Fin Clipping of Zebrafish
IACUC Standard Procedure
Effective Date: August 2024

UCSF Office of Research
Institutional Animal
Care and Use Program

Objectives:
Fin clipping is performed to isolate genetic material from individual fish for the purpose of genotyping. A small amount of tissue is clipped from the end of the tail to extract DNA, which will be used for further analysis such as PCR. If done correctly, the caudal fin regenerates within two weeks. Users should be trained appropriately.

Pre-Procedure Preparations:
- Surfaces used for the procedure should be disinfected with ethanol, Vimoba or a diluted chlorhexidine solution. The fish should not come in contact with the cleaning agents directly. Alternatively, fin clips can be performed in new petri dishes. Take great care to remove all tissue from the cutting tool (scalpel, razor blade or surgical scissors) after each animal. Disinfect the cutting tool with 70% ethanol between fish to reduce the risk of infection and cross contamination of genomic material. Wetted non-powder coated gloves should be worn to reduce tissue abrasion and per EH&S Tricaine policy. Fish needs to be > 1-2cm in length.

Description of Procedure:
- Fish are anesthetized by immersion in 0.02% MS-222 (Tricaine) at neutral pH until gill movement is slowed (estimated 2-3 minutes). Stock preparation is 4g/L buffered to pH 7 in sodium bicarbonate (at 2:1 bicarb to MS-222). The dosage for adult anesthesia is 168ug/ml or 4.2ml stock solution in 100 ml water. The anesthetized fish is then transferred carefully onto a petri dish or clean surface. The fin is clipped at a point not greater than halfway between the tip of the fin and the point where the scales end. The biopsy should be no more than 20% of the caudal fin and ideally less than 10%. Caution must be used to only remove fin tissue, and not damage the peduncle to avoid hemorrhage and permanent tissue damage. This procedure should take less than one minute and should not result in bleeding.

- Fish are then immediately transferred to a container with fresh system water and monitored continuously until they are recovered and the ability to right themselves. Upon immersion in fresh water, fish should regain swimming ability within 5 minutes.

Post-Procedure:
Following fin clipping, fish are transferred to on-system holding tanks with circulating water. Monitor animals until fully recovered from anesthesia and again later on the day of the procedure. Monitor animals at least once daily for 2 additional days, including weekends and holidays. Observe for signs of distress or discomfort, such as: abnormal swimming, reduced activity, or behavior. Document any problems and consult LARC if there are problems with recovery. Perform any additional monitoring per the IACUC-approved protocol.

Fin regrowth takes approximately 14 days but fish may be returned to general tanks within 3 days. Fully recovered fin-clipped fish may be housed with other clipped fish during recovery. If this is not possible, single-housed fish should be provided extra environmental enrichment (plastic plant, substrate image, etc.).

Alternatives: Skin swabs can also be considered as an alternative[4], but this procedure should be described in the approved IACUC protocol prior to implementation.

Agents:
This procedure requires MS-222 (tricaine) and sodium bicarbonate. All agents administered to animals should be listed in the "Agents" section of the IACUC protocol.

Adverse Effects:
Adverse effects should be listed in the "Adverse Effects" section of the IACUC protocol.

Examples include: Infection, injury due to handling, failure to exhibit normal swimming movements or eating behavior, over-exposure to anesthetic agents.

References:

1. Children's Hospital of Philadelphia Research Institute, Aquatic Zebrafish Core, Fin Clipping of Adult Zebrafish," 11/17/2017, https://www.research.chop.edu/sites/default/files/web/sites/default/files/pdfs/AZC_Fin%20clipping%20of%20adult%20zebrafish.pdf

2. Sneddon LU, Halsey LG, Bury NR. Considering aspects of the 3Rs principles within experimental animal biology. J Exp Biol. 2017 Sep 1;220(Pt 17):3007-3016. doi: 10.1242/jeb.147058. PMID: 28855318.

3. Westerfield, M, 2007, The Zebrafish Book, 5th edition. Eugene: University of Oregon Press.

4. NC3Rs Guidance, "Skin swabbing for DNA sampling of zebrafish," https://nc3rs.org.uk/skin-swabbing-dna-sampling-zebrafish