YOU CANT WASH WITH DIRTY WATER

CLEANING UP OUR ACT . . .

How IHARP Got Involved

and

Why It's Important

Interior Health

HOW IT ALL BEGAN . . .

Opening a can of Microbes

OPENING A CAN OF MICROBES

- One site with recurrent high colony counts despite aggressive measures
- Made us look at dialysis water standards and procedures
- Compare IH sites – no consistency
- Informal provincial scan – ditto
- We saw this as bigger than our region
- Proposal to PRA MAC for uniform provincial standards and procedures
- Agreed on pilot with IHARP lead

TEMPEST IN A TEAPOT?

Or is it more than that

Unexpected cyanosis in a hemodialysis patient - did someone add hydrogen peroxide to the dialysis water?

NDT Plus 2009; 2:158.

An outbreak of fatal fluoride intoxication in a long-term hemodialysis unit.

Ann Intern Med 1994; 121:339.

National News: Dialysis patients in Chicago die from fluoride poisoning: FDA issues safety alert.

Contemp Dial Nephrol 1993; 17:110-111

Epidemic aluminum intoxication in hemodialysis patients traced to use of an aluminum pump

Kidney International (1995) 48, 469–474

Illness in hemodialysis patients after exposure to chloramine contaminated dialysate.

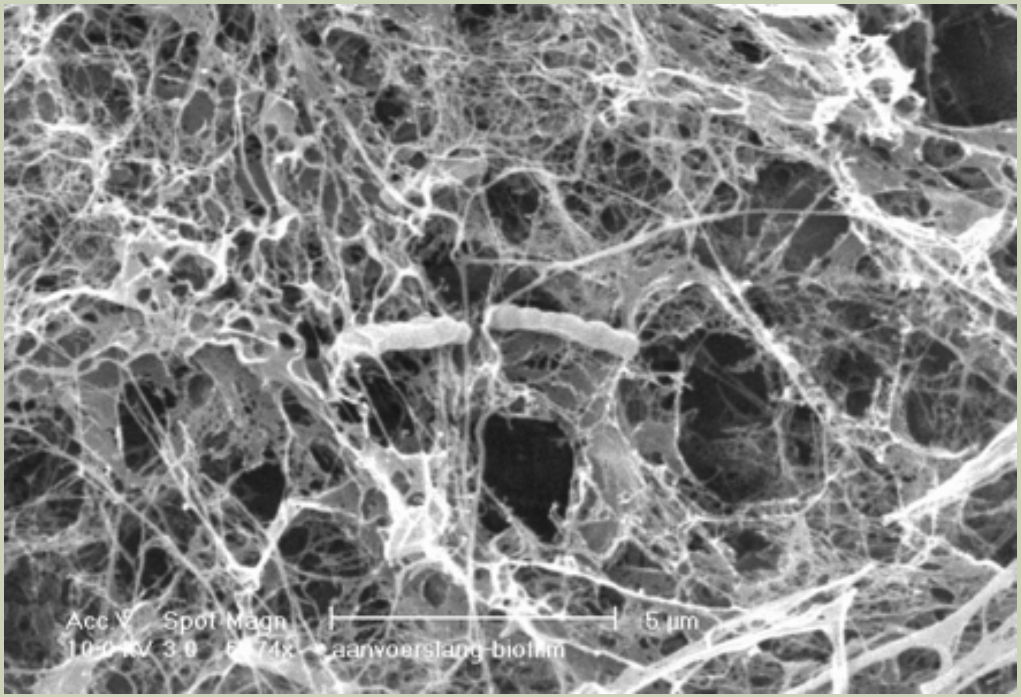
Trans ASAIO 1991; 37: 588-591

WHAT ARE WE CONCERNED ABOUT?

- Vulnerability of dialysis patients
- Contaminants:
  - Particulate
  - Chemical – organic, inorganic
  - Microbial – bacteria, endotoxin
- How we add to the risk:
  - Remove Cl
  - Add Bicarb buffer

BACTERIAL CONTAMINANTS

- Planktonic and sessile
- Sessile bacteria:
  - Biofilm – predominant, sequestered



BIOFILM

- Ubiquitous
- Complex
- Tenacious
- Persistent
- Resistant
- Hard to detect
- Infer presence from endotoxin assay
- Hard to remove
- No reliable prevention

BIOFILM IN DIALYSIS

- Study result: single RO unit – 92% prevalence in tubing*
- Culture not a reliable indicator
- Bacterial monitoring: colony counts
- Endotoxin monitoring: endotoxin assay (LAL)
  - High levels: Pyrogenic reaction –clinically evident with chills and/or fever
  - Low-level: association with chronic inflammation; ESA resistance; amyloid

*Smeets E et al. KI 2003;63: 1574-6

BIOFILM MANAGEMENT

- Prevention
  - Nature of piping surface
  - Avoid stagnation – flow rates, dead ends
  - Frequent sanitization
- Treatment
  - Sanitization method: chemical?, heat? or both?
- Potential new method for elimination
  - Detergent + enzymatic treatment:

    A New Procedure Allowing the Complete Removal and Prevention of Hemodialysis Biofilms.

    Marion, K *et al*. Blood Purif 2005;23:339-48

WHY ENDOTOXIN STANDARD?

- Colony counts are not a surrogate
- The evidence for harm from low levels is clear
- European, American and Canadian standards are harmonized and all include an endotoxin standard
  - Dialysis water < 0.5 EU/mL
  - Dialysate < 0.25 EU/mL
- Not whether but how
- Cost is the “elephant in the room”
- We need to find the most efficient way of doing it.

WHO'S PROBLEM IS THIS, ANYHOW?

Doesn't Biomed look after this stuff?

WHOSE PROBLEM IS THIS ANYHOW?

- ***Dialysis water is part of the dialysis prescription***
- ***The nephrologist is responsible :***
  - *For approving the **STANDARDS** for dialysis water quality*
  - *For ensuring that there are **SYSTEMS AND PROCEDURES** in place to ensure standards are met*
  - *For **SIGN-OFF** on system performance*
- ***But only Biomedical Engineers and Technologists can develop and manage the systems and procedures***

WHO'S PROBLEM IS THIS, ANYHOW?

It takes a team to do it right