

International Workshop
**“Anticipating Biosecurity Challenges of the Global Expansion
of High Containment Biological Laboratories”**

Istanbul, Turkey

11 – 13 July, 2011

**Russian biosafety experience
during the last two decades:
lessons and achievements.**

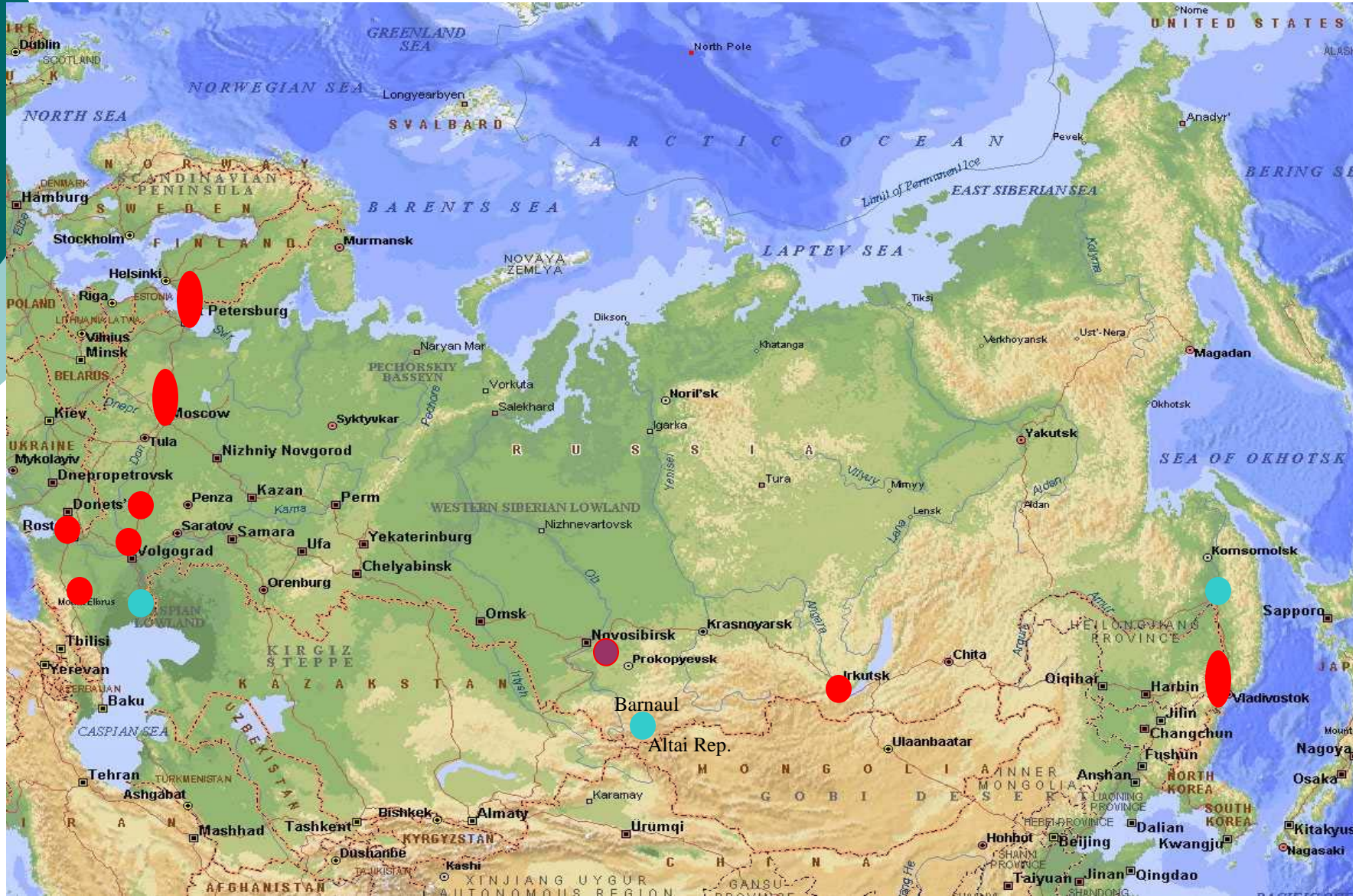
Sergey V. Netesov
Novosibirsk State University
Novosibirsk, Russia



