

# Improving Aseptic Conditions in Laboratory Animals : A Major Refinement Tool

SLAS and CroLASA LAS Day, June 15 2023

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# Aseptic conditions history at a glance

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- End of the 19<sup>th</sup> century , microorganisms + their role in post-operative infection identified
- By the late **1890s** Joseph Lister's antiseptic methods in operating theatres development, Gustav Neuber's sterilization and **aseptic methods** in operating room
- Since then... Step by step refinement of methods for **sterilizing instruments; swabbing down patients; robing, masking, and gloving surgeons; and dressing wounds with sterile dressings**



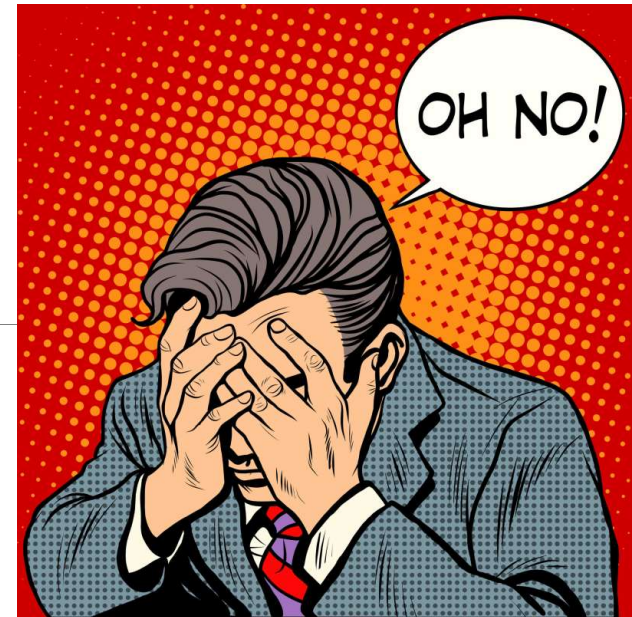
# Current situation in EU

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More than 95% of large laboratory animals surgeons\* are working under « state of the art » aseptic conditions (sterile gloves sterile drapes, autoclaved instruments, etc.)

Less than 25% of laboratory rodent surgeons\* are working under such conditions, most of the others are working under « grey » techniques

*\*estimation based on Dr Bouard's observations between 2009 and 2021 among approximately 120 EU laboratory animal teams (public institutions, biotechs, pharma companies)*



# But why changing ? We have « no problem »

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- **Infection  $\neq$  death !!!**
- **Aseptic conditions  $\neq$  « clean » conditions**
- **No animal specie is resistant to post-op infection : what matters is the skin/mucosa barriers !**

No issues, really... What about :

- these 10%-30% of animals with delayed wound healing ?
- these vascular catheters not working anymore after 5 days ?
- the dental cement not staying in place ?
- these cranial windows getting opaque after one week ?



# What could we improve with better aseptic conditions ?

Survival is not the point... and sometimes clinical signs of infection are difficult to detect

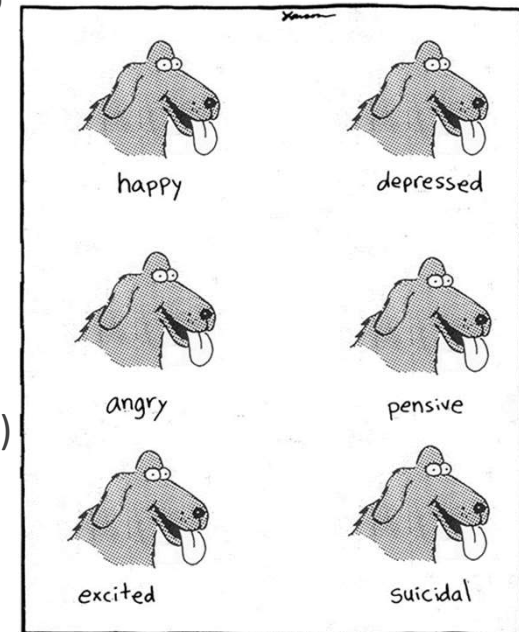
*« Survival alone is not a valid criterion for judgment of acceptability of a rodent surgical technique, but rather, the criterion for acceptability should be the presence of untoward, unplanned alteration of physiological functions or behavior due to perioperative infection » Cunliffe-Beamer 1993*

Nowadays, a large part of :

