Nizhny Novgorod State Medical Academy
(SEE HPT "NizhSMA")

Collaboration of the Medical academy, healthcare settings and industry as model for innovations promotion

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Nizhny Novgorod – 2011

Nizhny Novgorod State Medical Academy

- one of the great State Educational Establishment of Higher Professional Medical Training in Russia
- was founded in 1910
- 4500 students (from 25 countries), 760 teachers (565 PhD)
- 8 faculties
- 75 departments
- 2 Scientific-Research Institutes (SRI)
  - SRI of Applied and Fundamental Medicine
  - SRI of Preventive Medicine

Types of activities

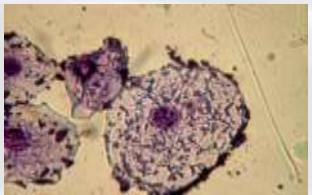
Education

Medical services

NizhSMA

Scientific researching

Innovation promotion



Healthcare associated infections (HAIs)

PROBLEM URGENCY

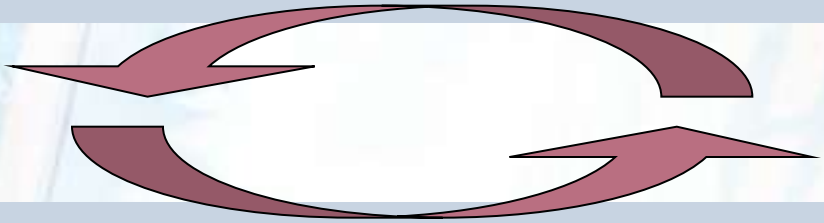
- healthcare associated infections – 2-10 % of all patients
- 2 million cases annually (RF, USA), 5 million - Europe
- 2.7 – 15% of cases with lethal outcome
- component of the system of quality and biosafety of medical services

Ways for overcome the conservation of healthcare workers and motivation them for application of new technologies in routine practice

- To inform
- To teach
- To conduct the training
- To control
- Others

Education Technology

1. Sphere of medicine requires innovation



2. Sphere of medicine is very conservative

Sphere of medicine has a lot of limits in application of new technologies

- Evidence of efficacy, safety (evidence-based medicine)
- Strong requirements for investigation before registration of preparations, methods, equipments (clinical trials, field trials)
- Post registration estimation
- Standardization of medical services

Education Center – EC (constantly operating School of hospital epidemiologists and others healthcare workers) as a platform for introduction of innovations