Russian achievements in disease control

- The “almost” eradication of plague in 1930’s because of creation of “Antiplague system” consisting of research institutes, stations, strategy of eradication of large rodents and surveillance
- The national eradication of smallpox in the end of 1930’s
- The successful development of polio vaccine and the strategy of its usage
- Measles, mumps, tick-borne encephalitis control

The largest San-Epi, research and diagnostic centers in Russia





Main Infectious Disease Problems in Russia

- Respiratory diseases – up to 30 mln officially registered cases per year, of them Influenza - about 500 000 cases per year
- Tuberculosis – more than 1 million ill (75 new cases per 100 000 per year)
- HIV – more than 600 000 officially registered carriers (>1 mln infected, according to NGO's estimates)
- HCV – increasing amount of chronically infected persons; total amount of HCV–infected – more than 3 mln

Zoonotic diseases:


- Tick borne encephalitis virus (more than 4000 symptomatic cases per year)
- Lyme disease (more than 5000 symptomatic cases per year)
- Yersiniosis – 2300 cases per year
- Hantavirus (HFRS) - from 5 000 to 20 000 symptomatic cases per year
- Nairovirus (CCHF) – up to 200 cases per year
- West Nile virus fever – from 50 to 500 symptomatic cases per year
- Cases of anthrax, malaria, other imported cases of tropical disease
- Imported cases of dengue fever, malaria, other diseases

Some lab accidents in Russia during the last years

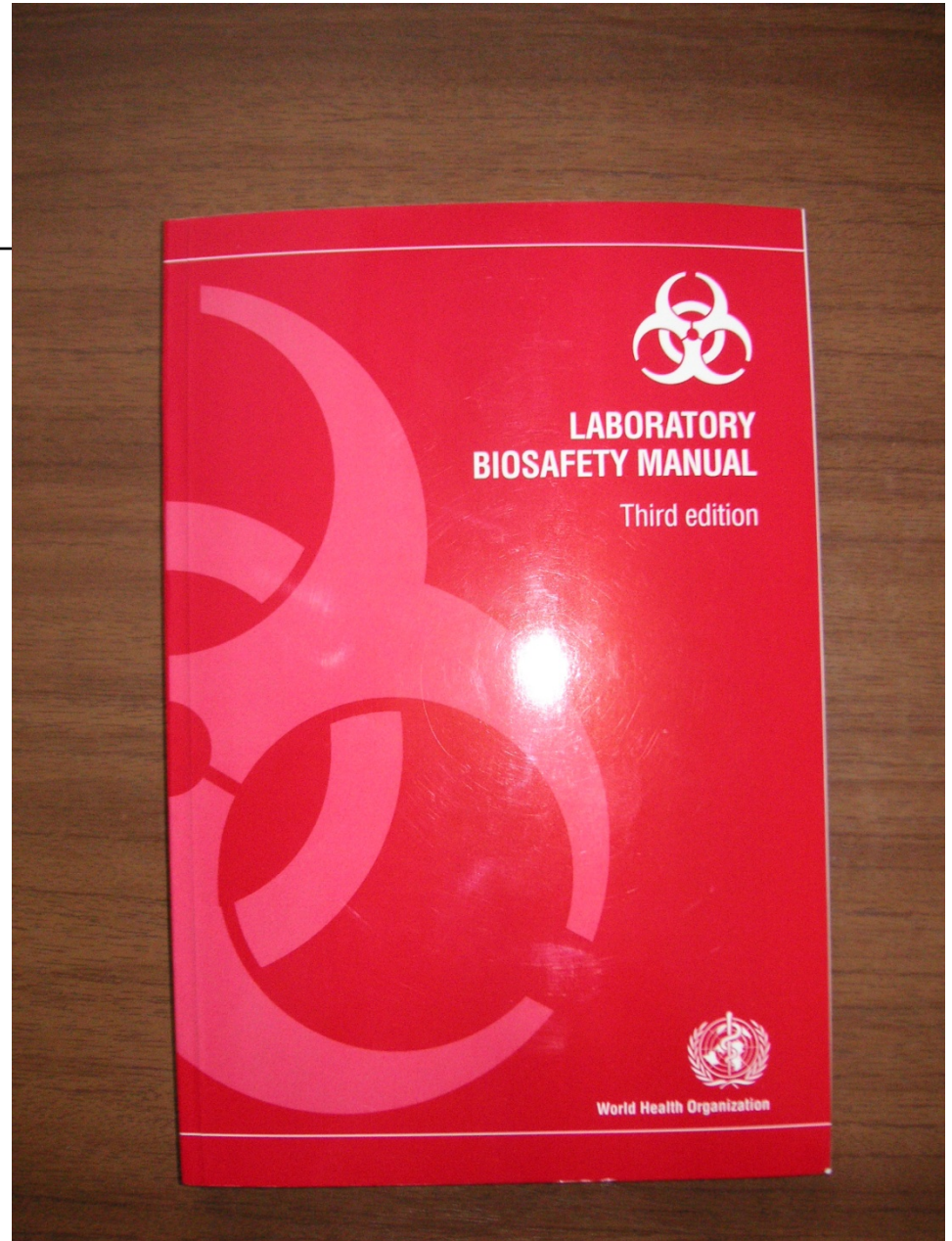
- **Some important laboratory infection cases with VEE, HFRS, CCHF, Machupo, Dhori, VSV, KFD viruses which occurred in Russia since 1950 till 1990 are described in the paper of S.Gaidamovich et al.**
- **In May 2004, an experienced technician who worked at the Vector Center pricked herself with a syringe needle containing blood from a guinea pig infected with Ebola virus. In spite of extensive prophylaxis and treatment she died. The case is described in publication below**
- **References:**
- S. Ya. Gaidamovich, A. M. Butenko, and H. V. Leschinskaya. *Human laboratory Acquired Arbo-, Arena- and Hantavirus infections*. Journal of American Biological Safety Association. -2000. -V.5 (1)-P. 5-11.
- 11. L. A. Akinfeeva, O. I. Aksionova, I. V. Vasilevich, Z. I. Gin'ko, K. A. Zar'kov, N. M. Zybavichene, L. R. Katkova, O. P. Kuzovlev, V. I. Kuzubov, L. I. Lokteva, E. I. Ryabchikova. *A case of Ebola hemorrhagic fever*. *Infektsionnye bolezni*. -2005-No. 1- P.: 85-88.

