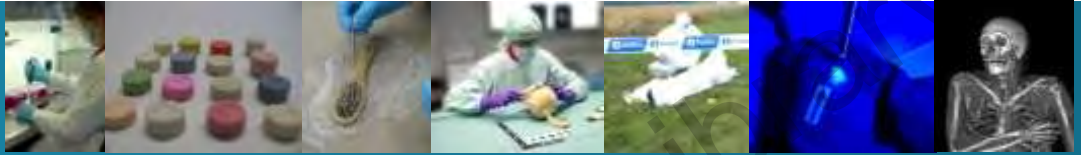


KU LEUVEN

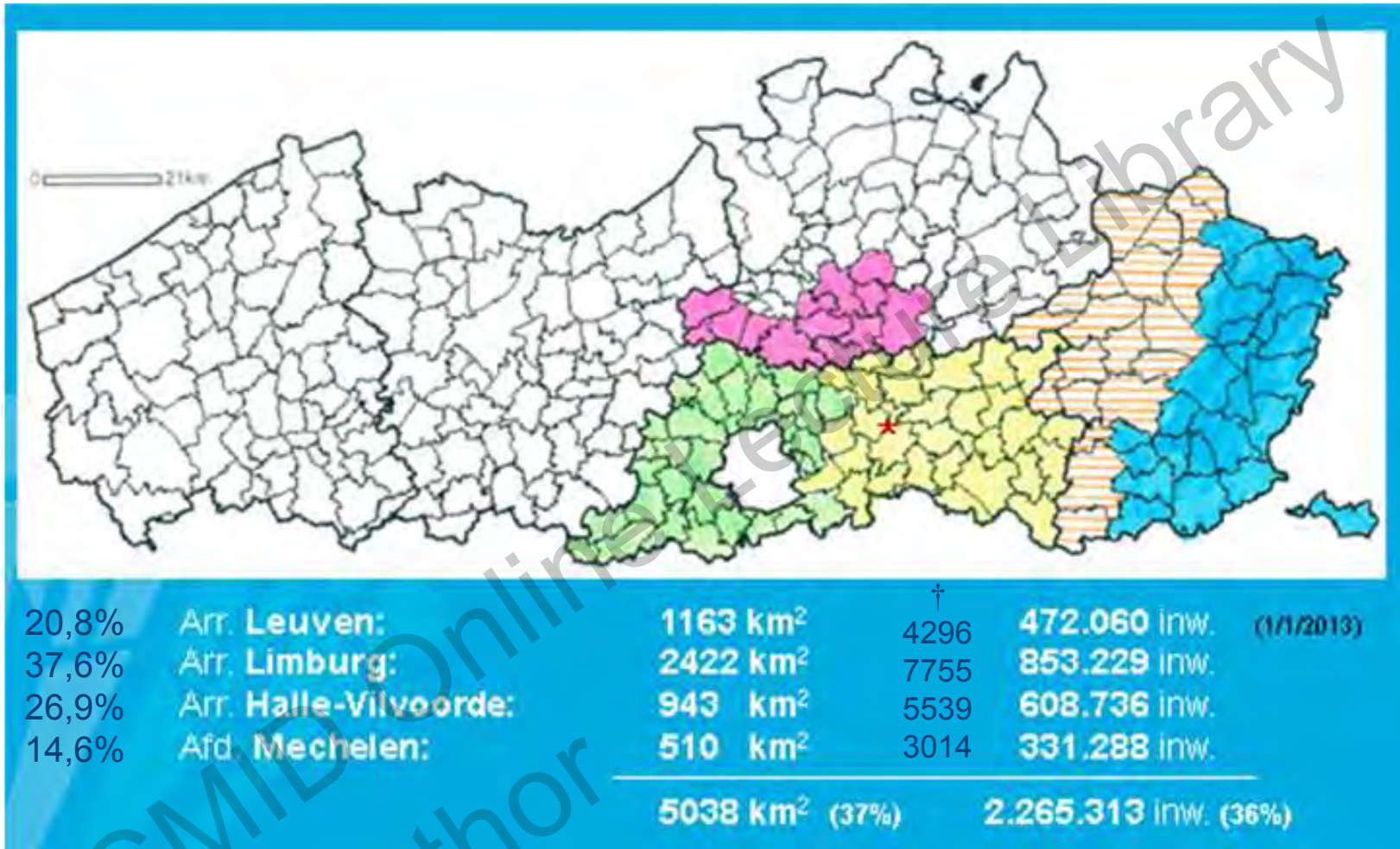
**FORENSIC BIOMEDICAL
SCIENCES**



Poisonous Spaghetti? Public-health concern of forensic microbiology and pathology

