

# Fettfinneklipping og fiskevelferd

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# Overview

- Project overview and aims
- Experimental methods
- Scoring system
- Effect of water temperature on wound closure
- Conclusion



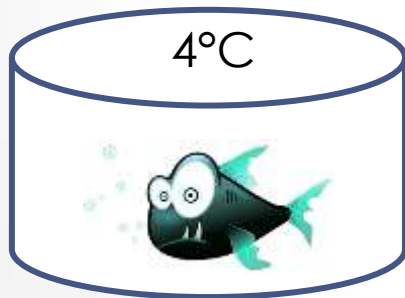
# Project overview and aims

- Control of farm escapees is a priority for the Norwegian Seafood Federation (FHL).
- Is it possible to mark **ALL** farmed fish?
- Which marking method?
  - PIT tagging
  - Floy tagging
  - Panjet tattooing
  - **Fin clipping**
- Aims of this study:
  - Document and describe initial wound closure and healing processes following 100% adipose fin clipping.
  - Determine the possible welfare aspects of this method.



# Experimental methods

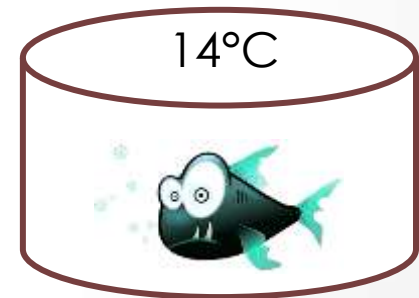
- Transferred 204 Atlantic salmon parr (mean 36g; range 27-45g) into three 450 L tanks.
- Each tank was set at different temperatures (4, 10 and 14°C).
- The experiment commenced following a 1 week acclimation period.
- Fish were transferred into an anaesthetic bath (Aqui-S).
- 100% adipose fin clipping was performed using scissors.
- Fish were returned to their respective tanks and observed.
- Sampling occurred at 2, 4, 6, 12, 18, 24, 30, 36, 48, 60 and 72 h post-clip.



n=66

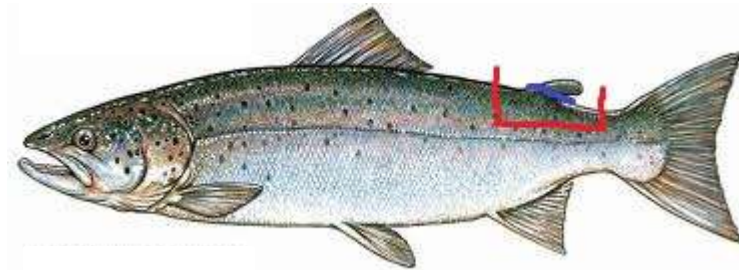


n=72



n=66

- Six fish were sampled from each group at each time point.
- Care was taken to not touch the wound area.
- All samples were immediately placed in 10% formalin.
- The samples were processed at the University of Bern.
- Histology sections were prepared using H&E staining.
- Sections from each sample were then scored using an adapted scoresheet from a past project.



# Scoring System

- All parameters were scored using a linear scale ranging from 0 (abnormal/no recovery) to 30 (normal structure).

## Epidermis:

#	Parameter	Description
1	Structure	All cell layers present incl. basal cell layer, round cells (w/ mucous cells), superficial cell layer
2	Thickness	'normal' thickness of the epidermis
3	Basal cells	Basal layer; normal = cuboidal/columnar cells
4	Round cells	Middle layer; normal = round/cuboidal
5	Superficial cell layer	Uppermost layer; normal = elongated, flattened cells
6	Mucous cells	Mucous cells are usually dispersed throughout the epidermis
7	Infiltration	Presence of granulocytes, lymphocytes & macrophages



## Dermis:

#	Parameter	Description
8	Structure	All cell layers present incl. basement membrane, pigment cell layer, stratum spongiosum (no scales), stratum compactum, hypodermal layer
9	Cell debris	Presence of necrotic cells and cell debris incl. Eosinophilic staining amorphous material
10	Infiltration	Presence of granulocytes, lymphocytes & macrophages

