Dr. habil. Anna Salek

Mikrobiologist
Biotechnologist
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Presentation: Dr. A. Salek
BIOTECHNOLOGY
of Food Science

- Cell Biology of Microorganisms
- Physiology of Microorganisms
- Biochemistry of Microorganisms
- Molecularbiology of Microorganisms
- Applied Microbiology
BIOTECHNOLOGY of Pharmaceutics

Drug-protein R & D
- Molecularbiology & Biochemistry Protein
- Development of Drug-Protein
- Prophylactic in Veterinary

Regulatory Affairs for EU
- 5 Vet. medicine
- Drug-Protein (Glykoprotein)

Development of vet. medicine
- Parenteralia

Quality control
- Microbiological
- Chemical
Laboratory Experience (Experienced checking)

- Microbiology of Food Products (Predictive microbiology)
- Hygiene in Food Industry (HACCP)
- Microbiology in Environmental (Water & Soil & Air)
- Microbiology in Pharmaindustry & Veterinary med.
Presentation:

Food safety and public health microbiology

Dr. habil. Anna Salek
Microbiologist

GERMANY, 2006
Food safety and public health microbiology

Germany
September 2006

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Microbiologist

HACCP
Bioterrorism
Pathogenes
Public health
The key needs
Microorganisms surround us and affect our lives in many ways. They play key roles in processing whole biotechnology and affect the quality of our food, water, control some pests (biocontrol) and cause diseases.
Microbiological infections are back at the top of the public and political media with the thread of bioterrorism.

How we should successfully contain and combat the threat and consequences of bioterrorist attack?
To meet this emerging threat, we have to address four important challenges:
Fully aware defence against bioterrorism weapons will be existing medical and public health response as well as efficient food chain surveillance system (i.e. HACCP).
Provide prophylaxis, medical care and infection control on massive scale in good network of onward diagnostic laboratory by enhancing capability to detect infections and conduct epidemiologic investigations.
Accelerating microbiological research and development of new drugs and vaccines as well as of rapid & safety diagnostics with application of recent attainment in science.

Adequate investment to prepare Anti-Bioterrorism initiative.
The key areas of public health care

- Microbiological infections
- Chemical contamination
- Bioterrorism
- Epidemiology
- Chemical contamination
- Epidemiology
- Bioterrorism
- Microbiological infections
The key areas of public health care

- Chemical contamination
- Epidemiology
- Bioterrorism
- Microbiological infections
Microbiological threat for public health

Sources of Microbiological Infections

Foodborne Pathogenes:
- Fecal-oral transmission,
- Gastroenteritis bacteria,
- Food poisoning bacteria

Infective Agents:
- Human-to-Human,
- Animal-to-Human,
- Water & Air & Soil

Bioterrorism:
- Anthrax, Botulism, Plague, Smallpox
- VHF, FMD,
- SARS ??

Diagnostic:
- Modern methods, i.e.
  FISH, PCR, ELISA, biosensors,
- Classic biology methods

Protecting the Food Supply and Production:
- HACCP System,
- Predictive Microbiology

Diagnostic/Identification:
- Rapid methods,
- Safety methods,
- Onward methods

Protecting Role of Food & Human Health Service:
Cooperation between science, medical & veterinary service

Zoonotic Microorganisms
Microbiological threat for public health

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Food pathogens ???
BIOHAZARD

CAUTION
Microbiological threat for public health

Sources of Microbiological Infections

Foodborne Pathogens

Fecal-Oral Transmission Bacteria
- Staphylococcal
  - S. aureus
  - S. epidermidis
  - S. haemolyticus
- Salmonella spp.
  - S. typhimurium
  - S. enteritidis
  - S. paratyphi A
- Shigella spp.
  - S. dysenteriae
  - S. flexneri
  - S. boydii
- Escherichia
  - Escherichia coli (EHEC)

Gastroenteritis Bacteria
- Vibrio spp.
  - V. cholerae
  - V. vulnificus

Food Poisoning Bacteria
- Gram-positive Sporeforming Bacteria
  - C. perfringens
  - C. botulinum
  - B. cereus

Foodborne Listeriosis
- Listeria spp.
  - L. monocytogenes

Foodborne Animal Protozoa
- Giardia lamblia
  - Cysts
- Cryptosporidium parvum
  - Oocysts

Foodborne Animal Protozoa
- Rotavirus
- Hepatitis Norwalk
- Prions (BSE)

Shigella

Food pathogens???
Salmonella spp.
Microbiological threat for public health

Sources of Microbiological Infections

Foodborne Pathogens

Diagnostic of pathogens:
- Modern of molecular biology & immunology methods: FISH, PCR, ELISA, biosensors,
- Classic microbiological methods

Protecting the Food Production and Supply:
- HACCP and Microbiological Criteria for Safety Food,
- Predictive Microbiology for Microbial Modeling,
- Indicators of Food Microbial Quality and Safety

Food pathogens ???
Microbiological threat for public health

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Bioterrorism:
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  - SARS ??

