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## SOME INTERNATIONAL PROJECTS ON INCREASING KNOWLEDGE IN BIOSAFETY AND BIOSECURITY: EFFORTS IN UKRAINE

Maksymovych I. S., Gergalova G. L., Komisarenko S. V.

Palladin Institute of Biochemistry NAS Ukraine, Kyiv, e-mail: slavamaks@gmail.com

**Summary.** Life scientists have with increasing intensity been requested to recognize and take responsibility for the potential dual use implications of their work. Thus, a major challenge for today's internationally scientific community is to find effective ways to raise awareness among scientists about their social responsibility regarding the potential for the destructive use of the life science research in which they are engaged. The aim of the presented study is gathering information on the some available for Ukrainian researchers, specialists and students in life sciences educational opportunities on biosafety, biosecurity and bioethics.

**Keywords:** biosafety, biosecurity, education, knowledge distribution

**Background.** Life science research and biotechnology have offered great social benefits globally, for example in improvements to public health, agriculture and energy development. Alongside these benefits, however, the same advances also generate safety and security risks, which, while less obvious, are nonetheless real (World Health Organization, 2004).

However, in addition to the risk addressed by Biosafety containment and engineering safety standards, life science research and engineering developments can also give rise to issues of dual-use, whereby peacefully developed scientific research and engineering projects can be misused for destructive purposes, such as biowarfare and bioterrorism (Committee on Research Standards and Practices to Prevent the Destructive Application of Biotechnology, Development, Security, and Cooperation Policy and Global Affairs, National Research Council of the National Academies, 2004). But the lack of awareness of individual scientists across the globe has been clearly demonstrated (Dando and Rappert, 2005; Rappert, Chevrier, and Dando, 2006).

Thus, a major challenge for today's internationally scientific community is to find effective ways to raise awareness among scientists about their social responsibility regarding the potential for the destructive use of the life science research in which they are engaged (Committee on Advances in Technology, the Prevention of Their Application to Next Generation Biowarfare Threats, Security, Cooperation Development, Board on Global Health, Policy, Global Affairs, Institute of Medicine, National Research Council, 2006).

Life scientists have with increasing intensity been requested to recognize and take responsibility for the potential dual use implications of their work (Kuhlau et al., 2012). Scientists have

an obligation to do no harm. They should always take into consideration the reasonably foreseeable consequences of their own activities. Scientists should be aware of, disseminate information about and teach national and international laws and regulations, as well as policies and principles aimed at preventing the misuse of biological research (Rappert, Chevrier, and Dando, 2006). In the current study the short brief of several International projects focused on biosafety, biosecurity and bioethics education and outreach in Ukraine are presented.

International projects activities in Ukraine. Ukrainian scientists have the opportunity to be involved in several international projects aimed at increasing knowledge in biosafety and biosecurity as well as dual-use issues. One of them is Project 3 of the European Union's Chemical, Biological, Radiological and Nuclear (CBRN) Risk Mitigation Centres of Excellence (CoE) entitled "Knowledge development and transfer of best practice on bio-safety/bio-security/bio-risk management. Planned Project implementation period was January, 1<sup>st</sup> 2013 – December, 31<sup>st</sup> 2014 (EU CBRN CoE Project 3 'Knowledge development and transfer of best practice on bio-safety/bio-security/bio-risk management', 2013), but it was prolonged.

The strategic goal of this Project is to promote sustainable knowledge development on bio-safety, bio-security and bio-risk management and transfer of best practice through the model "train the trainers". The project also works to harmonize international bio-safety and bio-security standards among the participating countries and to strengthen regional and international collaboration and cooperation so as knowledge sharing, sustaining and enhancing networking and awareness raising on bio-related issues among the areas.

Geographical scope includes four regions: a) South East Europe, the Caucasus, Moldova and Ukraine, b) South East Asia, c) North Africa and d) African Atlantic Façade and approximately 360 persons will be trained.

The project also contributes to strengthen regional and international collaboration and cooperation as well as knowledge sharing. The project also sustains and enhances networking and awareness-raising on bio-related issues among the areas (EU CBRN CoE Project 3 'Knowledge development and transfer of best practice on bio-safety/bio-security/bio-risk management', 2013).