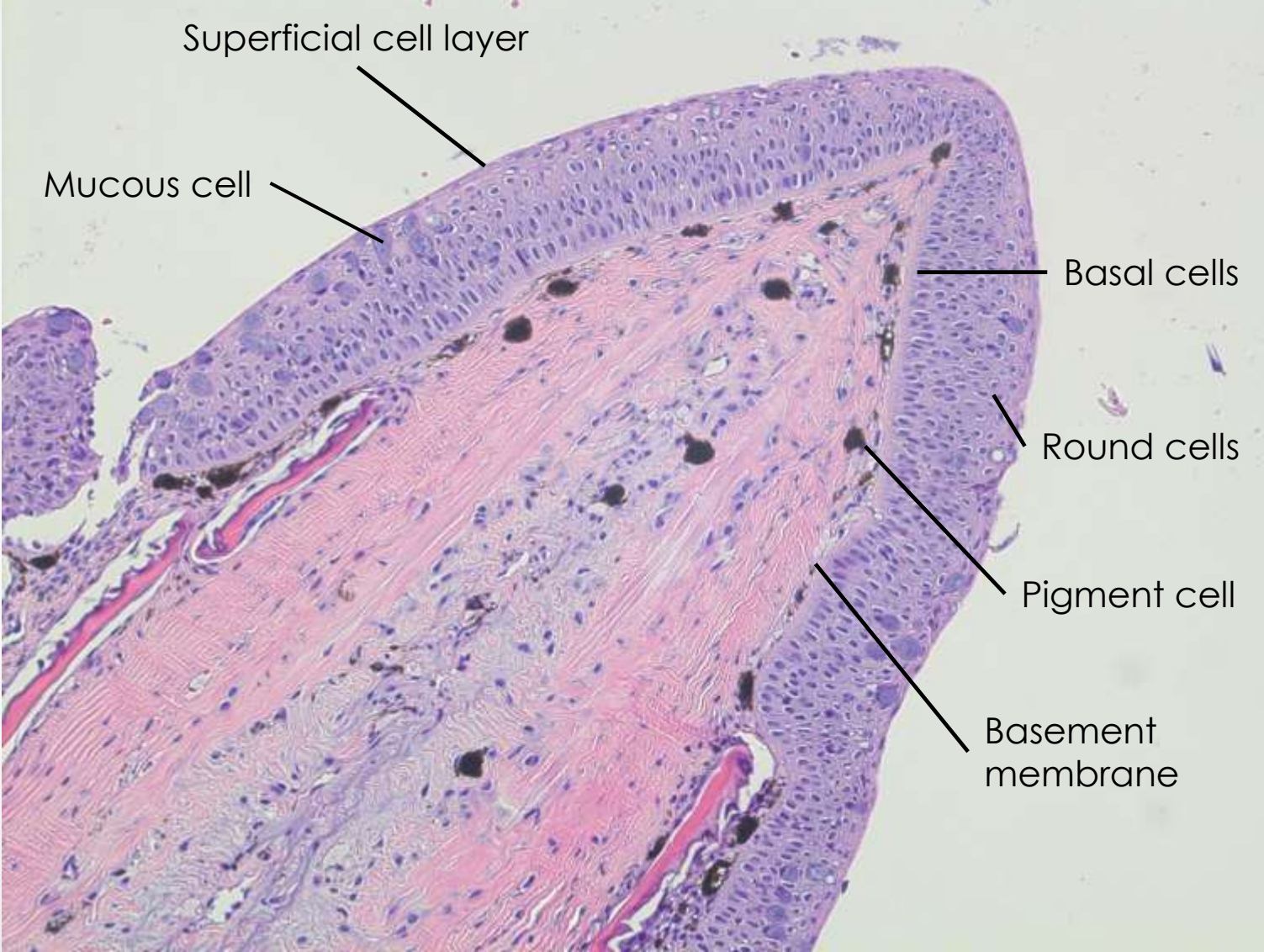
## Tissue:

#	Parameter	Description
11	Pigment cells	These cells are usually numerous throughout the dermis
12	Revascularisation	Blood vessels in dermal layers
13	Fibrous tissue	Normal arrangement of the fibres representing the stratum compactum