- surgically induced models failure** (ex : catheter blockage, cement dehiscence)
- results heterogeneity between batches** (ex: heterogeneous cells graft success rates)

could be **significantly reduced through aseptic techniques improvement**

**WORKING ON ASEPTIC CONDITION IS ONE OF THE KEY RESPONSE TO OUR REPRODUCIBILITY “CRISIS” !**



Let's highlights novelties and major area of improvement for :

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Animals



Environnement

Instruments/consumables

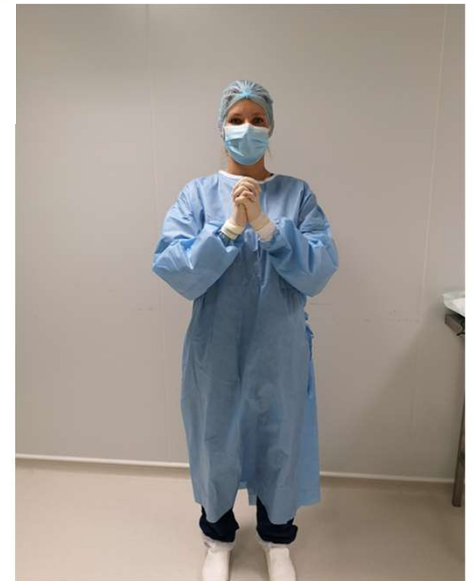
Surgeon

# Surgeons

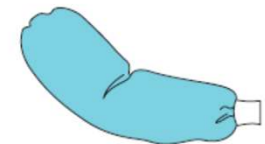


## STATE OF THE ART

- Proper surgeon hand washing
- Sterile gloves, eventually doubled and changed on a very regular basis
- Sterile gown changed in-between each animal for large animals, on a regular basis for rodents



- 1/ Get read of your hand jewelry !
- 2/ Wash your hands thoroughly *(after 40-90 minutes surgeries, approx. 15% of gloves are microperforated !)*
- 3/ Wear sterile gowns, or at least sterile sleeves for rodent surgeries
- 4/ Wear **sterile gloves**



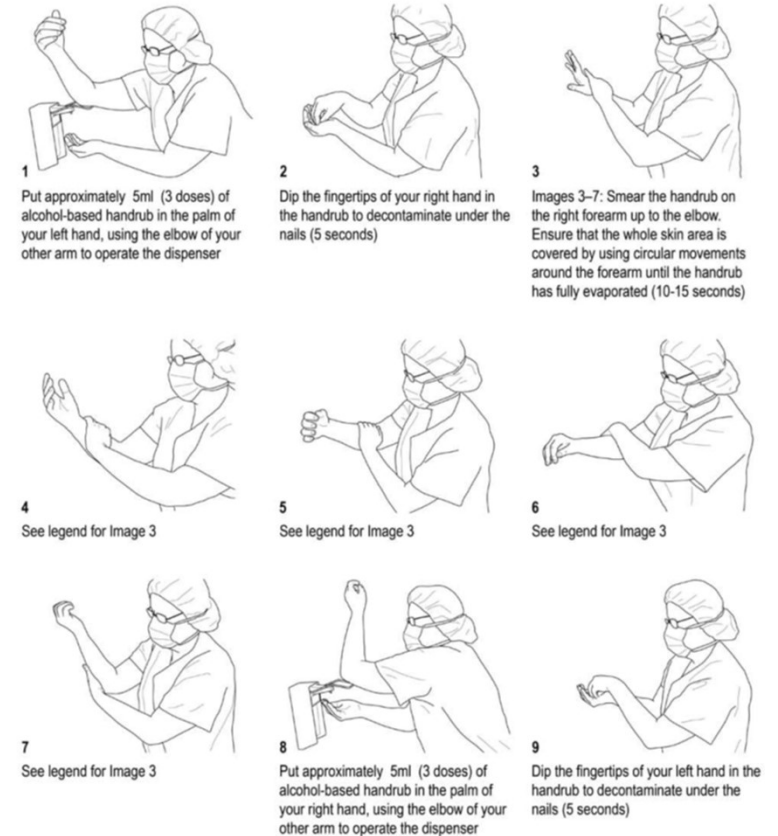
### Divers

Code	Descriptif	Conditionnement : Int.	Ext.
623501	Protège-bras imperméable 50 cm	30	180

# Surgeons (cont'd)

When no dedicated surgeons' sinks are available, its still feasible for surgeons to get properly prepared with hand gel, sterile gloves and sterile gown

Total time for the initial prep : approximately 5 minutes



*Infect Control Hosp Epidemiol.* 2013 Mar;34(3):245-50. doi: 10.1086/669528. Epub 2013 Jan 18.