Three reasons for biosafety and biosecurity enhancement

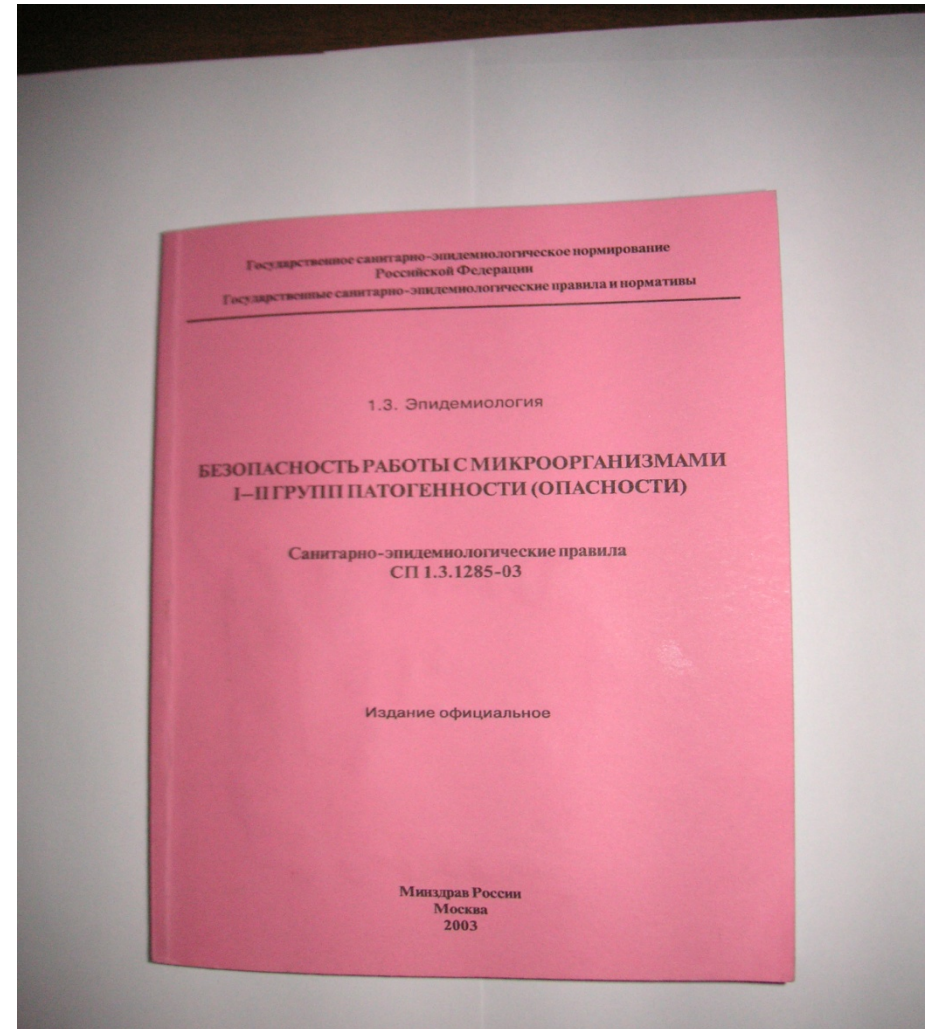
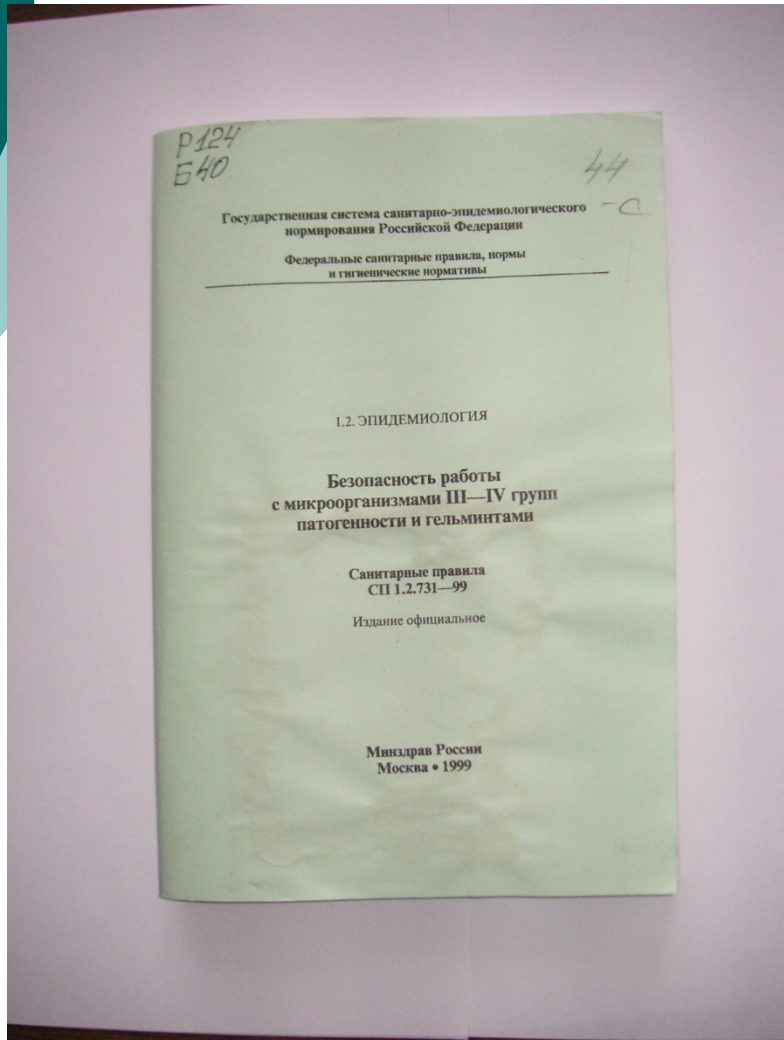
- **Large number of laboratory non-intentional accidents in the world (>5400 during the last 70 years)**
- **Accidents with unintentional release of infectious agents into environment from industrial biotech plants in the world (<50)**
- **Bioterrorism attacks in the world (<5)**



WHO Laboratory Biosafety Manual



Two of three chapters of Russian biosafety regulations





Work inside a BSL-4 Laboratory



**Reconstruction of the Security Fence at SRC VB "Vector"
in frames of ISTC/CTR Project # 1699p**

Main goals in the field of development of biosafety, biosecurity and bioethics education