In a first instance, selected National Experts (NEs) were trained on bio-security, bio-safety and bio-risk management systems as well as on training methodology. Consequently, qualified and selected NEs will train National Participants (NPs), who will then become trainers at local level. An e-learning platform will provide long distance learning materials and support the training of NEs and NPs. For now two Ukrainian NEs were trained. Training for NPs will be held in January 2015.

The project "International Network of Universities and Institutes for Raising Awareness on Dual-Use Concerns in Bio-technology" is part of the European Union (EU) Chemical, Biological, Radiological, Nuclear (CBRN) Centre of Excellence (CoE) Risk Mitigation Initiative, implemented and funded by the European Commission in cooperation with the United Nations Interregional Crime and Justice Research Institute (UNICRI) (EU CBRN CoE Project 18 'International Network of universities and institutes for raising awareness on dual-use concerns in bio-technology', 2013).

The European External Action Service (EEAS) is also involved in the follow up of the initiative. The Initiative is developed with the technical support of relevant International and Regional Organizations, the EU Member States and other stakeholders, through coherent and effective cooperation at the national, regional and international level.

The Initiative aims to mitigate CBRN risks of criminal, accidental or natural origin by promoting cooperation and improving coordination and preparedness at national and regional levels.

The implementation period of the Project started in January 2013 and finished in December 2014.

The project mission is that of modernizing and internationalizing biotechnology education; improving cooperation through the sharing of international standards and good laboratory practices; and improving bio-safety of society and environment, with a special attention to the "next generations of scientists".

The Consortium of organizations working together on the implementation of Project 18 is very wide and is composed of 18 Partner Universities and Institutes in 14 countries. Palladin Institute of Biochemistry (PIB) of National Academy of Sciences of Ukraine was Local Partner Organization in the frame of the Project (EU CBRN CoE Project 18 'International Network of universities and institutes for raising awareness on dual-use concerns in bio-technology', 2013).

The members of the Consortium are faculties of Sciences and Bio-technology, but also Ecologists, Political Scientists, Lawyers, Philosophers, Bioethicists, Public Health agencies, Agriculture and Medicine faculties.

During the Project implementation a survey among professors of the local universities, to gather information on the current level of awareness, the educational opportunities, and the attitude of scientists in this field was realized. The information on current level of awareness on Biosafety, Biosecurity and dual-use in the universities of Ukraine as well as the educational opportunities was collected during the project implementation. The "Questionnaire for Educators/Faculty members" was used for gathering information. 51 people participated in the survey. All the interviewees come from academic institutions, including 9 life science universities, 10 medical universities and 7 other institutions.

The interviewees were asked several questions in order to assess their knowledge and level of awareness on a number of topics related to Biosafety, Biosecurity and dual use concerns. Interviewees have shown high level of awareness on Biosafety, Biosecurity and dual-use issues. That can be explained by previous activities of participants in seminars and conferences on studying issues before interviewing. In additional, interviewees indicated presence of Bioethics committees and absence of Biosafety committees in their institutions.

The respondents noticed that the surveyed Ukrainian institutions almost always have courses that focus primarily on Biosecurity and Biosafety. However, participants noted an above average level of availability of resources and infrastructures used for teaching on Biosafety. Thus interviewees recognize necessity of implementing a series of activities to educate the students and have some plans to change their courses or modules to accommodate such topics. For this purpose it will be very beneficial to develop and implementation of training materials and guidelines on Biosafety, Biosecurity and dual-use issues (Gergalova et al., 2014).

During the project implementations Seminars addressed to students, focusing on different aspects of biosafety, biosecurity and dual-use, according to the local priorities were held.

The Seminar "Introduction into Biosafety, Biosecurity and Dual-use Concerns in Biotechnology" targeting Master and PhD students, was organized by the PIB to ensure their biosafety and biosecurity competence (EU CBRN CoE Project 18: Seminar at Palladin Institute of Biochemistry, Kiev, Ukraine, 2014).