**Modified World Health Organization hand rub formulations comply with European efficacy requirements for preoperative surgical hand preparations.**

Suchomel M<sup>1</sup>, Kundi M, Pittet D, Rotter ML.

# Animals

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## STATE OF THE ART

- Shaving
- Proper skin disinfection
- Draping with barrier drapes + films

- 1/ Shave (but away from the surgery area, and with a good shaver !)
- 2/ Disinfect the skin
- 3/ Drape the animal



# Animals: skin disinfection

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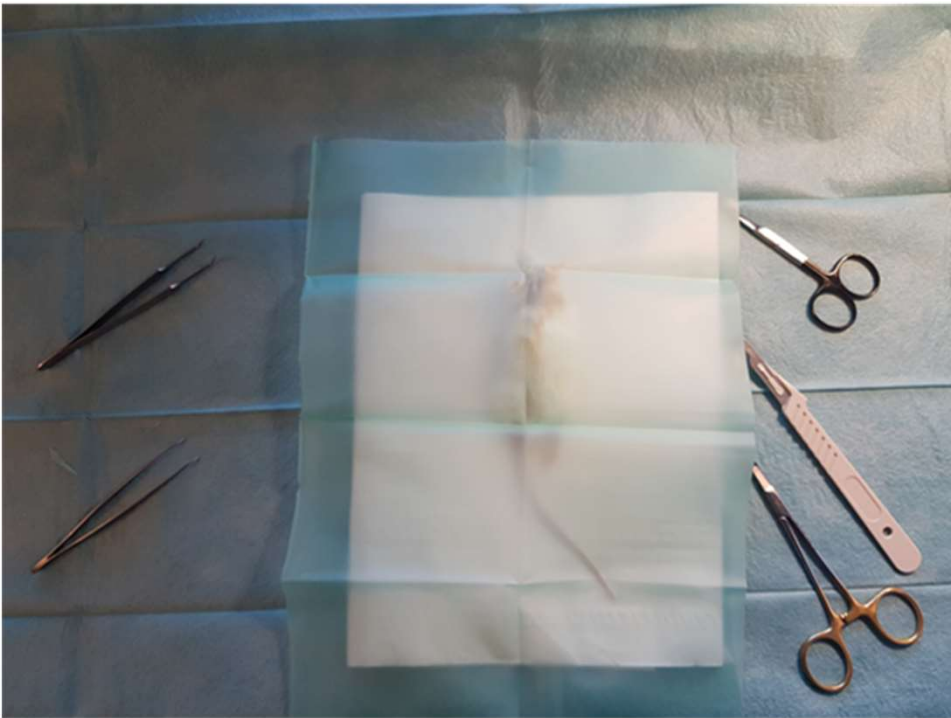
The « go-forward » principle and the 3 steps :

- 1/ Cleansing with a soap
- 2/ Rinsing with water or alcohol-based solutions
- 3/ Applying a disinfectant



# Animals : draping “tip” for rodents

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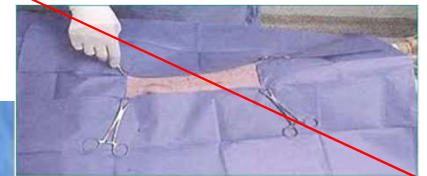


**Transparent barrier drapes** help with animals' monitoring  
Food film could eventually be used as a surgical drape in small animals