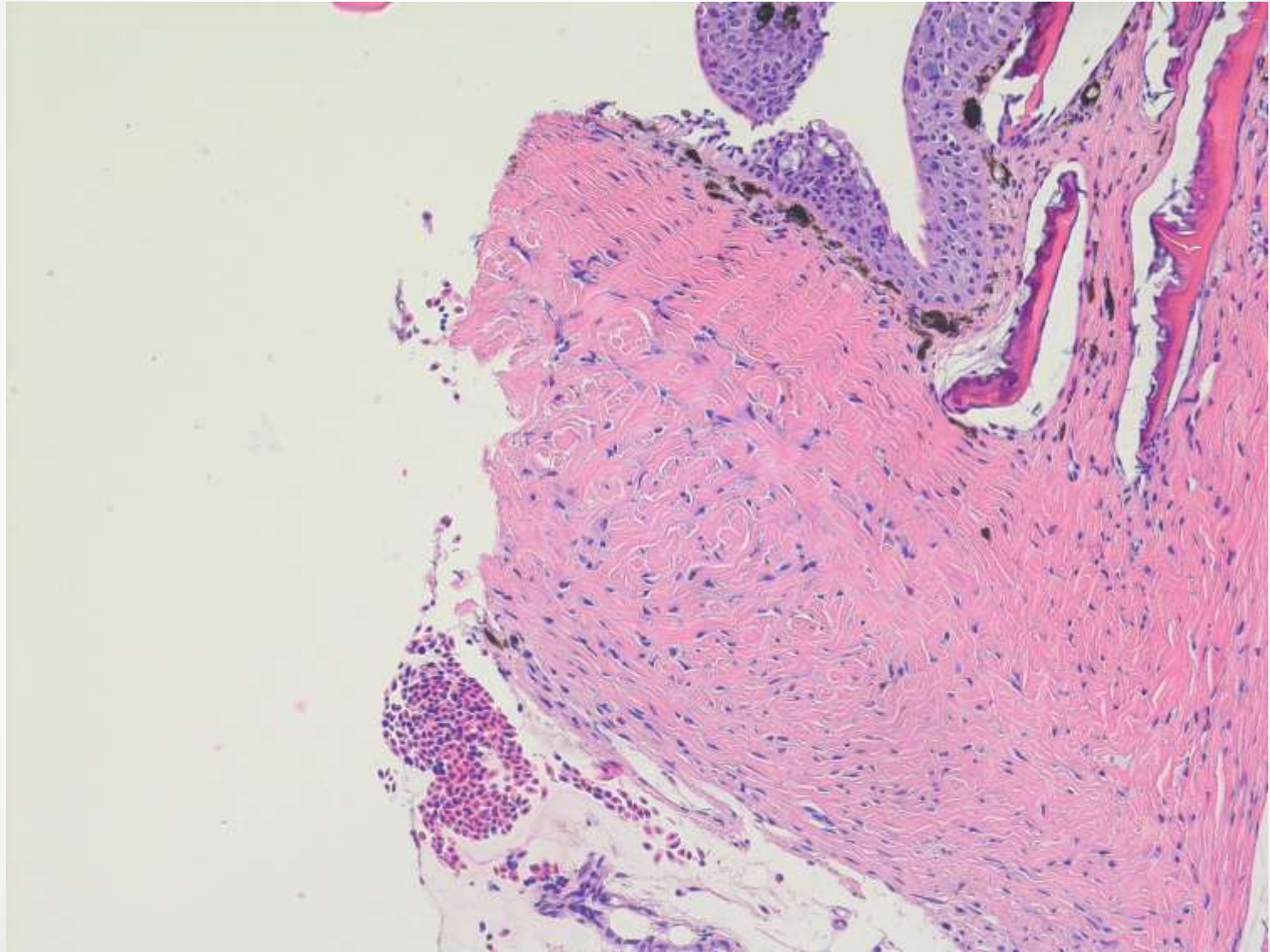


# Normal adipose fin:

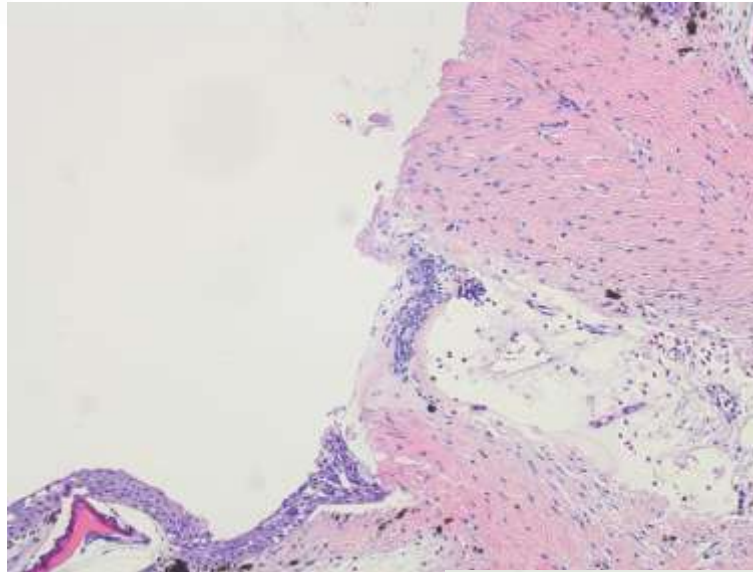




0 h post-clipping:

