Regulatory training "Initiation to surgery on fish used for scientific purposes"

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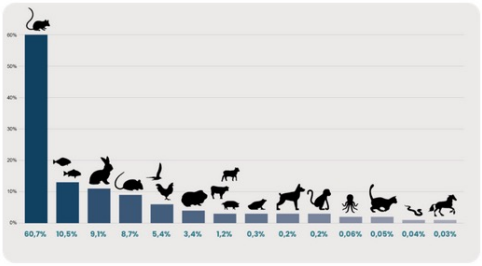
Background

- With 27.6% of animals used in Europe (2020) and 10.5% in France (2021), fish constitute the second category of species most used for scientific purposes.
- Many laboratories (Ifremer, Inrae, Cirad, Universities, high schools, private industries, …) use fish as a biomedical animal model or as sentinel in ecotoxicity studies or for population monitoring and biomeasurement recordings on wild populations.
- In certain cases, it is necessary to realize surgery to implement measurement, identification or remote detection systems.

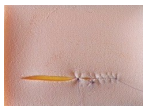
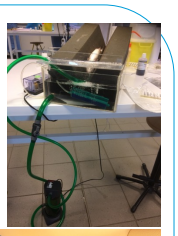


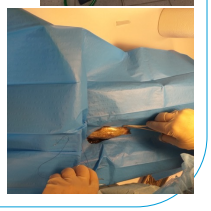
History and Objectives

- Regulatory training module in experimental surgery (Training in good practices in anesthesia, pre, intra and post-operative analgesia, asepsis, sutures, holding instruments and application of end points) approved by the French Ministry of Agriculture since 2011 (No. R44-ENVN-chir2-11).
- Absence of specific training in surgery for "Fish and amphibian" species in France before 2011. Training set up on demand and with the help of the fish users concerned (students and trainees).
- Respond to regulations in addition to training in regulatory animal training for personnel (scientists and technicians) using aquatic species (fish or amphibians) performing surgical procedures on live animals (laboratory, wild).

3R Application

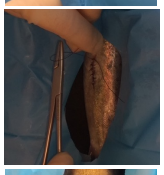
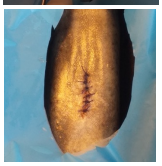
- Replacement: Session on holding instruments, making sutures with MEDICALEM® suture pads allowing trainees to train on non-animal material.
- Reduction: Purchase of unEviscerated cadavers (fishmonger or breeder) for anatomy dissection sessions.
- Refinement: Pre-, intra- and post-operative oxygen supply – non-traumatic "homemade" long-term anesthesia equipment with continuous oral maintenance (branchial perfusion) of anesthetic – anesthesia with operative analgesia – antibiotic therapy – minimally invasive laparotomy – application of endpoints.



Organization

- This training follows a program validated by the National Commission of the French Ministry of Agriculture through theoretical and practical regulatory learning without animals, 1 practical anatomy session on cadavers and 2 practical surgery sessions with live animals.
- It must be followed by formalized tutoring for specific surgeries when the trainees return to their establishments.
- Preparation of the surgeon and the surgical area in order to raise awareness and train trainees in the rules of asepsis (cleaning hands, wearing a sterile gown and gloves) and the animal through disinfection of the surgical area.
- Sessions of 12 to 14 trainees with a supervision ratio of 1 supervisor for 2 trainees which allows the animal to be secured throughout the procedure.
- Trainee support with step-by-step monitoring of actions and procedures to be carried out.
- The training ends with a theoretical assessment and a practical surgery assessment.

Conclusion

- The evolution of regulations requires us to update and improve regularly (evolution of knowledge, international regulations, tools, procedures, …).
- On average 1 annual session of 12 trainees trained since 2011, i.e. around 150 people from very varied backgrounds.
- Good level of satisfaction of the trainees, particularly thanks to the important practical part.

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References

1. Unit for Laboratory Animal Medicine (University of Michigan), 2017, Guidelines on Fish Anesthesia Analgesia and Surgery, lien consulté le 7 avril 2023, https://az.research.umich.edu/animalcare/guidelines/guidelines-fish-anesthesia-analgesia-and-surgery
2. Florida Atlantic University, Institutional Animal Care and Use Committee, Standard Operating Procedure, Fish Anesthesia, Analgesia, and Biological Sampling Procedures – Captive Fishes, lien consulté le 7 avril 2023, https://www.fau.edu/research-admin/comparative-medicine/files/fish-anesthesia-analgesia-biological-sampling-procedures-sop-captive-fishes.pdf
3. Schroeder Paul, Lloyd Richard, […], and Mocho Jean-Philippe, 2021, Anaesthesia of laboratory, aquaculture and ornamental fish: Proceedings of the first LASA-FVS Symposium, Volume 55, Issue 4, https://doi.org/10.1177/0023677221998403
4. Stathopoulou T, Light J, […], and Pelligand L, 2022, A Protocol for Prolonged Surgical Anaesthesia with Recovery in Fire Salamanders Using Tricaine Mesylate (MS-222): A Case Series, Laboratory Animals, Volume 56, Issue 6, https://doi.org/10.1177/00236772221103706
5. Tânia Martins, Ana Valentim, […], and Luis Marques Antunes, 2018, Anaesthetics and analgesics used in adult fish for research: A review, Laboratory Animals, Volume 53, Issue 4, https://doi.org/10.1177/0023677218815199