# Animal : draping (cont'd)



Picture : courtesy of Charles River surgery team



# Environnement



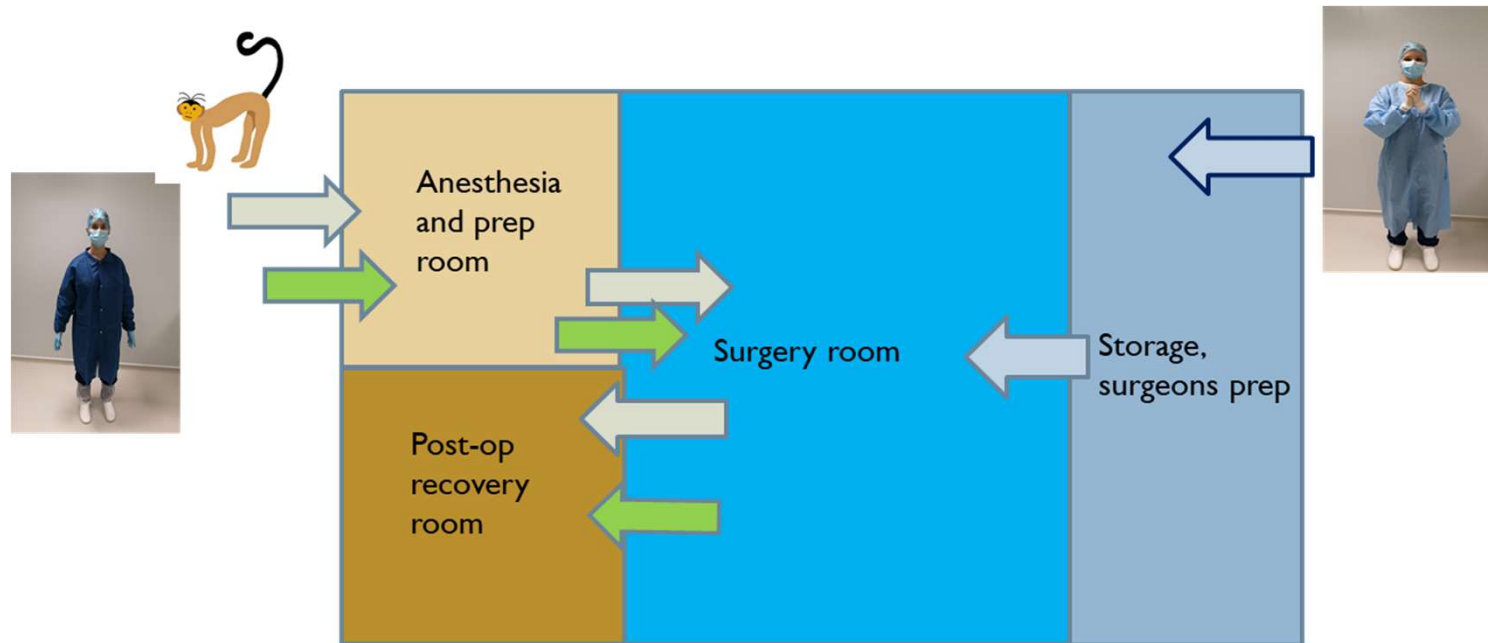
## STATE OF THE ART

- Dedicated rooms (preparation, surgery, recovery)
- Dedicated teams
- Very clean and “empty” surgery room

- 1/ Separate clean from “dirty” area (separated rooms are ideal)
- 2/ Keep clean area clean !
- 3/ Protect non-sterile equipment close to your surgical area
- 4/ Try to remove “dangerous” equipment from the room (ex : fridges!) and eventually check ventilation systems

# The ideal set-up

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# Separating clean from dirty : team work and dedicated spaces



## « Dirty » activities

Pre operative care

Anesthesia

Shaving

Disinfection

Post-operative care

Cleansing, maintenance

« Dirty nurses »  
Preparation area

Animal transfer

## Activities to be performed under aseptic conditions

Sterile consumables preparation

Sterile material manipulation

Surgical area set up

Surgeries

Surgeons  
Surgery area







# Instruments and consumables

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## STATE OF THE ART

- One fresh set of sterile instruments per animal
- Sterile consumables only

- 1/ Work only with sterile instruments and consumables : everything that enters in contact with the animals cavity should be sterile !
- 2/ Anything you have to touch during the surgery that can't be sterilized should be covered with something sterile

# Different classical sterilization processes and what you can sterilize with it

## **Autoclave**

Stainless steel Instruments  
Glass pots  
Cotton tips  
Gauze  
Silicone tubing  
Aluminum foil



## **Dry heat**

Stainless steel instruments  
Glass pots  
Aluminum foil



## **Cold sterilant**

Stainless steel instruments  
Hamilton syringes  
Telemetry implants  
Brain cannula  
Injectors



## **Gamma irradiation**

Everything !! Including food film,  
PU tubing...



