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Maintenance of the recording chamber for non-human primate (Chamber cleaning and dura scraping)

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We use this protocol and it's working

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Abstract

Once a craniotomy has been done in the chamber, the inside of the chamber must be cleaned regularly (2-3 times per week) to prevent infection. This protocol explains two procedures to maintain the recording chamber in a healthy condition:(1) chamber cleaning and (2) dura scraping.

Materials

	Item	Specifications	Vendor	Reference number
	Sani-Cloths Plus		PDI	370845
	Vacuum canister	800 ml	McKesson	544102
	Fluid solidifier	1500 cc	McKesson	1152097
	Sodium chloride irrigation solution	1000 ml	McKesson	13878
	Sterile water irrigation solution	1000 ml	McKesson	14045
	Hydrogen Peroxide	3%	McKesson	142779
	Dakin's wound cleanser solution	16 oz.	McKesson	479746
	Betadine skin prep solution	10%	McKesson	1073829
	Syringe	10 ml	McKesson	1044112
	Needle	18G	McKesson	433

List of the consumable items

	Item	Specifications	Vendor	Reference #	Quantity	Note
	Beaker	150 ml			1	
	Beaker	100 ml			2	
	O-ring	OD: 0.879"	McMaster-Carr	1182N018	5	This o-ring works for our chamber, but may not

	Item	Specifications	Vendor	Reference #	Quantity	Note
						work for yours.
	Q-tip				10	
	Gauze	2" x 2"	McKesson	446029	10	
	Grass pipette				2	Cut off the thin nozzle, and smoothen the edge with a butane torch or a gas burner
	Sterilization wrap				1	

List of items for the chamber cleaning kit.
All items (1-6) should be wrapped in the sterilization wrap (7) and sterilized in the EO gas.
(One 100 ml beaker can be non-sterile)

	Item	Vendor	Model	Note
	EO gas sterilizer			
	Beads sterilizer	Sigma-Aldrich	Z378585	The beads sterilizer is optional (but recommended) when your chamber is plastic and cannot be sterilized in the beads sterilizer
	Vacuum pump	Gomco	1180	

List of devices used for the preparation and chamber cleaning

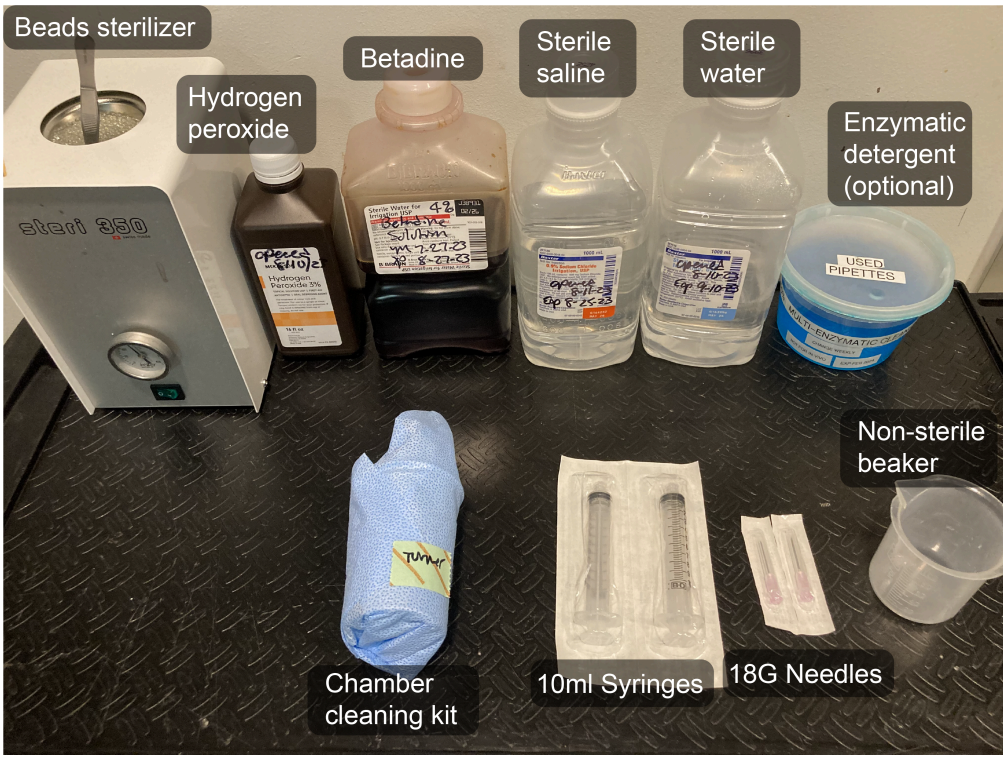
	Item	Specifications	Vendor	Reference #
	Excavator spoon	#1 and #153-154	Nordent instruments	https://nordent.com/product/excavator-1-2/ https://nordent.com/product/excavator-english-pattern-153-154-2/
	Dumont forceps	#7	Fine Science Tools	11252-20
	Adson-Brown forceps		Fine Science Tools	11627-12
	Vannas Tubingen scissors	3"	World Precision Instruments	504499
	Gelfoam	12-7 mm	Pfizer	https://www.pfizermedicalinformation.com/en-us/gelfoam-absorbable-gelatin-powder
	HemaBlock		HemaBlock	https://hemablock.com/

