

Surprising Side-effects of Electrosurgery

TNO Science & Industry

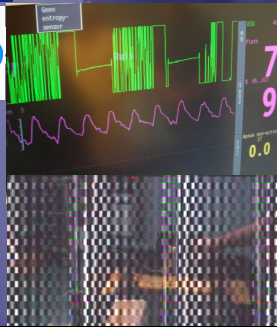
F.P. Wieringa^{1,2}, J. Jansen³

1 TNO Science & Industry, Delft; ✉ f.wieringa@tno.nl

2 Erasmus MC, Biomedical Engineering, Rotterdam

3 Rivierland Hospital, Medical Instrumentation, Tiel

European Society for Gynaecological Endoscopy (ESGE), Amsterdam Oct 2008



Operating theatre is a **complex high-tech area**

- **Elektrical Installations (interconnected with equipment)**
- **Medical Gas & Water Installations (also path for currents)**
- **Heavy equipment controlled by electronics (X-ray, laser)**
- **Air quality (pressure/flow regime, surgical smoke)**
- **Pendants (“Grey zone” between installations & devices)**
- **Fire safety (O₂, N₂O)**
- **Electromagnetic Compatibility (EMC):**
 - **mains pollution**
 - **intended transmitters (e.g. WLAN, RFID)**
 - **unintended transmitters (e.g. Electrosurgery)**



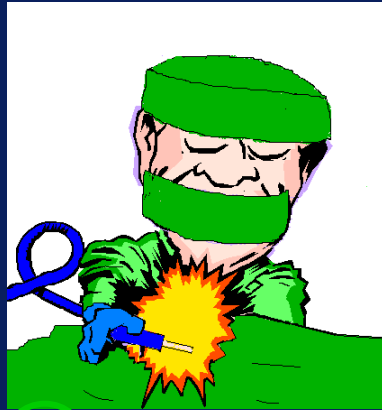
ESGE Amsterdam 2008 f.wieringa@tno.nl

2



FDA definition of Electrosurgical device:

Device that effects tissues via the use of a **high frequency** electrical current waveform passing into the tissue



High frequency > 20000 Hz



Low frequency e.g. 50-60Hz



HF-leakage & Fire most widely known



Dennis *et al.*



Also need for inspections of Devices & Installations

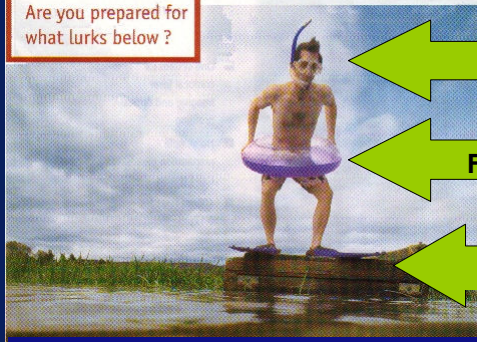


Small things can have large consequences

In devices... & installations




Are you prepared for what lurks below ?



Anesthesia

Floating circuit

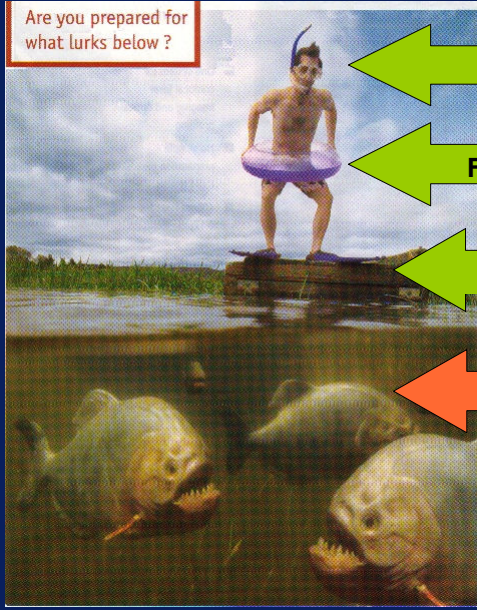
Accessoires



ESGE Amsterdam 2008 f.wieringa@tno.nl

5

Are you prepared for what lurks below ?




Anesthesia

Floating circuit

Accessoires

No problem ?