The Seminar was aimed to introduce students with the dual-use nature of science and technology, spectrum of biological risks and threats, biosafety and biosecurity concepts, relevant international agreements and regulations, etc. Besides the students, all those interested in dual-use, biosafety and biosecurity issues were also welcomed to participate in the Seminar as observers.

The Seminar brought together 79 participants (students, lecturers and scientists) (Seminar for Master and PhD students 'Introduction into biosafety, biosecurity and dual-use concerns in biotechnology', 2014). Pre-seminar and Post-evaluation testing was conducted during the Seminar. It seems that many participants found some difficulties during answering the pre-seminar questions regarding biosafety/biosecurity.

The majority of the participants admitted that their previous knowledge was sufficient to follow the seminar and they had some prior knowledge about the potential "hostile misuse" of life sciences.

During the seminar participants learnt dual use/misuse/security issues and the broader context of life science (e.g. social, ethical, legal aspects, etc) as well as acquired new skills and experience and interacted with fellow colleagues. Participants identified websites and university libraries as their best sources on information about biosafety and biosecurity issues.

The third initiative, «Education and Awareness-Raising in Ukraine» funded by the UK Ministry of Defense, began in July 2014 (Education and Awareness-Raising in Ukraine, 2014). The main objective of the project is to collect information, develop a network and to disseminate knowledge on biosafety, biosecurity and bioethics amongst life sciences experts, and specialists in the field of biotech and pharmaceutical industries. In addition, recommendations on the biosafety and biosecurity status in Ukraine will be prepared and submitted to the Government of Ukraine, relevant ministries and agencies including recommendations for the ministries with subordinated universities (at first for the Ministry of Education and Science of Ukraine)

on the necessity to implement of obligatory curriculums on biosafety, biosecurity, and «dual-use» technics and materials for students studying biology, medicine and agrarian sciences.

Discussion with teachers of higher educational institutions of Ukraine and relevant local authorities for development of guidelines and a training manual for the course on Biosafety and Biosecurity is also planned during the project implementation.

One of the important tool for the Project implementation is development and further maintaining of a website <http://www.bsseducation.com.ua> devoted to various aspects of Biosecurity, Biosafety and Bioethics and contained all key translated materials, aimed, in particular, at lecturers and students of the Ukrainian Universities teaching life sciences in the field of biology, medicine, ecology and agriculture as well as at the relevant professional societies.

In framework of this project the Palladin Institute of Biochemistry held the first International Meeting titled "Awareness-Raising and Education on Biosafety and Biosecurity in Ukraine" in October 2014. There were 33 delegates from 20 Ukrainian universities and 5 life sciences research institutes; 9 participants from other countries attend. In November the two-day first Regional Meeting was held. During the first day 65 undergraduate and postgraduate students were involved in interactive seminars "Introduction into Biosafety & Biosecurity" and "Introduction into Bioethics".

Overall, the participants were really interested in learning more about biosafety, biosecurity, bioethics aspects of modern life sciences. The second day was addressed to lecturers and dedicated new technics in teaching of biosafety, biosecurity and bioethics. During Round table the main issues on biosafety, biosecurity and bioethics education in Ukraine were discussed.

Project «Education and Awareness-Raising in Ukraine» is one of the first steps to aware Ukrainian students on biosafety, biosecurity and bioethics

**Conclusions.** Ukraine's efforts in promoting and engaging in biosafety and biosecurity education, and dual-use and bioterrorism issue awareness-raising are mostly recent developments. However, Ukrainian researchers, specialists and students in life sciences have the opportunity to be involved in several international projects aimed at increasing knowledge in biosafety and biosecurity as well as bioethics. In addition, all mentioned project provide possibility to collect and analyze information of the current status of biosafety and biosecurity education on in Ukraine as well as identify gaps and needs in this fields.

All these benefits can be used for improvement the current status of biosafety and biosecurity in Ukraine because of development of a nation-wide education network

for these issues is a key requirement for fostering a biosafety and biosecurity culture in Ukraine.