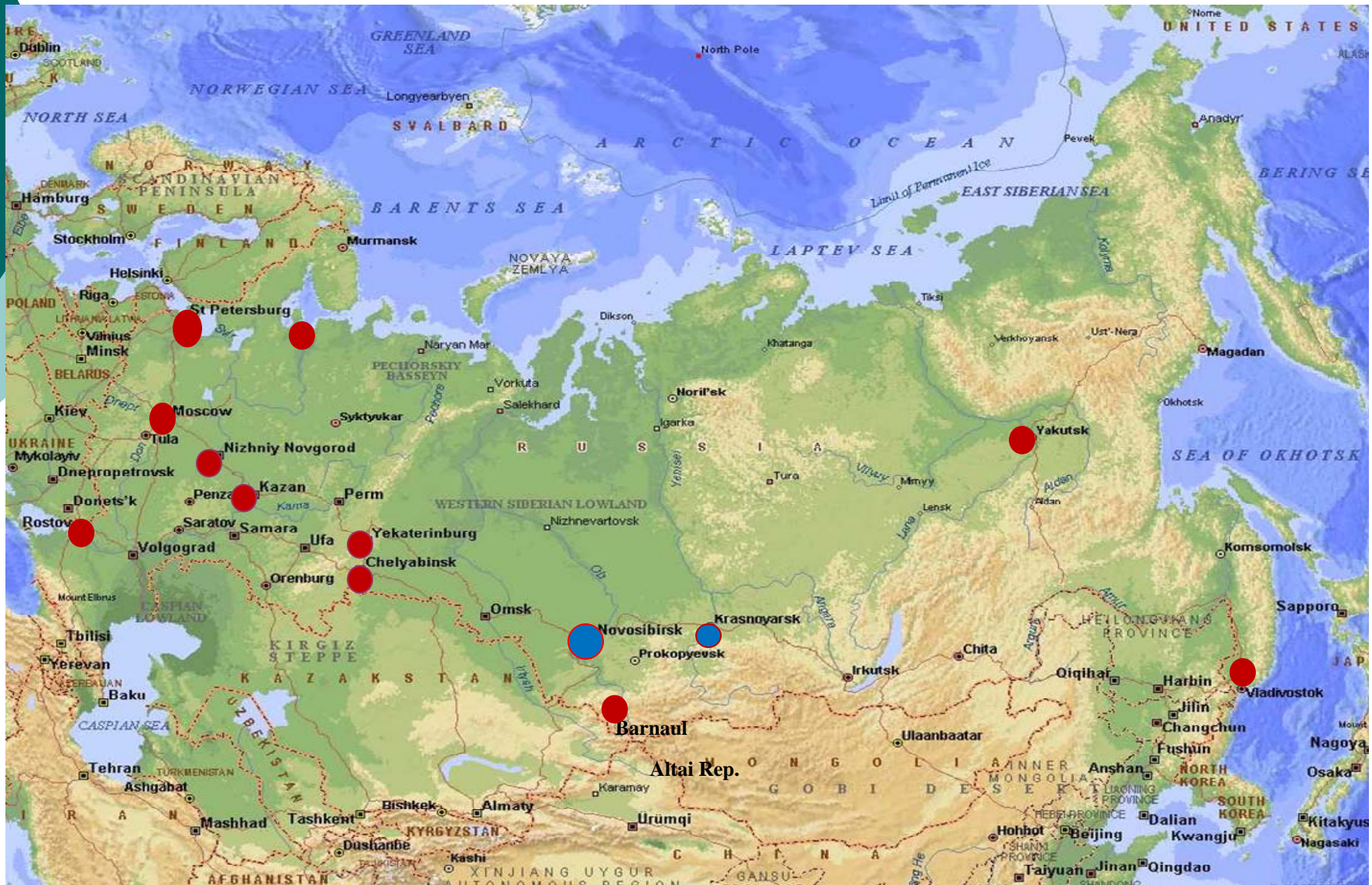
- To upgrade educational programs in **biology, medicine, microbiology and biotechnology** including into them **biosafety, biosecurity and bioethics** aspects in accordance with modern international recommendations
- The **history of prevention of BW development and spread** should be studied and developed as, at least, the part of biosafety and bioethics educational program
- The **biosafety and bioethics educational courses** for researchers and engineers should be harmonized internationally
- **The biosecurity education** should be of a few types: for security professionals, for bench scientists working with living pathogens and for all students studying life sciences



Biotech master education programs in Russia - 1

- **Moscow State University (Moscow), Biological Department (Microbiology and Biotechnology; Nanobiotechnology)**
- **Russian Chemical-Technological University named after D.Mendeleev (Moscow), Biotechnology Chair, (Molecular and cell biotechnology; Industrial biotechnology; Ecobiotechnology)**
- **Russian State Agricultural University named after K.Timiryazev (Moscow). Biotechnology master program (not presented in the website)**
- **St-Petersburg State University, Biological Department (Molecular and cell biology; Biotechnology)**
- **Siberian Federal University (Krasnoyarsk); Institute of fundamental biology and biotechnology (Microbiology and Biotechnology)**

