondary goal to other interests, such as the building of research laboratories. Understanding one’s intentions and motivations for entering into collaboration is extremely important.

**Integrating Scientists into the Global Scientific Network**

- Networks can come in different forms:
  - Networks can help provide infrastructure, funding opportunities, a mechanism for discussion of challenging scientific and social issues, awareness of new technologies, and training opportunities.
  - Networks can encourage horizontal (peer-to-peer) and vertical (scientists in different stages of their careers) communication and interaction.
  - Networks can help provide a better understanding of different paths that scientists can take to address global issues. Laboratory science is not the only way scientists can contribute.
  - Networks can help facilitate the development of public-private partnerships (government with industry and/or academia) and private-private partnerships (industry with academia).
  - Networks can promote communication between scientists and non-scientists to promote science and technology, improve the scientific dialogue in discussions with the public and policymakers, and enhance political interest and support for science within a country.
  - Networks can contribute to outreach and education of the general public and policymaking communities to get ahead of any problems and provide the public the tools to assess risk and benefit of scientific issues. Enhancing the public’s understanding of science can result in increased support of science and vigilance against potential misuse of science.
  - Networks can also be used to address global challenges, such as infectious diseases.
- Scientific interaction may be greater and longer-lasting with an institution that strives for scientific excellence rather than one that does not achieve global standards of excellence. Scientific excellence depends on the quality of education and training; quality of scientific environment including the research and administrative structures, visibility of the institution, and research competitiveness of institution; use of technology; and political will.

- Two important aspects of international science are independent evaluation and peer review, and clear scientific communication. Both greatly benefit from global scientific networks.

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<td>The National Academy of Young Scientists (NAYS) is Pakistan’s largest forum of young researchers. It funds projects, provides online discussion forums, hosts workshops on scientific advancements and risks, organizes scientific competitions, and hosts conferences on emerging ideas. <a href="http://www.nays.com.pk/">http://www.nays.com.pk/</a></td>
<td>The Fulbright Program is an international educational exchange program sponsored by the U.S. government. It is designed to “increase mutual understanding between the people of the United States and the people of other countries.” <a href="http://www.cies.org/about_fulb.htm">http://www.cies.org/about_fulb.htm</a></td>
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<td>Qatar National Research Fund (QNRF) was established in 2006, and aims to foster original, competitively selected research collaboration between Qatar and international researchers in areas that include engineering and technology, physical and life sciences, medicine, humanities, social sciences and the arts. Key funding programs by QNRF include the National Priorities Research Program (NPRP), which provides funding for successful proposals of up to US $350,000 per year. <a href="http://www.qnrf.org/funding_programs/nprp/">http://www.qnrf.org/funding_programs/nprp/</a></td>
<td>In addition to funding, QNRF aims to encourage dialogue and partnerships. This includes a Collaborative Forum that aims at providing an opportunity to researchers inside and outside Qatar to interact with each other and discuss matters relating to the collaboration in scientific and academic research that might be carried out under the National Priorities Research Fund Program. <a href="http://www.qnrf-forum.org/">http://www.qnrf-forum.org/</a></td>
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Suggestions

The following are a list of suggestions made by meeting participants. These suggestions are not consensus recommendations and do not suggest ease of implementation.

- Scientific collaboration should enhance the scientific and institutional capacity for education and conduct of research in the life sciences. These capacities should include training on management of research, data, personnel, and collaboration, and ethical, legal, and social implications of biological research.

- Since ethical issues change with societal concern, standards and policies for minimizing ethical, environmental, safety, and security risks should be adaptive and focused on good practice rather than prescriptive requirements.

- Scientists and institutional officials responsible for oversight and compliance of research at their institutions should pay close attention to national and international discussions on ethical issues and develop processes to minimize risk to the research subject and environment and to ensure the research is being conducted at the highest possible quality.

- Scientists should be trained on risk (ethical, safety, security, and environmental) identification and mitigation and be made aware of the legal, ethical, and regulatory environment of their collaborating partner’s institution and country. Some country-specific issues may prohibit aspects of the research activity (e.g., testing antimicrobial resistance may not be allowed.)

- Scientists should develop a communication strategy at the outset of a collaborative project to ensure that partners have mutually agreed upon authorship, access to research results, access to products, and other issues as relevant.

- Communication of “dual use,” as a potential risk associated with biological research, should be approached as a process that repeatedly engages scientists in dialogue about the concept of “dual use,” helps dispel scientists’ concerns that they are viewed as “threats,” and promotes better understanding of the underlying concept that biology should not be used for harm. The ways in which “dual use” is discussed should be culturally sensitive, easily understood, and intuitive.

- Scientists should work with local institutions to gain expertise and resources they may not have themselves. For example, Institut Pasteur de Tunis and NAMRU-3 could be local resources for training, laboratory evaluation, and scientific expertise for infectious disease research, detection, and surveillance.