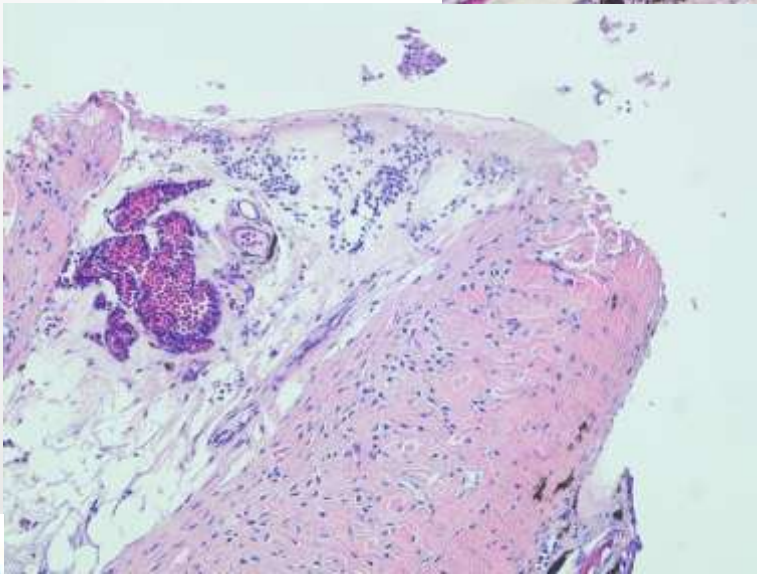


# 2 h post-clipping:

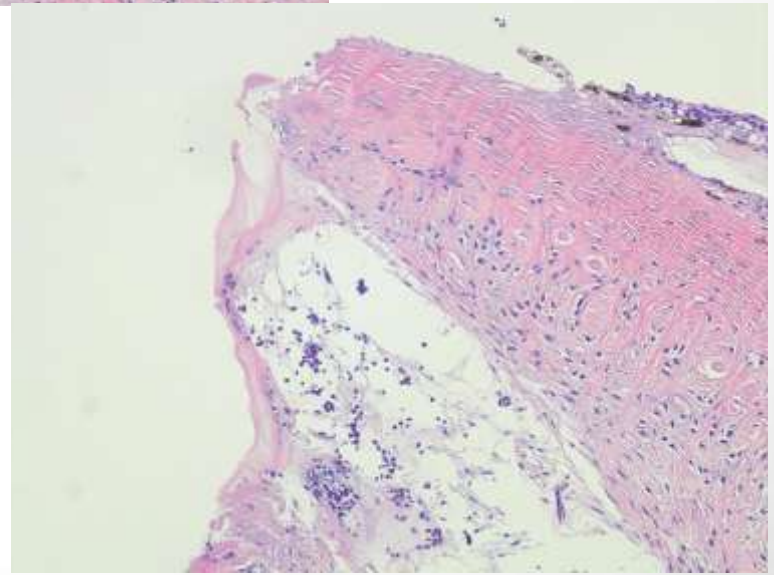


10°C

4°C



14°C

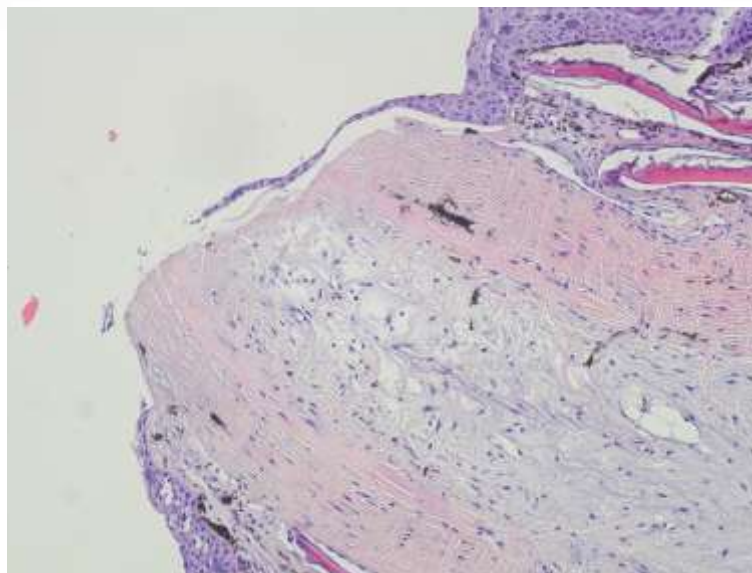


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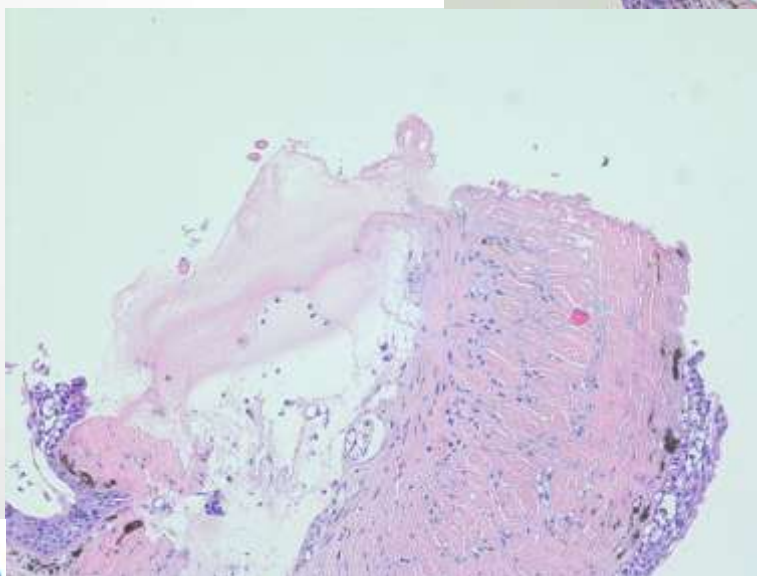