The universities which have or develop the biotechnology master degree educational programs in Russia





Russian initiators and participants of biosafety educational programs development

- **I.M.Sechenov Moscow Medical Academy**
- **Novosibirsk State University (close to State Research Center of Virology and Biotechnology VECTOR in Koltsovo)**
- **Pushchino State University (near State Research Center of Applied Microbiology and Biotechnology, Obolensk, Moscow Region)**

Foreign collaborators:

Health Canada and CSC HAH in Winnipeg
ISTC
NTI foundation, USA



Steps in Russia:

- Preparation and publication of first **Glossaries of Biosafety Terms in Russian** – 2005-2007
- Development of Curricula of **Biosafety** lecture course for trainers – 2008
- Training of trainers in Biosafety – 17-19 November, 2008
- Preparation and publication of the book «**Main principles of biosafety**» - 2008-2009
- Start of Biosafety lecture courses at the universities – 2009 (supposed but really started in 2010)
- Publication of the first **English-Russian Harmonized Dictionary** – November, 2010
- Modification of **Russian educational standard in Biotechnology** – 2010-2011
- New editions of biosafety regulations – 2011-2012 (proposed)
- Foundation of **Russian Biosafety Association** and following steps – 2011-2012 (proposed)



Biosafety - textbooks and primary sources in the world

- WHO Laboratory Biosafety Manual, published in 2004
- European Community Biorisk Standard
- NSF (USA) Standards
- The Anthology of Biosafety – now it is a series of 10 books (were generously donated by US National Academy of Sciences)
- Specialized scientific journals like The ABSA Journal of Applied Biosafety
- And websites

We have all these books, documents and journal in our university library

Web resources with texts of biosafety manuals and regulations

WHO :

<http://whqilibdoc.who.int/publications/2004/9241546506.htm>

Russia :

- National Biosafety regulations for BSL-1-2 pathogens:
<http://www.plib.ru/library/book/14084.html>
- National Biosafety regulations for BSL-3-4 pathogens:
<http://www.tehdoc.ru/files.1735.html>

EC : <http://www.ebsa.be>

USA : <http://www.absa.org> and
www.cdc.gov/OD/ohs/biosfty/bmb15/bmb1_5th_edition.pdf

Canada : www.phac-aspc.gc.ca/publicat/lbg-lmb1-04/index.html

USA – Bioethics : <http://www.hhs.gov/ohrp/>



Biosafety – is still a new course in Russia

- Standard course will be, as proposed, 10-12 hours of lectures and 2-4 hrs of practical work
- Biosecurity is included as a special part of Biosafety course (1 hour) for students **(NOT for professionals!)**
- Design of biotechnological laboratories and production sites will be delivered as a separate course : it is in development stage now, from 4 to 8 hours of lectures
- Bioethics is an obligate component



Bioethics course for students in Russia

TWO purposes:

- to educate students in the field of pre-clinical and clinical trials, and
- to educate students in **principles of the social responsibility of researcher working in the field of dual-use research**

Standard course for clinical trials education exists: 36 hrs of lectures and 16 hrs of practical work - for medical students

The course for biotechnology students is proposed for 2-4 hrs

The NEEDS are:

- * The textbooks in Bioethics **are still far from needed standards in Russia**
- * The history of Bioethics and BW convention **is practically absent in these books**
- * The Code of Conduct for researchers is recommended to be developed and implemented by UN in 2000-2001 but in Russia it exists among chemists only yet.
- * The Code of Conduct for biotechnologists is under discussion



CONCLUSIONS

- The periodical modernization of educational courses in all areas of biotechnology and medicine should be made with inclusion of basic educational modules of biosafety, biosecurity and bioethics.
- Biosafety and biosecurity periodical upgrade for experienced researchers in the laboratories working with dangerous pathogens are needed to better protect environment, personnel and to prevent possible terrorism cases.
- The easiest and fastest way to upgrade the national level of biosafety/biosecurity is to study the modern international recommendations and textbooks in this area, to upgrade national biosafety regulations and standards, to modify the national educational programs and to participate actively in international biosafety meetings and associations.



Thank you for attention!