improvement of internal interaction, exchange the experience

Innovation introduction, feedback, estimation quality and effectiveness

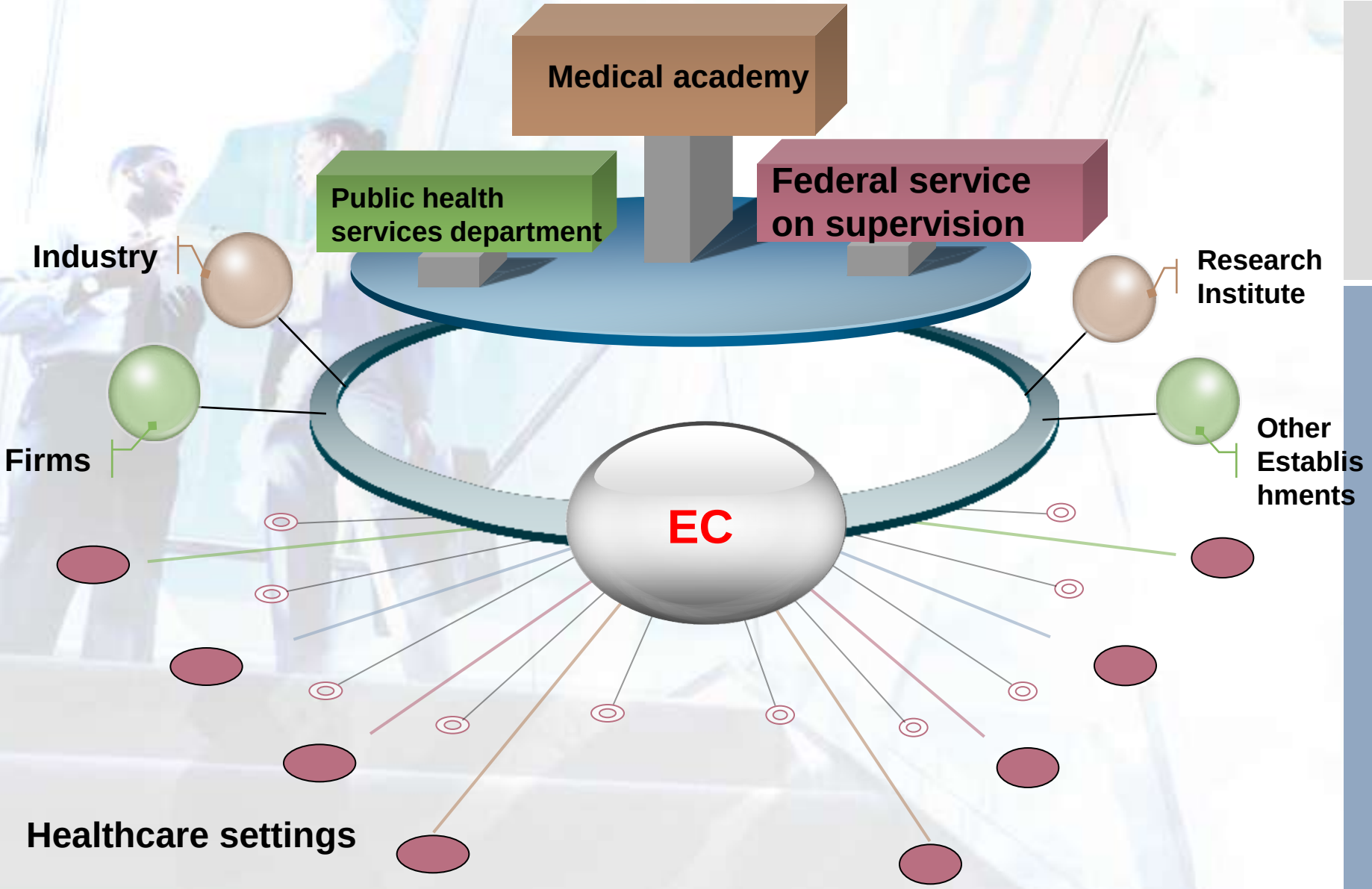
Information

Education, Training

Involving in researches, Bases for investigation, request from practical healthcare

Collaboration with science, industry, state establishments

Education Center
as a platform for introduction of innovations



THE TECHNOLOGY OF ESTIMATION OF MICROORGANISMS RESISTANCE TO DISINFECTANTS

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General description of “The technology of estimation of microorganisms resistance to disinfectants”.

The technology is referred to medicine and biotechnology, in particular to epidemiology and microbiology and is intended for prevention the healthcare associated infections (HAIs) and community-acquired infections (CAIs)

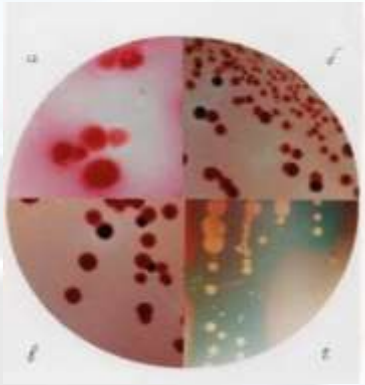
The technology of estimation of microorganisms resistance to disinfectants allows

- to reveal the resistance of microorganisms to disinfectants with high accuracy and efficiency,
- to carry on the monitoring of disinfectant resistance in healthcare setting and in community,
- to raise effectiveness of disinfection

PROBLEM URGENCY

- Infectious diseases are the cause of each 3rd death in the world
- High adaptable potential of microorganisms, development of the resistance of microbes to disinfectants
- Expansion of spectrum of applied disinfectants in healthcare settings and in community
- Absence of uniform strategy of disinfectant application in practical public health services and monitoring of resistance of microbes to disinfectants






Key results and achievements

The Nizhniy Novgorod scientific epidemiological school, involving the authors of the Technology, receives the following scientific results representing the high scientific novelty and the practical importance, being innovative for Russia and worldwide:

- **estimation of prevalence of the resistance to disinfectants and its characteristic by results of large-scale, long-term researches at regional level is conducted (fig.1-3);**
- **factors and conditions of formation of resistance to disinfectants are revealed resistance to disinfectants in the conditions of laboratory experiment is generated (fig.4,5);**
- **the way of modeling of formation of resistance of a microorganism to disinfectant is developed;**

the method of detection of sensitivity of microorganisms to disinfectants (variants) is created;

- **creation of a scientific substantiation, methodical and organizational maintenance of monitoring of resistance of microorganisms to disinfectants that is innovative for Russia and world practice**

Key results and achievements

- The resistance of microorganisms to disinfectants is extended in healthcare settings