# 4 h post-clipping:

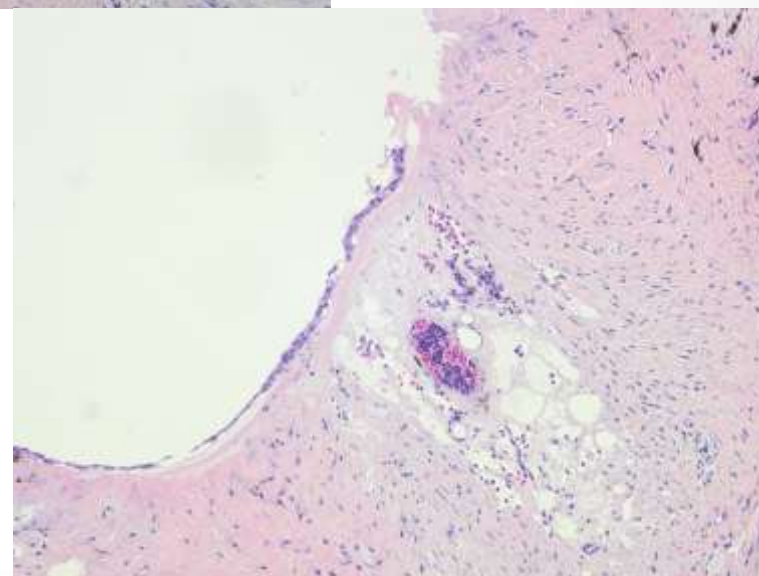


10°C

4°C



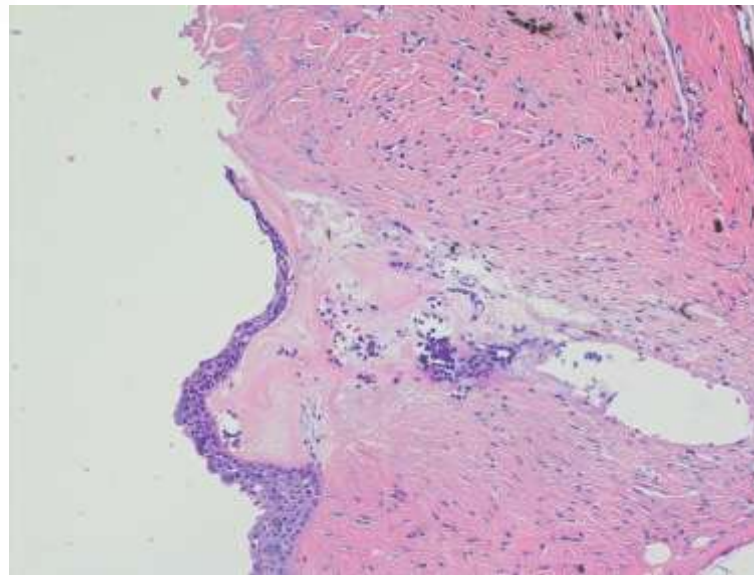
14°C



200x

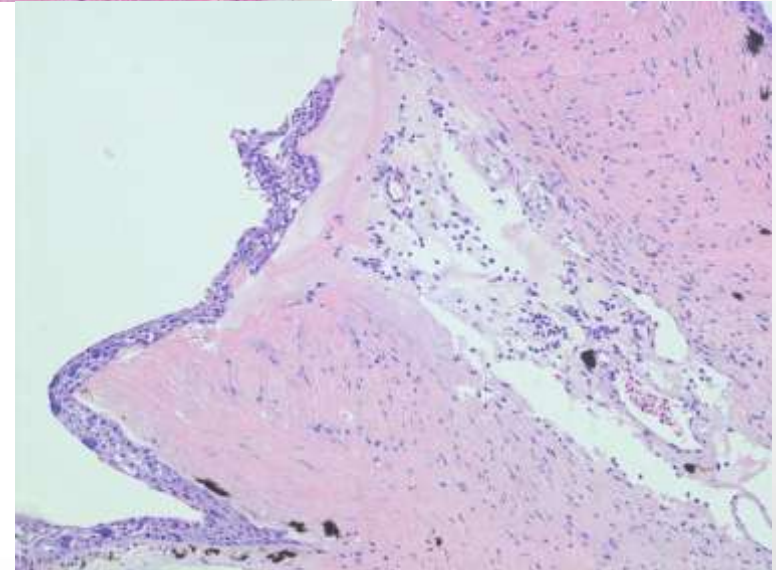
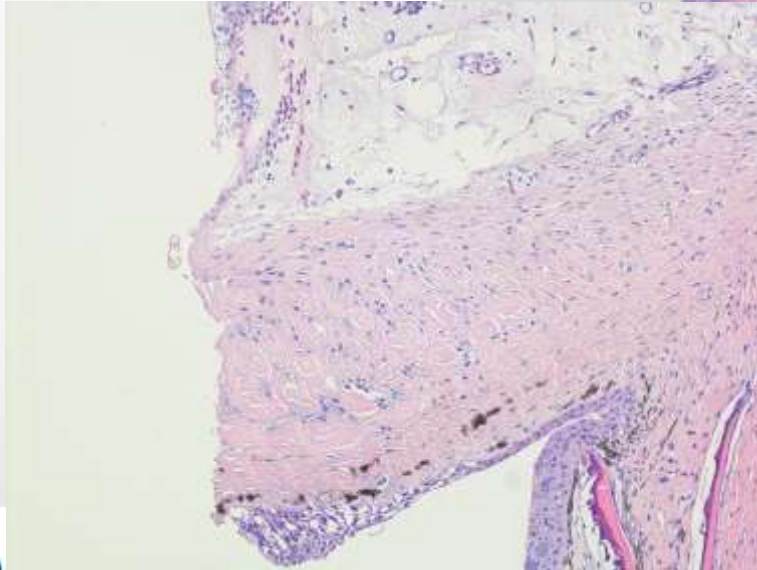


# 6 h post-clipping:



10°C

4°C

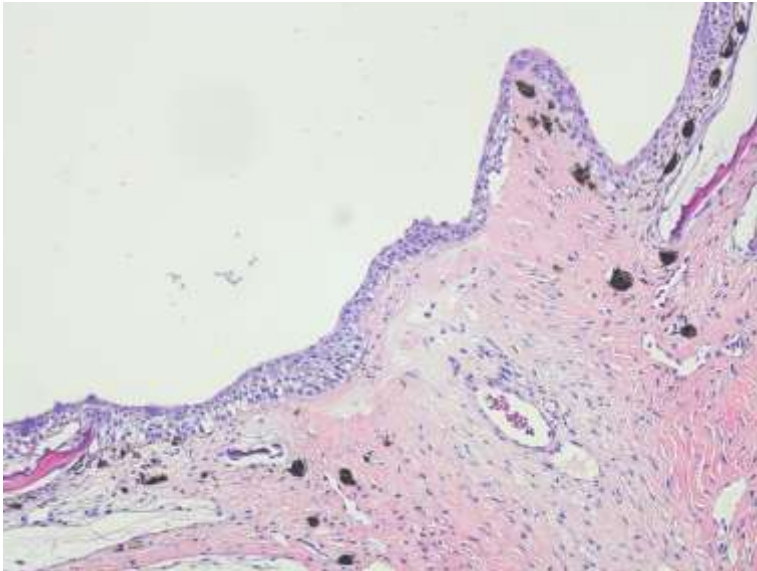


14°C

200x

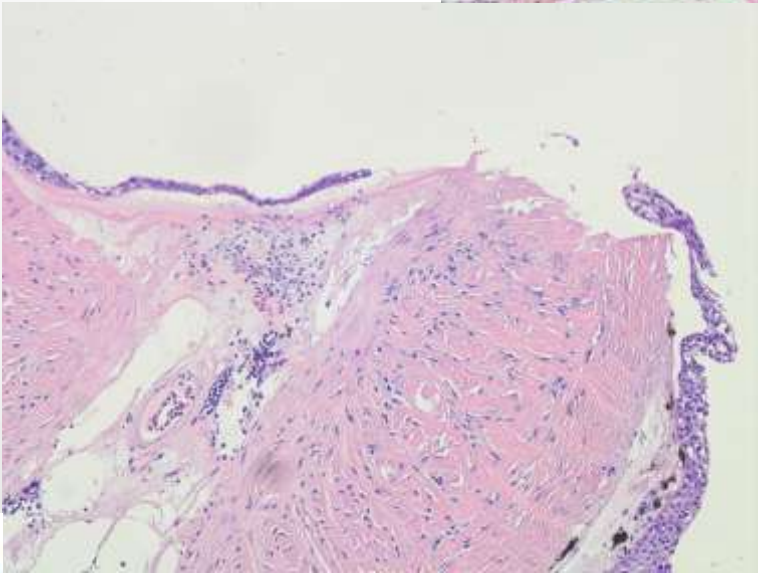


12 h post-clipping:

