About Biofilm and prevention of nosocomial infection through water associated germs

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Biofilm
- oldest form of life on earth
- high stability
- high adaptability
- biocenosis
Organic Compounds, Nutrients

Biofilm

Water pipe
Bacteria

Organic C (H) Phosphate Ammonia

Oxygen (Nitrate)

Energy

ADP

ATP

ADP

ATP

Cells

EPS

Enzymes
Extracellular Polymere Substances

- 80% Water
- high Adsorption capacity
- base of biocenosis
- density depending of flow
- prevention for bacteria
Hospital water point-of-use filtration: A complementary strategy to reduce the risk of nosocomial infection
Aqua Free Membrane Technology GmbH
– Free your water from germs –

Ablösung nach beim Spulen einer Glaspipette.mov
Example:

Piece of Biofilm
  1 mm diameter
  1 mm³ volume

Bacteria = 1μm = 1/1000 mm
  1000 x 1000 x 1000 x 0,1 = 100.000.000 Keime

100 Million Germs
Example of growth

1 bacteria divided within 20 minutes

20 min  = 2 germs
40 min  = 4 germs
1 hour  = 8 germs
2 hour  = 64 germs
4 hour  = 4.096 germs
8 hour  = 16.777.216 germs
Nosocomial infection through water
„40 % of nosocomial infection are related to water associated germs“/1/

Bacterias
- Legionella pneumophila
- Pseudomonas aeruginosa

Infection pathes
- Aerosols (shower e.g.)
- washing patients
- contaminated endoscopes

Fig 2. Distribution of *Pseudomonas* nosocomial infections reported from 91 outbreaks over the period 1965-early 2004 (adapted from Stamm-Balderjahn et al. Abbreviations: UTI, urinary tract infections; SSI, surgical site infections.
Requirements of sterile filtration

- Reduction of germs
  - 7 Log-Steps *Brev. dim.*
  - Complete Rejection of Leg./Pseud.
  - Medical device
  - Easy to use

- Minimizing Retrograde Contamination
  - definite operating time
- shower

- tap

- Rinsing endoscopes

- washer disinfector (endoscopes)
Recommendation for products

- CE marked medical devices
- definite using time
- clinical proved
- reuseable with validated reprocessing
Bakterie

Organic C (H)  
Phosphate  
Ammonia

Oxygen  
(Nitrate)

ADP  
Energy  
ATP

ADP  
ATP

Cells

EPS

Enzymes
Thank you for your attention