Better way to message the concept of “dual use”:
“...use of research in good way and not bad way...”
Mona Mostafa Mohammed, Cairo University
• Research institutions should have supportive research management to positively affect the morale and enthusiasm of the faculty, staff, and students. If such an environment is not achieved, the institution might run the risk of ethical, safety, and security violations.

• Scientists should work with management experts during the planning of joint projects to ensure that all issues identified prior to a collaborative venture are adequately addressed.

• Before initiating collaborative projects, scientists should write an agreement or contract that includes legal issues, project objectives, roles and responsibilities of the institution and scientists, handling and communication of research results, and management of different expectations and conflicts of interest. An agreement containing these and other relevant information helps resolve any problems that might arise during the course of a collaborative project.

• Workshops on and exchanges in science policy should be supported to improve communication of scientists with policymakers and enhance scientific input into the decision-making process.

Conclusions

Although scientists can do a lot prior to initiation of a collaboration, they may not be able to anticipate all challenges they may face during the course of the project or after the project has been completed. Enhanced awareness of some of the challenges scientists may face, better understanding and experience with addressing different types of challenges encountered during a collaboration, and an institutional and/or national environment that supports and enables research and collaboration can provide the resources and skills necessary to address risks and challenges as they happen. The long-term impact and sustainability of the relationships made during this and the previous meetings as well as the increased awareness of how to build and maintain cooperative relationships to withstand funding cycles and political changes depend on greater participation of the scientific community well beyond the meetings in this series.
Appendix One:
Meeting Agenda

Infectious Diseases and International Engagement:
Responsible Science for a Safe and Secure Society

October 31 to November 1, 2011
Tunis, Tunisia

Workshop Three

Scientific collaboration offers significant opportunities to advance biological science to address national priorities and discuss shared principles and standards of practice. The AAAS Center for Science, Technology, and Security Policy (CSTSP) initiated a series of meetings in the Broader Middle East and North Africa (BMENA) to better understand critical issues underlying international collaboration in the biological sciences. The first meeting, held in collaboration with the Jordan University of Science and Technology Princess Haya Biotechnology Center in October 2010, focused on the state of the scientific and human capacity in BMENA countries, and responsible stewardship (bioethics, biosafety, and biosecurity). The second meeting, hosted in collaboration with the Kuwait Institute for Scientific Research (KISR) in March 2011 examined national priorities to which existing biological research and biotechnology can contribute, needed scientific capacity to address national priorities, and mechanisms (via development or through collaboration) by which countries can gain needed capacities. The meeting brought together scientists from fourteen BMENA countries (Afghanistan, Algeria, Egypt, Iraq, Jordan, Kuwait, Lebanon, Morocco, Pakistan, Qatar, Tunisia, Kingdom of Saudi Arabia, United Arab Emirates, and Yemen), the United Kingdom and the United States.

For the third meeting, AAAS in collaboration with the Institut Pasteur Tunis, The Faculté des Sciences de Tunis, and the Cairo University, proposes to focus on international collaboration on infectious diseases and include an audience of young and early career scientists in the discussions. The workshop will address infectious disease research, incorporation of legal, ethical and security issues in the workforce development of life scientists, and building sustainable long-term international collaborations among life scientists from the Middle East, North Africa, Afghanistan and Pakistan (the Broader MENA or BMENA) region, and the United States. We hope to include examples of successful collaboration and challenges faced in initiating and maintaining scientific collaboration.
We aim at expanding and building a network of young scientists from the BMENA countries and the United States and previous workshop participants to address important scientific and societal issues, develop a program on responsible research conduct at the institutional level, and provide opportunities for career development and peer mentorship.

For more information: http://cstsp.aaas.org/InternationalMeeting/home.html

16:00 - 20:00 Poster hanging time (early career scientists, not speakers)

Day 0 [October 30, 2011] – Welcome Dinner

19:00- 21:00 Welcoming Reception (heavy appetizers) and Registration
Poster Session (simultaneously with welcome dinner)

Day 1 [October 31, 2011]: Tulipe Room

8:00 – 8:30 Registration

8:30 – 8:45 Welcome
Gerald Epstein, AAAS Center for Science, Technology, and Security Policy
Abdelhafidh El Gharbi, University of Tunis El Manar - Invited
Hechmi Louzir, Institut Pasteur de Tunis

8:45 – 9:15 Meeting Goals
Gwenaële Coat, AAAS Center for Science, Technology, and Security Policy
Amel Benammar ElGaied, University of Tunis El Manar, Faculty of Science
Mona Mostafa Mohamed, Cairo University

Peter Agre, Johns Hopkins Bloomberg School of Public Health
Claude Pirmez, Oswaldo Cruz Foundation

10:15 – 10:45 Break / Networking

10:45 – 12:15 Global Networks and Research Advancements to Address the Infectious Disease Events
Hechmi Louzir, Institut Pasteur Tunis
David Relman, Stanford University
Jérôme Salomon, Institut Pasteur, France
Salem Chouaib, Institut Gustave Roussy
12:15 – 13:30 Lunch