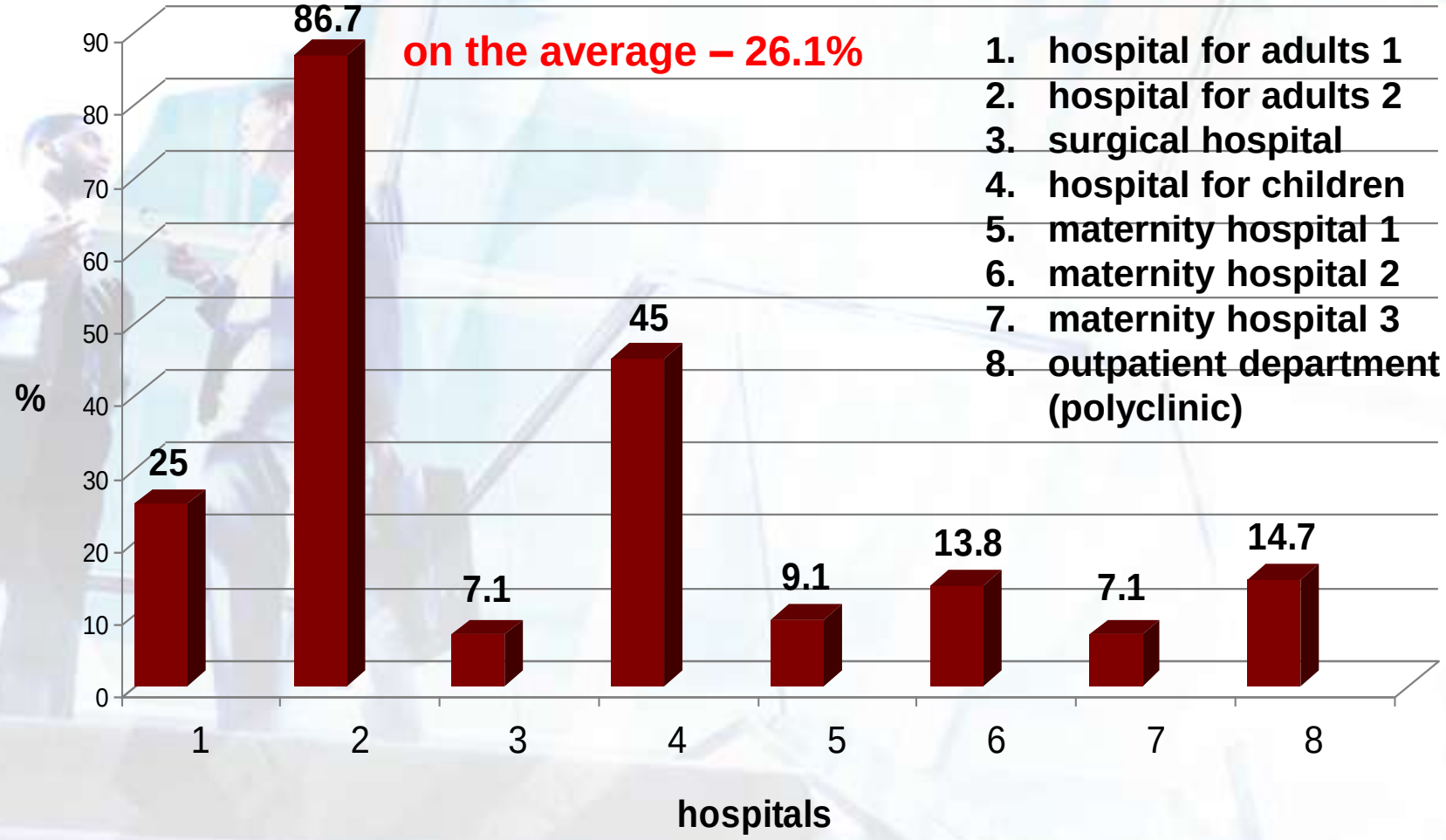


Figure 1. Share of resistant to disinfectants strains of microorganisms in different hospital

The resistance of microorganisms to disinfectants

- presents among microbes, caused enteric infections in community (salmonelloses, dysentery)
- presents to disinfectants of different groups of chemical compounds (figure 2)
- presents at various species of bacteria (figure 3)
- is one of the reasons of an inefficiency of disinfection
- leads to occurrence of outbreaks of healthcare associated infections and community-acquired infections