# Interesting sterilization tools

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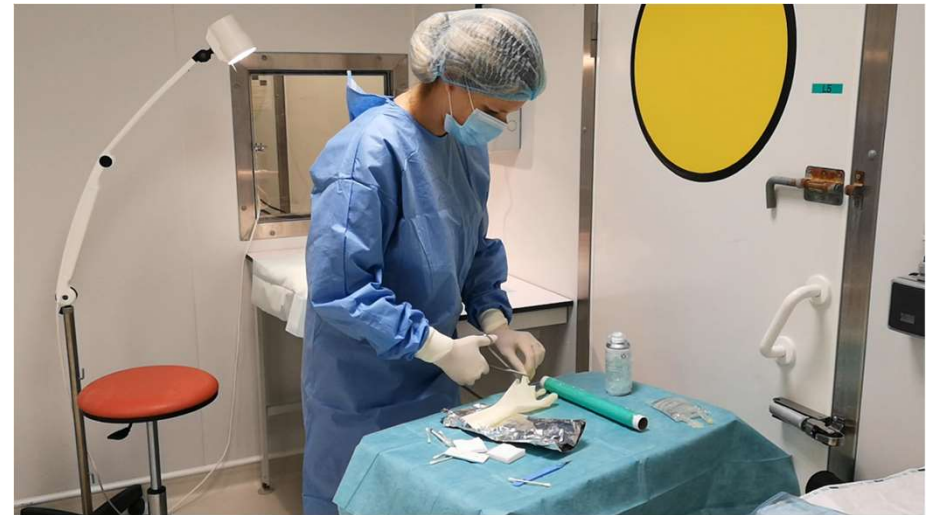
EnosS class B mini autoclave (approx 2000€)  
Ultra fast cycle available (7 minutes!)



Dry bead « sterilizer » (approx 500€)  
**Can be used in rodents inbetween 2 animals  
when one fresh set/ animal is not available**

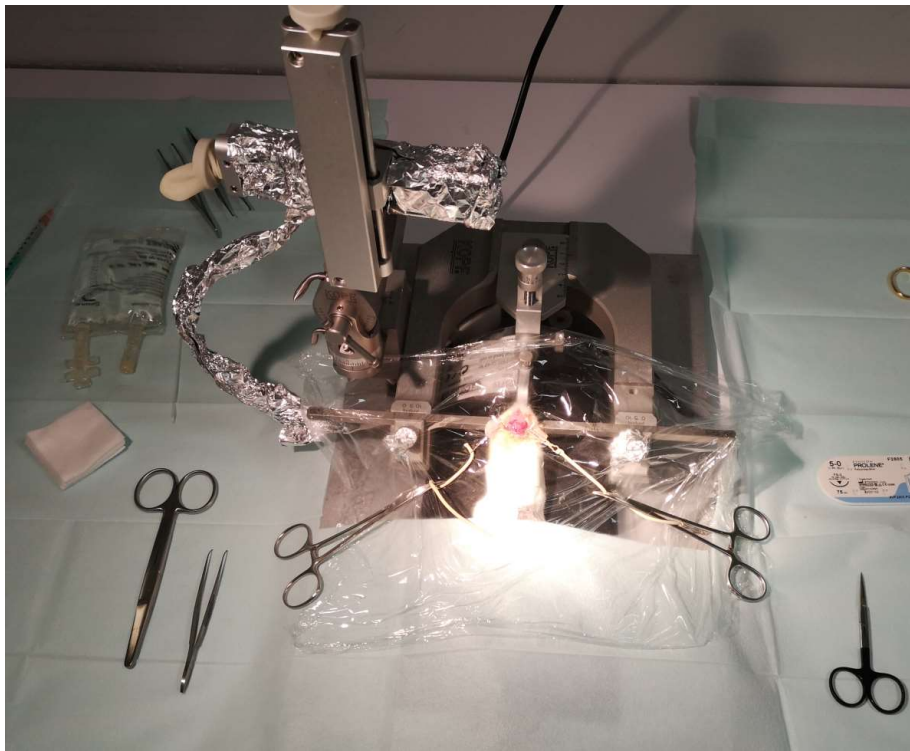
# Covering non sterile items : some tips and tricks

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# Covering non sterile items : some tips and tricks (cont'd)

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# Conclusion and Q&A sessions !

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EALAS : <https://www.ealas.eu/>

Thanks a lot for your attention 😊