13:30 – 14:00 Networking Tools: Demos
Scientific Networking: National Academy of Young Scientists, Pakistan

14:00 – 15:30 Funding Prospects, Priorities, and Opportunities
Jane Coury, U.S. National Institutes of Health
Dirar Khoury, Qatar Foundation

15:30 – 16:00 Break / Networking

16:00 – 17:15 International Collaboration: Navigating Legal Requirements and Scientific Methodology
James J. Casey, The University of Texas at San Antonio
Afif Ben Salah, Institut Pasteur Tunis
Col. Max Grögl, Walter Reed Army Institute of Research
Maj. Mara Kreishman-Deitrick, U.S. American Medical and Material Development Activities

17:15 – 18:00 Bridging the gap between science and policy in the MENA region
Alona Bachi, Science Policy Advisor

19:00 – 21:00 Casual Dinner at Hotel

Day 2 [November 1, 2011]: Tulipe Room

8:00 – 9:00 Working breakfast
Mona Mostafa Mohamed, Cairo University
Lida Anestidou, U.S. National Academy of Sciences

9:15 - 12:15 Interactive Exercise in Raising Awareness in Shared Bioethics, Biosafety, and Biosecurity Principles
Exercise leaders: Judi Sture, University of Bradford
Amel Benammar ElGaaied, Faculty of Sciences of Tunis

9:15 – 9:30 Introduction, Goals, and Mechanics of Exercise

9:30 – 10:45 Small Group, Interactive Case Studies

10:45 – 11:15 Break / Networking

11:15 – 12:30 Reporting of Small Group Discussions:
Interactive Discussion and Information Sharing
Summary of Exercise and Way Forward

12:30 – 13:30 Lunch

13:45 – 17:30 Lessons Learned and General Discussions Using Different Examples
Open discussions on three other examples of successful collaboration in Infectious Disease Research and/or Supportive Research Environment (legal framework)

15:15 – 15:45 Break / Networking

15:45 – 17:30 Way forward: bringing lessons learned home

Workshop Four

19:00 – 21:00 Dinner

Tuesday November 1 or Wednesday November 2 – Departure (depending on flight patterns)
Appendix Two: Participant List

Infectious Diseases and International Engagement:
Responsible Bioscience for a Safe and Secure Society
Workshop Three

31 October – 1 November 2011
Tunis, Tunisia

Participant List

Afghanistan

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Appendix Three: Choice-based Exercise

The objectives of the exercise were:
- To discuss and identify key legal, social, behavioral, and ethical issues which may arise during the course of a research project;
- To facilitate the identification of similarities and differences between countries and scientists about the main research principles and day-to-day practices; and
- To stimulate conversation between participants on mechanisms of international scientific collaboration related to biological sciences and infectious diseases.

There were no right and no wrong answers. There were several different pathways and outcomes that could have been reached for this exercise.

Background Scenario

While this scenario was not based on real events, it was designed to mimic possible real life situations. Helen was an American scientist researching drug therapies and Halim was a North African scientist studying infectious diseases. An outbreak of Pathogen Y occurred in 2009 in North Africa, where it was endemic at low levels. Halim studied pathogen Y and Helen was studying a potential drug target for pathogen Y. Helen & Halim met at an annual Conference on Retroviruses and Opportunistic Infections and began to explore the possibility of collaborating.

The research question and specific aims of the joint project were designed to elicit discussion on legal, operational, ethical, safety, and security issues that may or may not arise in a research project. The pathogen was not listed on the U.S. select agent list though it did cause significant health consequences to the affected population. All laboratory procedures and materials were consistent with standard molecular biology, microbiology, and immunology methods and in standard laboratory facilities with standard laboratory equipment. Only tissue culture cells and mice were used in the experiments; the research project did not include a clinical trial or clinical studies, but the project did include use of human serum samples. This was intentionally done to encourage discussion about ethical and regulatory issues associated with animal subjects and use of samples derived from humans, but not to focus the discussion on clinical trials, which involves much more complex issues that were not pertinent to the overall objectives of the exercise.

The research questions and specific aims included in the exercise:

- **HYPOTHESIS:** The drug inhibits post-translational modification of the pathogen’s binding protein, which decreases the infectivity of pathogen.
• **SPECIFIC AIM 1**: To study pathogen replication in tissue culture cells infected with purified pathogen and human serum containing pathogen, and in the presence or absence of drug.

• **SPECIFIC AIM 2**: To study pathogen replication, transmission rates, and immune responses in serum from mice infected with purified wild-type and genetically modified strains of pathogen in the presence and absence drug administration.

**Choices**
Throughout the scenario, Helen and Halim needed to make decisions about how to proceed with joint or independent projects. There were 13 different pathways that could have been taken.

Each of these pathways ended in one of three ways:
1 – Collaborative work with submission of an abstract to an international conference.
2 – Independent research of mutual interest. This is not a true collaboration. This situation is more like a researchers asking for published strains, reagents, compounds, etc from another colleague. This is independent research.
3 – Independent research with no mutual interest.