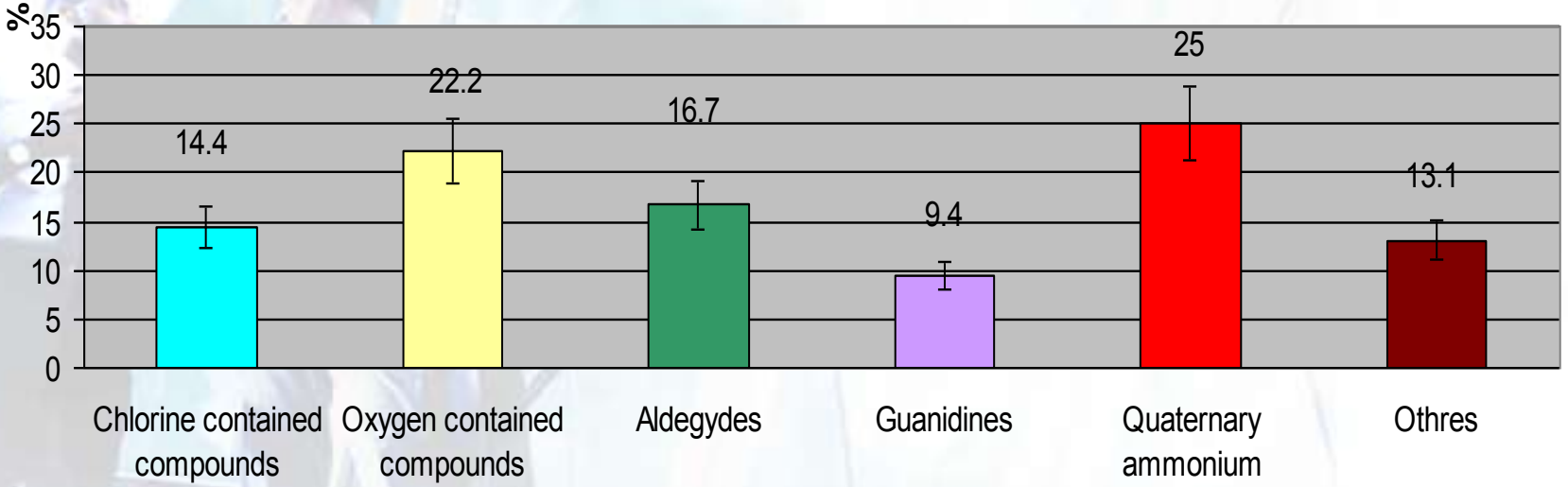


Figure 2. The resistance to disinfectants of various groups of chemical compounds

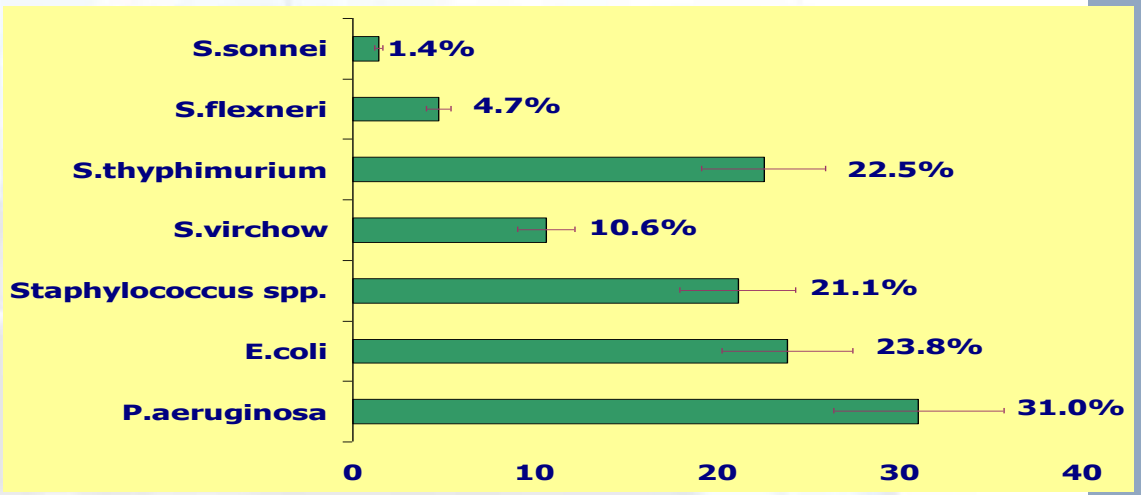


Figure 3. The resistance to disinfectants of different species of microorganisms

Strain *E.coli* sensitive to disinfectant (A)

Strain *E.coli* resistant to disinfectant (B)