Wim Van de Voorde, MD, PhD
Forensic Pathology





Death ratio 9,1/1000 = ca. 20 604 † / year

506 death cases/2014 = 2,5 % // 204 autopsies/2014= 0,99 %

Forensic death investigation

- Belgian law: “homicide or suspicious for homicide”
- Aims of medicolegal investigation
 - Who is it? IDENTIFICATION
 - When did he/she die? TIME of DEATH
 - Why did he/she die? CAUSE & MANNER of DEATH
- Forensic pathologic examination
 - Death scene examination & external examination
 - Autopsy (golden standard) & ancillary investigations
 - Forensic evidence (contact / transfer traces)

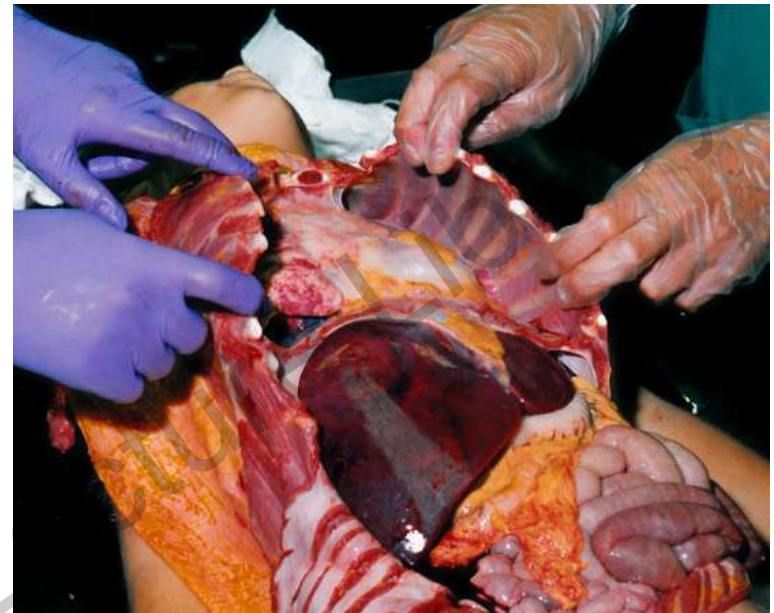
Case 1 (ON/03-281)

- 5 out of 6 children became sick (excessive vomiting) after eating pasta
 - 4 survived after intensive care because of transient liver failure-metabolic acidosis-hypoglycemia-coagulopathy
 - youngest 6-y old girl died after 5 hours



Autopsy (125 cm, 22,3 kg)

- DIC
 - Serosal and mucosal haemorrhages
 - Pulmonary microthrombi
 - Haemorrhagic diarrhea
- Cerebral oedema (1372 g)
- Shock changes in
 - lungs (430 g = + 77 %)
 - liver: portoportal bridging haemorrhagic necrosis
 - kidneys: myoglobinuric nephrosis
- Acute haemorrhagic necrotizing enteritis
- Splenomegalia (85 g = + 46%)



Ancillary investigations

- Microbiology
 - Samples
 - Post mortem : faeces and spleen
 - Pasta at home
 - Isolation of *Bacillus cereus* with identical profile/biotype (1 strain)
- Investigation (judicial) by Federal Agency of Food Safety
 - Contaminated rests of pasta
 - Kept for 2 days in a refrigerator at 14 °C after picnic
- **DIAGNOSIS:** Enterotoxin producing *Bacillus cereus* food poisoning, emetic type

Case 2 (FG 002964)