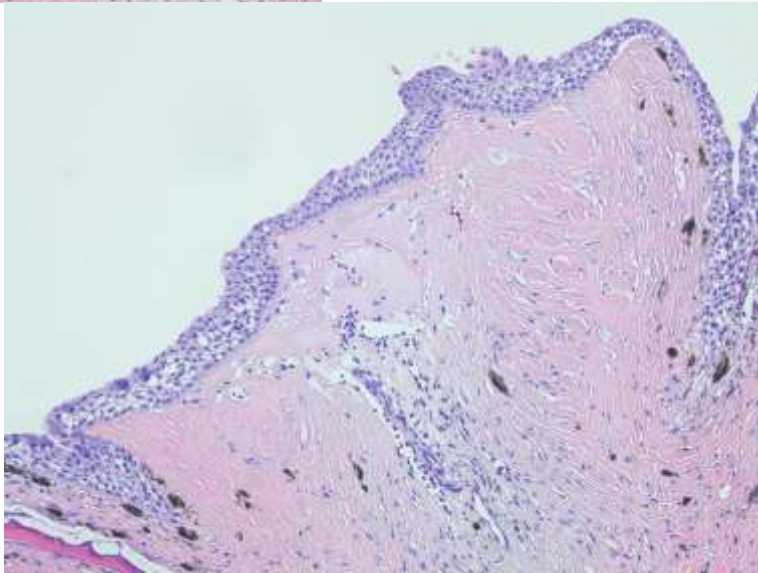


10°C

4°C



14°C

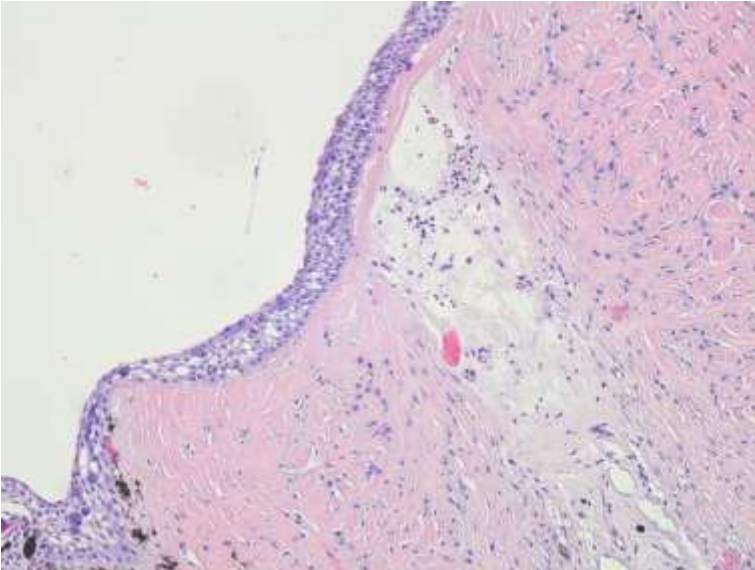


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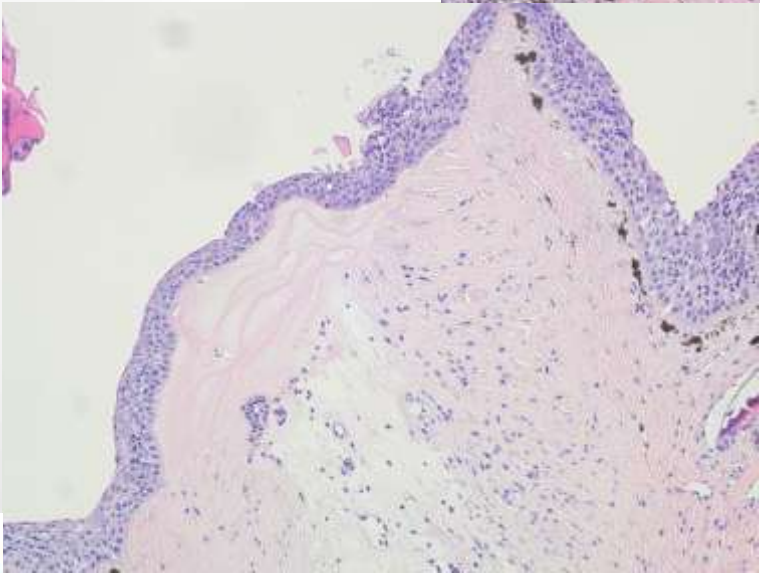


18 h post-clipping:

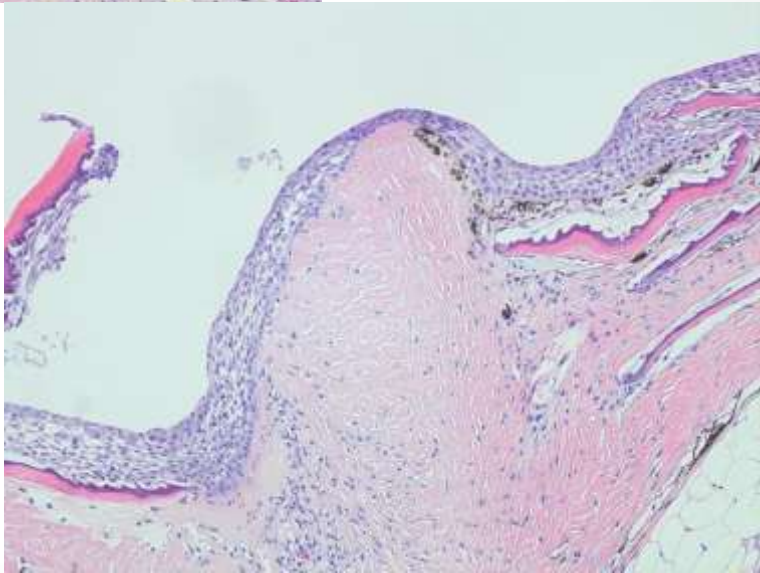


10°C

4°C



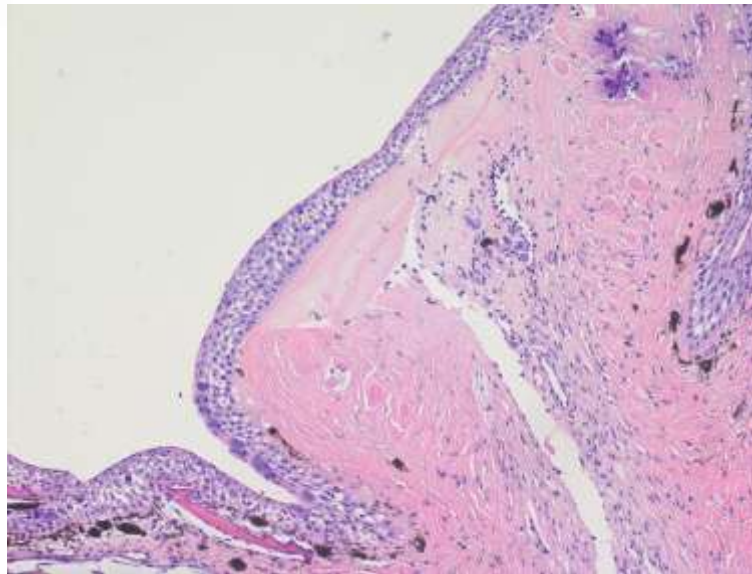
14°C



200x

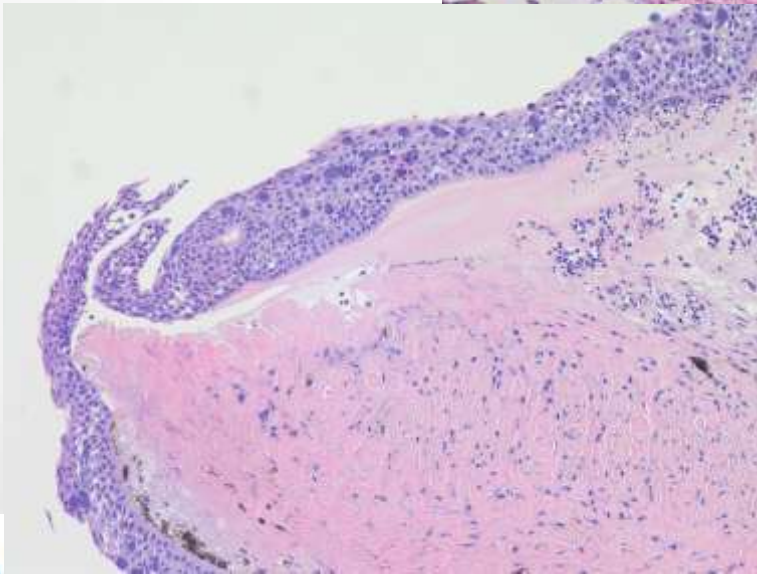


# 24 h post-clipping:

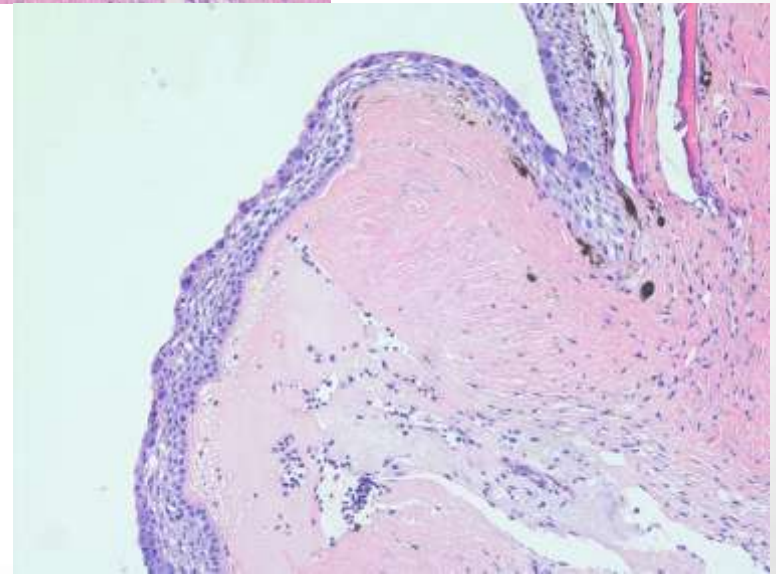


10°C

4°C



14°C

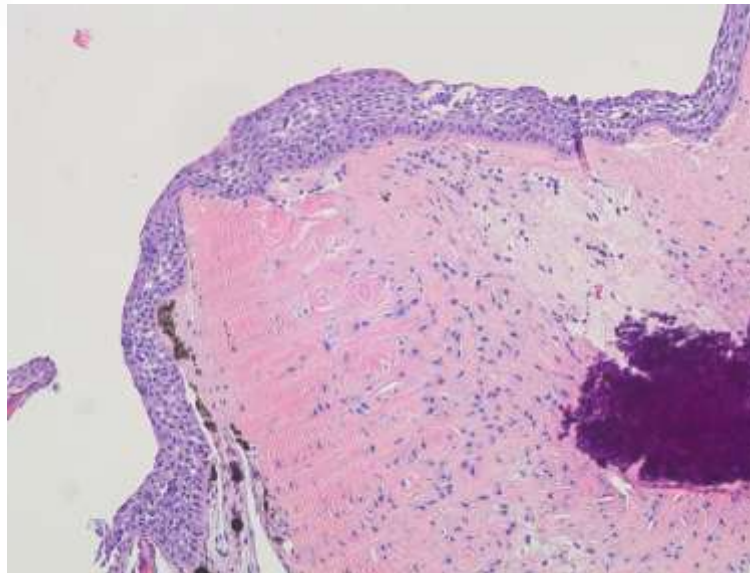