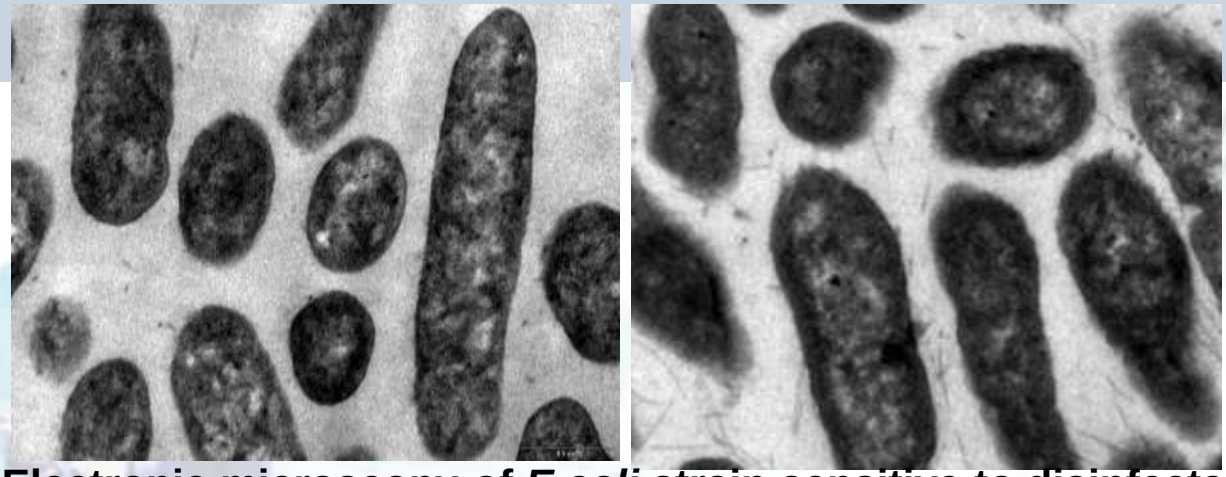


Figure 4. Electronic microscopy of *E.coli* strain sensitive to disinfectant (A) and *E.coli* strain resistant to disinfectant (B)