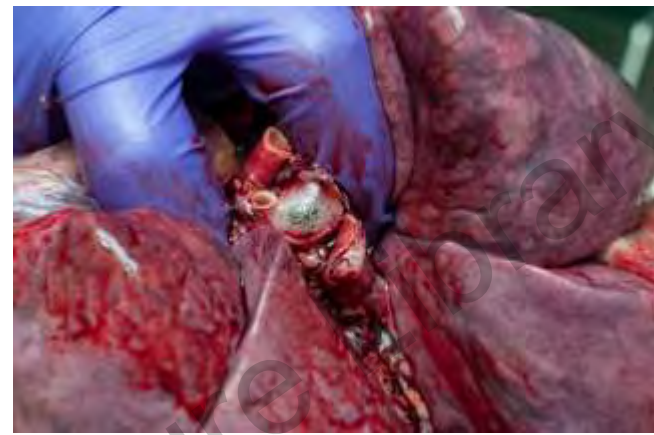
- 3 y-old boy found dead in his bed 5 hours after vomiting in bed
- External examination: petechial rash
- Tentative diagnosis
 - Waterhouse-Friderichsen?
 - Septic bacterial meningitis?



Autopsy (102 cm, 17,3 kg)



- Petechial rash
- Foamy froth
 - nose
 - airways
- Pulmonary oedema (375 g = + 130%)
- Cerebral oedema (1480 g = + 32%)
- Tardieu's spots
 - thymus
 - pleura
 - epicardium



Microbiology

(Prof. dr. J. Verhaegen, UZ-Leuven & Scientific Institute Public Health)

- Haemoculture **Bacillus cereus**
- Stomach content *coagulase-negative Staphylococcus + enterococcae*
- Swab brain surface, cerebrospinal fluid, pericardial fluid
Streptococcus mitis
- Content ileum and colon *E.Coli + enterococcae (normal flora)*
- Swabs pleura, peritoneum, liver and spleen: *no microbial growth*
- Swab screw cap bottle **Bacillus cereus** (food samples negative)

Further specification: enterotoxin producing **Bacillus cereus**

Diagnosis: Bacillus cereus food poisoning, emetic form

Source unknown (water bottle?)

Note: 8 month old brother became ill with minor symptoms.

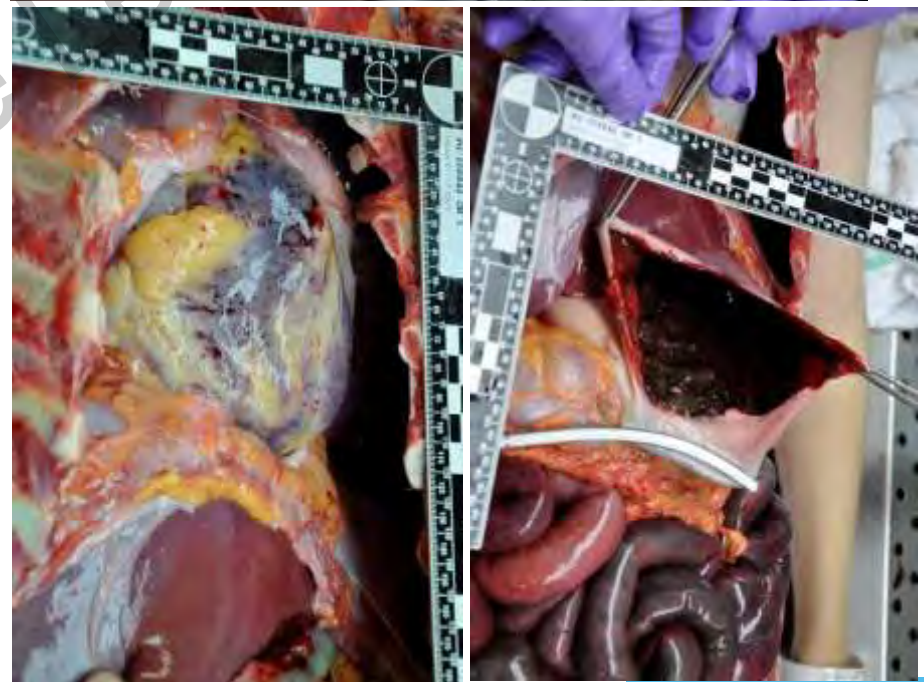
Case 3 (FG 006840)