List of tools for the dura scraping kit

Troubleshooting

Daily maintenance of recording chamber (Chamber cleaning)

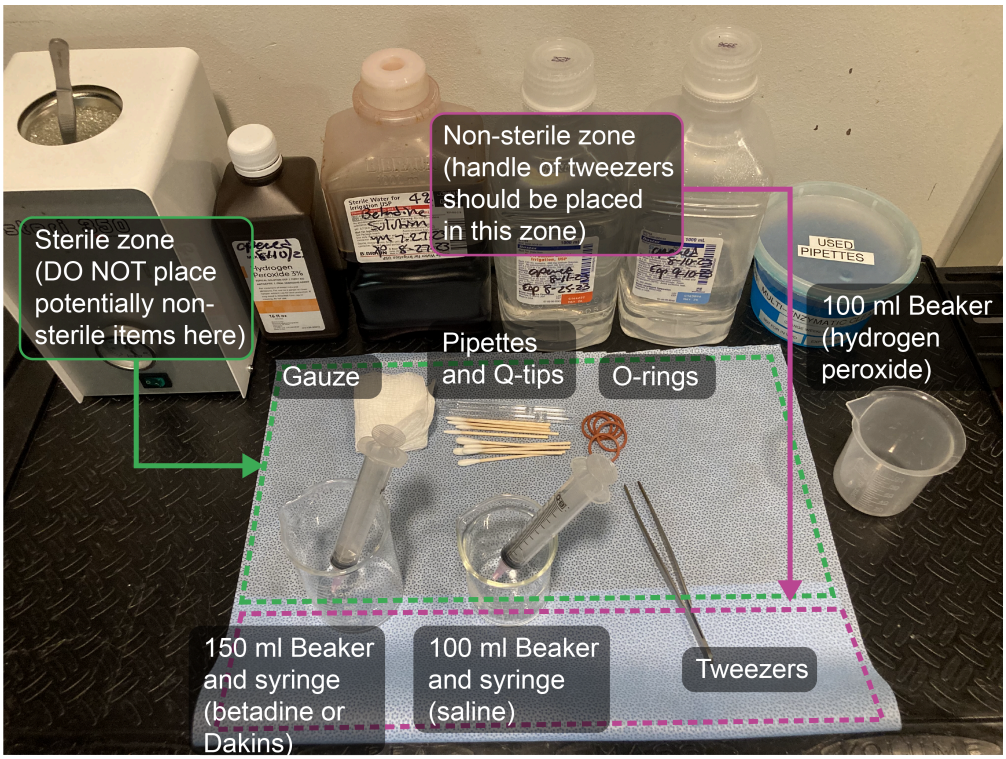
1 Wipe the desk with disposable disinfection wipes, then check if you have all items.