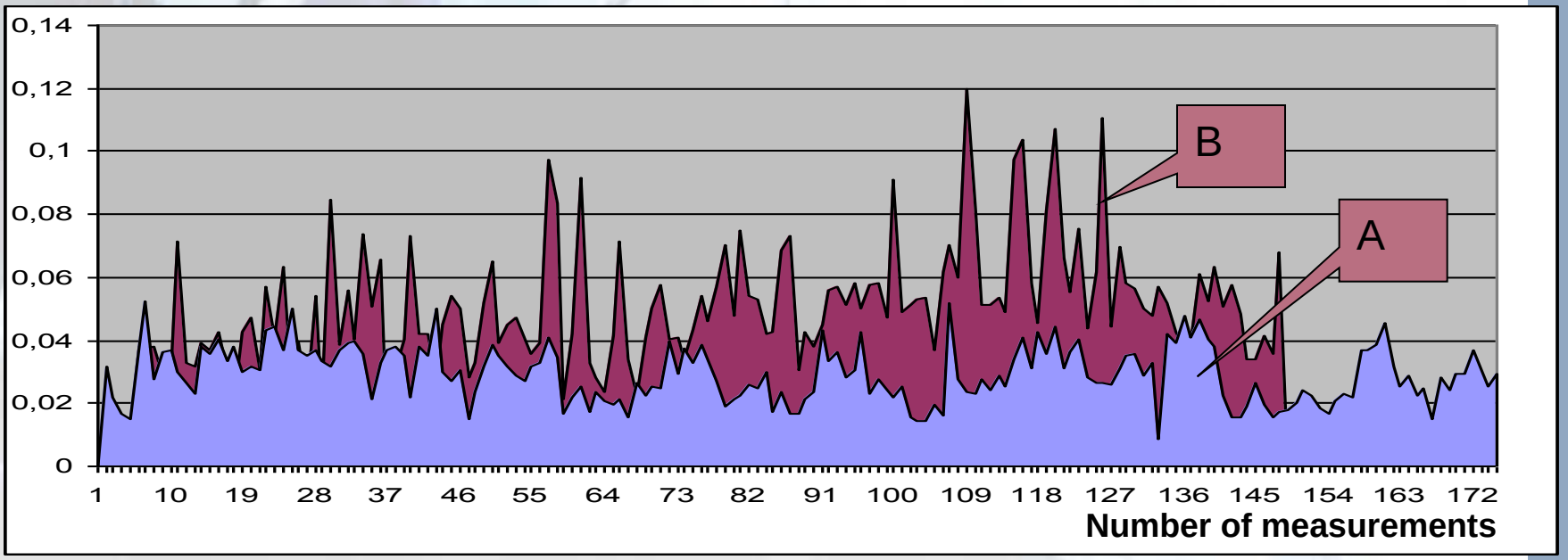
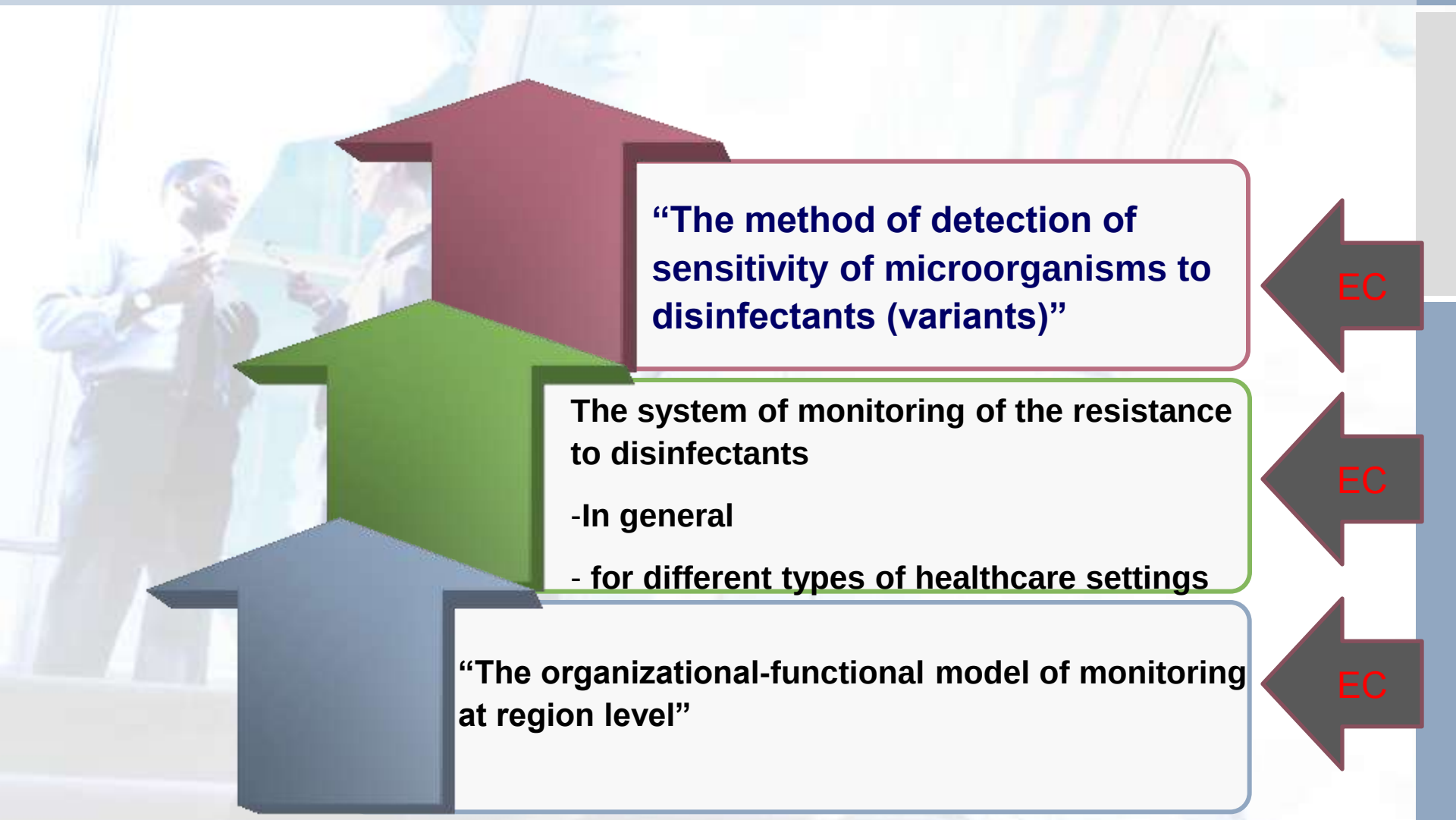


Figure 5. Thickness of a cellular wall (micron) of *E.coli* strain sensitive to disinfectant (A) and *E.coli* strain resistant to disinfectant