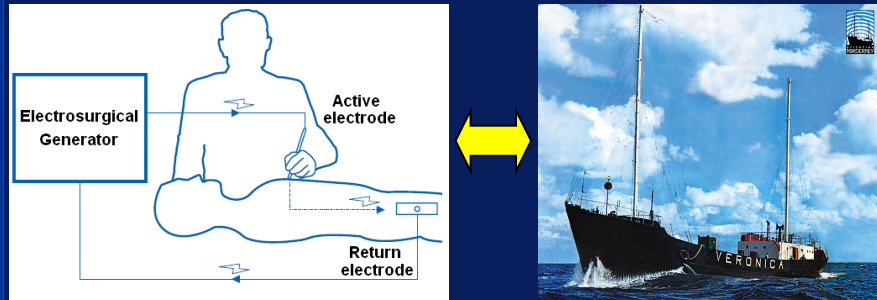


ESGE Amsterdam 2008 f.wieringa@tno.nl

6

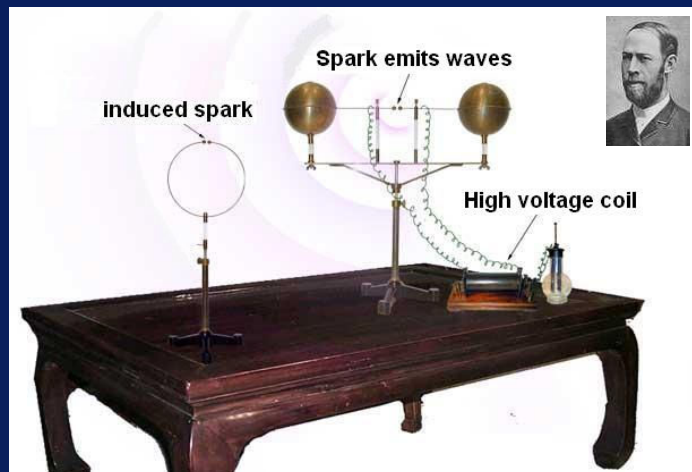


Electrosurgical circuit \equiv Radio Transmitter!

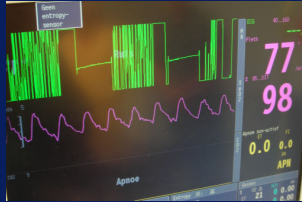


Why? \rightarrow Electromagnetic Waves

“Untersuchungen Ueber die Ausbreitung der Elektrischen Kraft”
Book of Heinrich Rudolf Herz dated 1892



Electromagnetic interference: Only nuisance?



We all know EMI effects on physiological signal monitoring



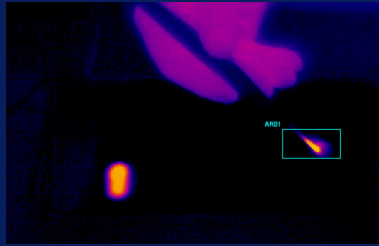
And sometimes the video image also “sees” disturbances



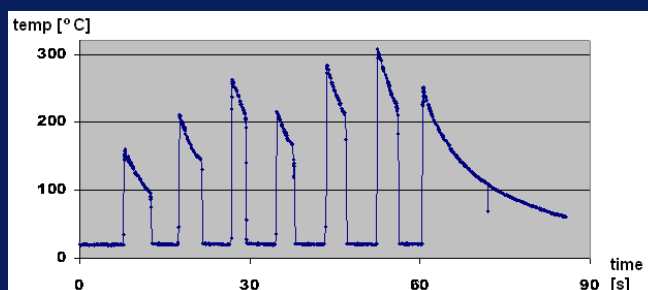
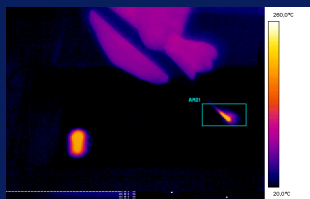
“Spontaneous” reset of monitoring



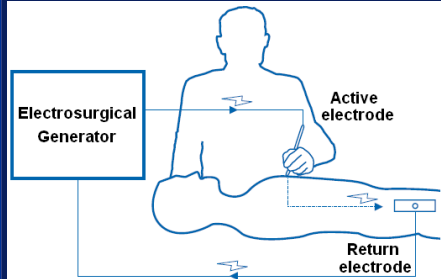
Electrosurgical contact \equiv Heat source !



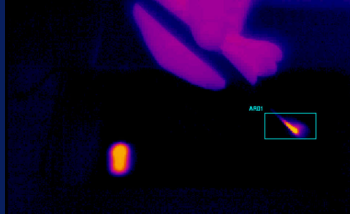
Demo: Heat Accumulation Probe Tip (70W)



Electrosurgical circuit Radio transmitter!



Electrosurgical contact Heat source !



Thanks for your attention !