- 13 y-old boy became suddenly cyanotic and unconscious at home
- Died shortly after hospital admission → invasive resuscitation (ECMO !)
- Death certificate: ‘natural death’
- Prosecutor ordered forensic autopsy because ‘father admitted to have given “poisoned spaghetti” to his son’
- Autopsy performed to days after death

Autopsy (171 cm, 45,8 kg)

- Accelerated decomposition
- **Cutaneous petechiae** legs
- Tardieu's spots pleura and epicardium
- **Gastro-intestinal haemorrhage** (stomach, colon, mucosal petechiae; no inflammation)
- Endocardial tigroid haemorrhages
- Pulmonary haemorrhagic oedema
- Cerebral oedema

Quid EHEC septicemia ?



Microbiology (new protocol)

- Cerebrospinaal fluid sterile
- Peripheral blood sterile
- Lungs (le & ri) S. dysgalactiae, S. aureus, E. faecalis
- Spleen: sterile
- Faeces: E. coli, E. faecalis, **Bacillus cereus**, Lactococcus sp.
- Nasopharynx S. mitis, S. dysgalactiae, S. aureus
- Stomach content: S. aureus, **Bacillus cereus**, E. faecalis
- Pleural fluid sterile
- Pericardial fluid sterile

Toxicology: acute arsenical poisoning

- Blood
 - Hospital 1,565 $\mu\text{g/g}$
 - Post mortem 1,085 $\mu\text{g/g}$

Further toxicological and police investigations are ongoing...

Note: HAEMORRHAGES DUE TO ECMO !

How to optimise the yield of forensic and clinical post-mortem microbiology with an adequate sampling: a proposal for standardisation

**A. Fernández-Rodríguez, M. C. Cohen,
J. Lucena, W. Van de Voorde,
A. Angelini, N. Ziyade & V. Saegeman**

**European Journal of Clinical
Microbiology & Infectious Diseases**

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Sampling – ‘sterile’ procedure



HOOFDSTUK studie MICROBIOLOGIE

Cerebrospinaalvocht	[1805]	Natieve tube met rode dop
Perifeer bloed EXTERN	[1750]	Glazen fles, aërobe (groen etiket)
Perifeer bloed EXTERN	[1750]	Glazen fles, anaërobe (oranje etiket)
Perifeer bloed INTERN	[1750]	Glazen fles, aërobe (groen etiket)
Perifeer bloed INTERN	[1750]	Glazen fles, anaërobe (oranje etiket)
Hartbloed	[1750]	Glazen fles, aërobe (groen etiket)
Hartbloed	[1750]	Glazen fles, anaërobe (oranje etiket)
Longfragmentje LINKS	[1790]	Wilkins broth in Duran flesje
Longfragmentje RECHTS	[1790]	Wilkins broth in Duran flesje
Milt	[1790]	Wilkins broth in Duran flesje
Faeces wisser	[1820]	Eswab
Nasopharyngeale wisser	[1763]	Eswab

Standard set:

- Cerebrospinal fluid
- Peripheral blood (popliteal and iliacal/femoral vein)
- Cardiac blood
- Lung tissue
- Spleen tissue
- Faecal swab
- Nasopharyngeal swab
(*inflammatory lesion*)

Cave interpretation

- Post mortem interval
 - colonization (intestinal tract/oropharynx/skin)
 - contamination
 - translocation
 - invasion
- Always in correlation with
 - patient history
 - circumstances of death
 - pathologic (macroscopic and microscopic) findings
- Commensal – opportunistic – pathogenic bacteria

Indications???

- Unexplained petechial rash
- History of infectious syndrome / symptoms
 - fever
 - diarrhea
 - nausea – vomiting
 - **accelerated putrefaction** (Clostridium sepsis!)
- Sudden unexplained death (SUDI/SUDA)
- Inflammatory lesion(s)
 - purulent effusion (body cavity, meninges, airways, urinary tract)
 - abscess
 - pneumonia, pyelonephritis, meningitis, pleuritis, meningitis...

Thanks for the attention