Main components of the Technology



“The method of detection of sensitivity of microorganisms to disinfectants (variants)” is used for epidemiological surveillance of healthcare associated infections for revealing resistance strains and microbial associations

Figure 6. Estimations of results

Growth less 300 CFU/ml – sensitive strain:

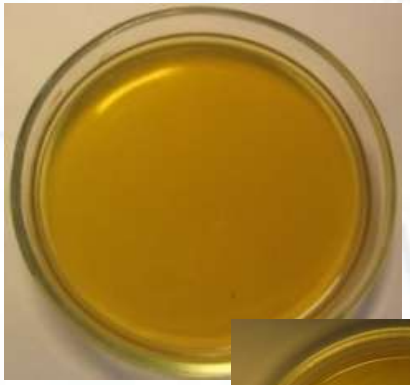
- **Full sensitivity (A) – growth of microorganisms absent at all**

- **Incomplete sensitivity (B):**

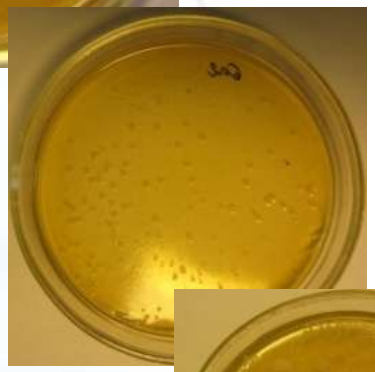
  Growth 1 - 99 CFU/ml – incomplete bactericidal action
  Growth 100 – 299 CFU/ml – subbactericidal action