Diagnostic:
- Classic methods,
- Modern methods, i.e. FISH, PCR, ELISA

Protecting the Food Supply and Production:
- HACCP System,
- Predictive Microbiology

Diagnostic/Identification:
- Rapid methods,
- Safety methods,
- Onward methods

Protecting Role of Food & Human Health Service:
Cooperation between science, medical & veterinary service

Zoonotic Microorganisms ???
Sources of Microbiological Infections

Infective Agents

Human-to-Human
- All Human Pathogens
  i.e. Vibrio cholerae

Animal-to-Human
- Zoonotic Microorganisms
  - Salmonella
  - Campylobacter
  - Clostridium
  - Klebsiella

Environment
- Surface & Supply Water
- Air in Environment and for public health
- Soil in Environment and for utility
- Air in Environment and for public health
- Soil in Environment and for utility

Environment
- In the Environment
- For public health
- For utility

Infective Agents
- Bacteria:
  - Spore-forming
  - Enterococci
  - Legionella

Infective Agents
- Protozoa:
  - Giardia
  - Cryptosporidium
  - Toxoplasma

Infective Agents
- Yeasts:
  - Candida
  - Trychomycetes

Infective Agents
- Viruses:
  - Human
  - Animals

Infective Agents
- Fungi:
  - Aspergillus
  - Fungi

Infective Agents
- Prions

Infective Agents
- Bacteria & Fungi

Infective Agents
- Viruses & Prions BSE

Infective Agents
- Prions

Infective Agents
- Salmonella Typhimurium

Infective Agents
- Vibrio cholerae

Infective Agents
- Candida albicans
Legionella pneumophila
Legionella pneumophila

Serogroup 1

Serogroup 2-14

Legionella sp.

Grown on Blood-Agar

No Legionella
Microbiological threat for public health

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Diagnostic/Identification:
- Rapid methods,
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Protecting Role of Food & Human Health Service:
- Cooperation between science, medical & veterinary service

Diagnostic:
- Modern biology methods: FISH, PCR, ELISA, biosensors,
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Protecting the Food Supply and Production:
- HACCP System,
- Predictive Microbiology

Biohazards Microorganisms ! ! !
Bioterrorism: Anthrax, Botulism, Plaque, Smallpox
- VHF, FMD,
- SARS ??
BIOTERRORISM

What you need to know?

Something about physiology of biohazards...
Bioterrorism in the World

Diagnostic/Identification:
- Rapid methods,
- Safety methods,
- Onward methods

Protecting Role
of Food & Health
Service
Cooperation with Veterinary

Biohazards Microorganisms !!!

Anthrax: Bacillus anthracis
Botulism: Clostridium botulinum
Plaque: Yersinia pestis
Smallpox: genus Orthopoxviruses
Viral Hemorrhagic Fever (VHF): Several Viruses
Tularemia: Francisella tularensis
1 Key microbiological needs for Public Health Care

Providing frontline co-operation between specialists from epidemiological services and national reference laboratories about:

- Investigations and surveillance of diseases from foodborne pathogens, i.e. gastroenteritis, protozoa, Viruses, prions, like PrPres (BSE);
- An application of *Predictive Microbiology* and HACCP System to identify in food any indicators and source of zoonotic as well as biohazards organisms;
- A protection of food production and supply disruption by bioterrorism.
2 Key microbiological needs for Public Health Care

Application of the HACCP (hazard analysis critical control point) System according to microbiological criteria for safety food:

- Choice of indicators for food microbial quality & safety, like: Coliforms, Enterococci, Coliphages, Fecal microorganisms;

- An application of **Predictive Microbiology** for microbial modelling.
Key microbiological needs for Public Health Care

Organisation of permanent education and training (also international) of specialist from another services, i.e. the response to bioterrorism.

Cooperation with international Societies (WHO, FAO, FDA).
4 Key microbiological needs for Public Health Care

Development and transfer of onward, safety and rapid methods for competent microbiological diagnostic, considering genetic research, integration of microbial databases and microbial biodiversity.

5 Key microbiological needs for Public Health Care

Competently organised structure of routine microbiological laboratory (GLP) for connections with industry (GMP) and public services (collaborative working for health).
International Bio - Consulting

Elaborated by: Dr. habil. Anna Salek