## References

Committee on Advances in Technology, the Prevention of Their Application to Next Generation Biowarfare Threats, Security, Cooperation Development, Board on Global Health, Policy, Global Affairs, Institute of Medicine, National Research Council. (2006) *Globalization, biosecurity, and the future of the life sciences*. Washington, D.C. : National Academies Press. ISBN 0-309-65754-7.

Committee on Research Standards and Practices to Prevent the Destructive Application of Biotechnology, Development, Security, and Cooperation Policy and Global Affairs, National Research Council of the National Academies. (2004) *Biotechnology research in an age of terrorism: confronting the dual use dilemma*. Washington, DC: National Academies Press. ISBN 0-309-09087-3.

Dando, M. R. and Rappert, B. (2005) *Codes of Conduct for the life sciences: some insights from UK Academia*. Bradford Briefing Paper No 16 (Second Series). Available at: [http://www.brad.ac.uk/acad/sbtwc/briefing/BP\\_16\\_2ndseries.pdf](http://www.brad.ac.uk/acad/sbtwc/briefing/BP_16_2ndseries.pdf).

*Education and Awareness-Raising in Ukraine* (2014). [Online] Available at: <http://www.bsseducation.com.ua>.

*EU CBRN CoE Project 3 'Knowledge development and transfer of best practice on bio-safety/bio-security/bio-risk management'* (2013). [Online] Available at: <http://www.cbrn-coe.eu/Projects.aspx>; <http://icis-uninsubria.eu/index.php/programs/eu-cbrn-coe-project-3-knowledge-development-and-transfer-of-best-practice-on-biosafety-biosecurity-biorisk-management/>; [http://icis-uninsubria.eu/wp-content/uploads/2013/09/Summary-EU-CBRN-CoE-Pr-3\\_EN\\_08.10.2013.pdf](http://icis-uninsubria.eu/wp-content/uploads/2013/09/Summary-EU-CBRN-CoE-Pr-3_EN_08.10.2013.pdf).

*EU CBRN CoE Project 18 'International Network of universities and institutes for raising awareness on dual-use concerns in bio-technology'* (2013). [Online] Available at: <http://www.cbrn-coe.eu/Projects.aspx>; <http://landaunetwork.org/index.php/eu-cbrn-coe-project-18/>.

Gergalova, G., Kysil, O., Maksymovych, I. and Komisarenko, S. (2014) 'Biosafety and biosecurity education in Ukraine: current situation, gaps and necessities analysis', *Veterinary Medicine [Veterynarna medytsyna]*, 98, pp. 29–33. Available at: [http://jvm.kharkov.ua/sbornik/98/1\\_7.pdf](http://jvm.kharkov.ua/sbornik/98/1_7.pdf).

*EU CBRN CoE Project 18: Seminar at Palladin Institute of Biochemistry, Kiev, Ukraine* (2014). [Online] Available at: <http://landaunetwork.org/index.php/2014/04/eu-cbrn-coe-project-18-seminar-at-palladin-institute/>.

Kuhlau, F., Evers, K., Eriksson, S. and Höglund A. T. (2012) 'Ethical competence in dual use life science research', *Applied Biosafety*, 17(3), pp. 120–127. Available at: <http://www.absa.org/abj/abj/121703Kuhlau.pdf>.

*Seminar for Master and PhD students 'Introduction into biosafety, biosecurity and dual-use concerns in biotechnology'* (2014). [Online] Available at: [http://landaunetwork.org/wp-content/uploads/2014/04/Website-Notice\\_full.pdf](http://landaunetwork.org/wp-content/uploads/2014/04/Website-Notice_full.pdf).

Rappert, B., Chevrier, M. I. and Dando, M. R. (2006) *In-depth implementation of the BTWC: education and outreach*. Bradford Review Conference Papers No 18. Available at: [http://www.brad.ac.uk/acad/sbtwc/briefing/RCP\\_18.pdf](http://www.brad.ac.uk/acad/sbtwc/briefing/RCP_18.pdf).

World Health Organization. (2004) *Laboratory biosafety manual*. 3rd ed. Geneva: WHO. ISBN 92-4-154650-6.