Resistant strain (C) – growth 300 CFU/ml and more

A



B



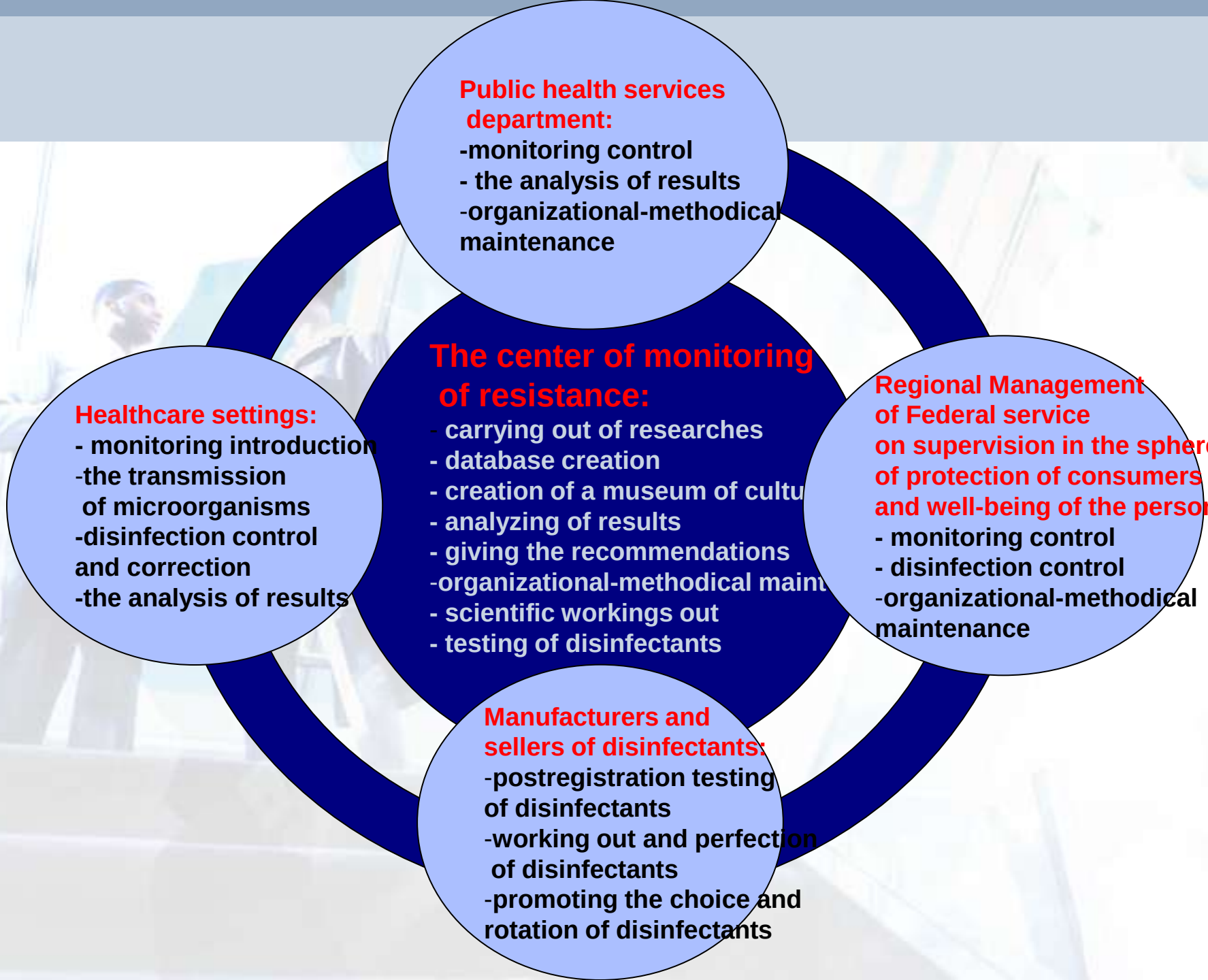
C

Advantages of “The method of detection of sensitivity of microorganisms to disinfectants (variants)”:

- **high sensitivity (98,7 %);**
- **high specificity (99,2 %),**
- **reproducibility (95,4 %),**
- **quantitative estimation (growth 300 CFU/ml and more is consider as the resistance of the strain to disinfectants),**
- **simplicity of performance,**
- **speed,**
- **profitability,**
- **availability to routine practice.**

The project on monitoring of resistance to disinfectants of microorganisms in healthcare settings at regional level

For the first time in the Russian Federation and world practice in territory of the Nizhniy Novgorod region since 2009 the project on monitoring of resistance to disinfectants of microorganisms in healthcare settings at regional level is carried out .


Public health services department:
-monitoring control
- the analysis of results
-organizational-methodical maintenance
Healthcare settings:
- monitoring introduction
-the transmission of microorganisms
-disinfection control and correction
-the analysis of results
The center of monitoring of resistance:
- carrying out of researches
- database creation
- creation of a museum of cultu
- analyzing of results
- giving the recommendations
-organizational-methodical maint
- scientific workings out
- testing of disinfectants
Regional Management of Federal service on supervision in the sphere of protection of consumers righ and well-being of the person:
- monitoring control
- disinfection control
-organizational-methodical maintenance
Manufacturers and sellers of disinfectants:
-postregistration testing of disinfectants
-working out and perfection of disinfectants
-promoting the choice and rotation of disinfectants

Organizational-functional model of monitoring of resistance of microbes to disinfectants:

- applies at the level of healthcare settings and at regional level
- allows to reveal the resistance to disinfectant and to correct disinfection
- has high epidemical and economic effectiveness

Bases of success of the project:

- A problem Urgency
- Deficiency of the information
- The Unique scientific and practical data
- The Priority of a group of authors on many questions of the given problem
- The Statement and theoretical questions, organizational-methodical workings out, practical recommendations

Key components of success of an administrative team work:

-multidisciplinary approach;

-collaboration of science (Medical academy), industry (manufactures of disinfectants, antiseptics, medical equipments, items and etc) and consumers (healthcare settings);

-involving in project different establishments from different departments and servicers:
Public health services department,
Regional Management of Federal service on supervision in the sphere of protection of consumer's rights and well-being of the person;

Key components of success of an administrative team work:

-participation in the project of young specialists and authoritative experts with a wide experience;

-training of participants of the project to technologies of advancement of innovations;

-application of educational technologies for project promotion (EC);

-feedback;

- dynamic estimation of quality and effectiveness of monitoring

The technology of estimation of microorganisms resistance to disinfectants has no analogues worldwide.

All rights are reserved in 2 patents of the Russian Federation.

“The method of detection of sensitivity of microorganisms to disinfectants (variants)” was recommended in 2010 by the Regional Ministry of Health and Regional Management of Federal service on supervision in the sphere of protection of consumers rights and well-being of the person for monitoring of microbial resistance to disinfectants in healthcare settings of Nizhny Novgorod region.

We are awarded by 3 gold and 2 silver medals at international exhibitions:

- **VIII Moscow International Exhibition of Innovations and Investments: Silver medal and Diploma (Moscow, 2008г.)**
- **XI International Exhibition of Industrial Property “Archimedes-2008”: Gold medal and Diploma (Moscow, 2008 г.)**
- **International Salon of Technological Innovations «Eureka!»: Silver medal and Diploma(Belgium, Brussels, 2009)**
- **Salon International Des Inventious, Geneve: Gold medal and Diploma (Geneva, 2009), Gold medal and Diploma (Geneva, 2011)**

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Thank you for attention!