2 Open the chamber cleaning kit as instructed in the sub-steps below, and arrange the tools on the sterilization wrap.

Note

1: We use the sterilization wrap to make a sterile surface. Top part of the wrap should be strictly used for the sterile tools (see an image below).
2: We can touch the wall of the beaker and tweezers. However, other sterile items should be grabbed with the tweezers.



2.1 Carefully make a sterile surface with the sterilization wrap and arrange the tools (see an image above).

2.2 Pour saline and Dakin's solution or Betadine into the sterile beakers.

2.3 Pour hydrogen peroxide into a non-sterile beaker.

3 Chair the animal and secure the head.

> Note
>
> It is recommended to secure the animal's arms.

4 Clean the surface of the implants and chambers with disinfecting wipes.

5 Open the chamber cap, and place it in the hydrogen peroxide.

Note

Researchers need to make sure that the air pressure inside the chamber won't be too negative when they pull up the chamber cap. A small threaded hole on the top of the chamber cap can be used to release pressure.

6 If the chamber cap can be sterilized in the beads sterilizer, put it in the beads sterilizer.

7 Rinse inside the chamber with saline.

8 Wipe the inner wall of the chamber with Q-tips.

9 Wipe the outer wall of the chamber with disinfectant wipes.

10 Fill the chamber with Dakin's solution or Betadine.

11 Wipe the inner wall and top of the chamber using the Q-tips, especially the part where the filled Dakin's solution or Betadine does not reach (This happens regularly when the chamber is tilted).

12 Suction the Dakin's solution or Betadine from the chamber, fill the chamber with Dakin or Betadine once again.

13 If the chamber can be sterilized in a bead sterilizer, wipe the chamber cap in the hydrogen peroxide and put it in the bead sterilizer.

14 Wait for at least 5 minutes.

15 Suction the Dakin's solution or Betadine from chamber, rinse the chamber with Saline twice

16 If the chamber cap is hot in the bead sterilizer, transfer the cap from the sterilizer to the saline beaker.

17 Put an O-ring on the chamber.

18 Put the sterile chamber cap back on the chamber and tighten the screws on the cap.

Occasional maintenance of recording chamber (Dura scraping)

19 Clean the chamber as described above.

20 Fill the chamber with saline to prevent the surface tissue from drying.

21 Cover the edge of the chamber with sterile drape to reduce the reflection of light from surgical microscope.

> Note
>
> An sterile non-reflective seal (ex. sterilization tape) can be used instead of drape.

22 Open the dura scraping kit on the table.

23 Sedate the animal.

Note

1: We also inject dexamethasone (0.5 mg/kg, IM) before starting the dura scraping.
2: Dura scraping usually takes 1 - 2 hours. Researchers have to keep checking the degree of sedation and add sedatives before the animal starts feeling pain.

24 Start scraping the tissue from the inner edge of the chamber with the excavator spoon. This should be done slowly and carefully. The vascularized tissue tends to bleed profusely.

Note

When there is active bleeding, multiple solutions can be used depending on the speed of breeding (see below).
1. slow bleeding: keep flushing the chamber with saline for a few minutes.
2. mild bleeding: press the bleeding spot with the Q-tip softly and keep applying gentle pressure to the spot for a few minutes.
3. fast bleeding: place a small piece of gelfoam on the bleeding spot and apply gentle pressure with a Q-tip.
4. more faster bleeding: apply the hemablock on the bleeding spot (also use gelfoam and pressure if necessary).

25 Rinse with saline as needed to flush the blood.

26 Stop before the lowest layer of dura is observed (slightly shiny and resembles the fascia of a chicken). If you use a piercing guide in the recording, you don't need to scrape the tissue until you see the lower layer.

27 Rinse with saline, then put the O-ring and cap.

28 Treat the animal with pain medication. We use ketofen (2 mg/kg, IM).