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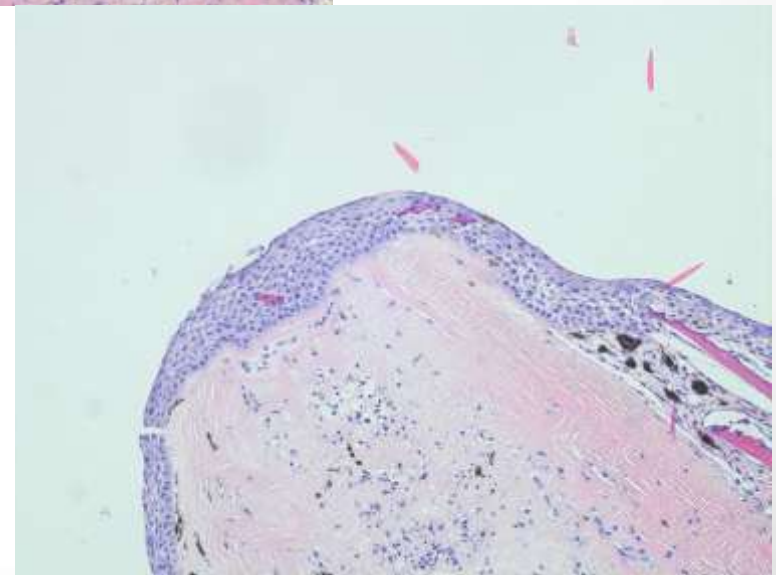
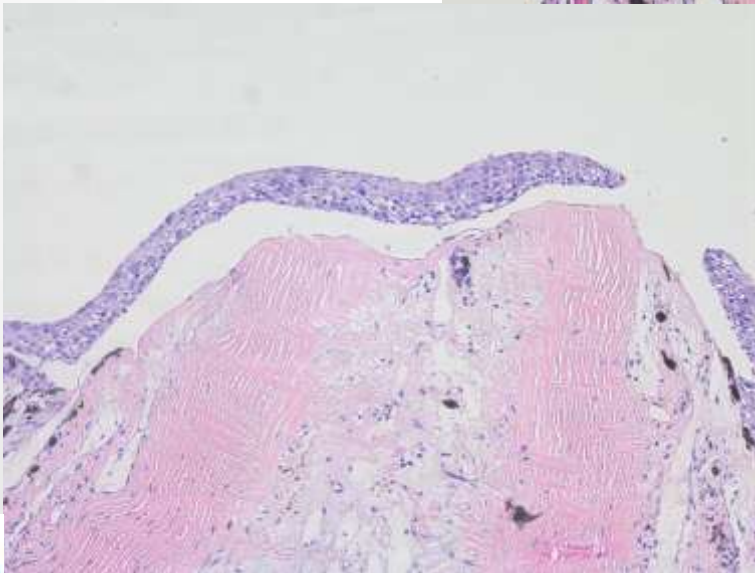


# 30 h post-clipping:



10°C

4°C

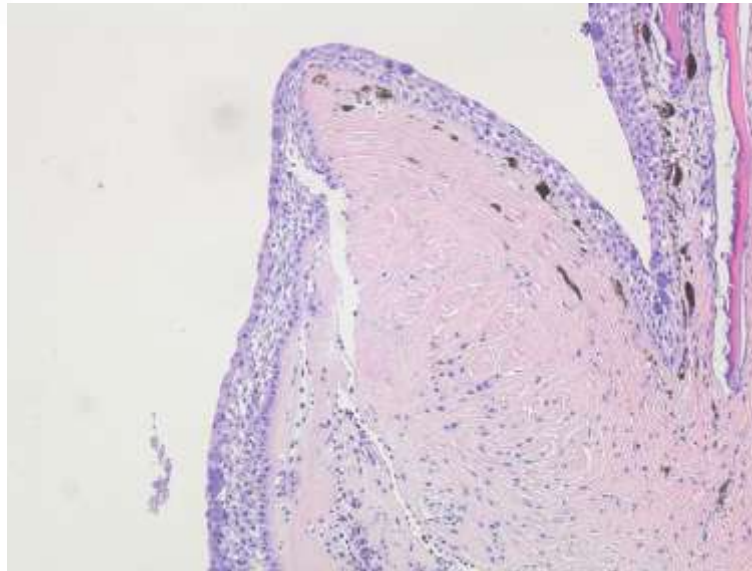


14°C



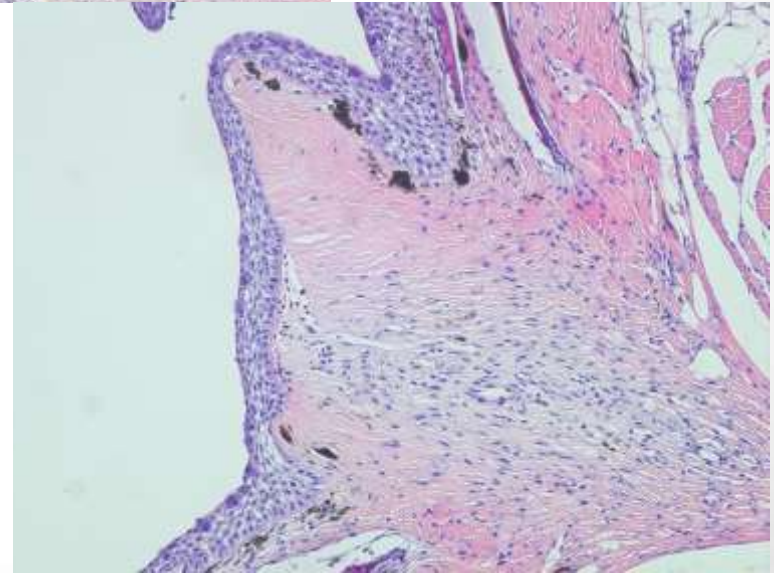
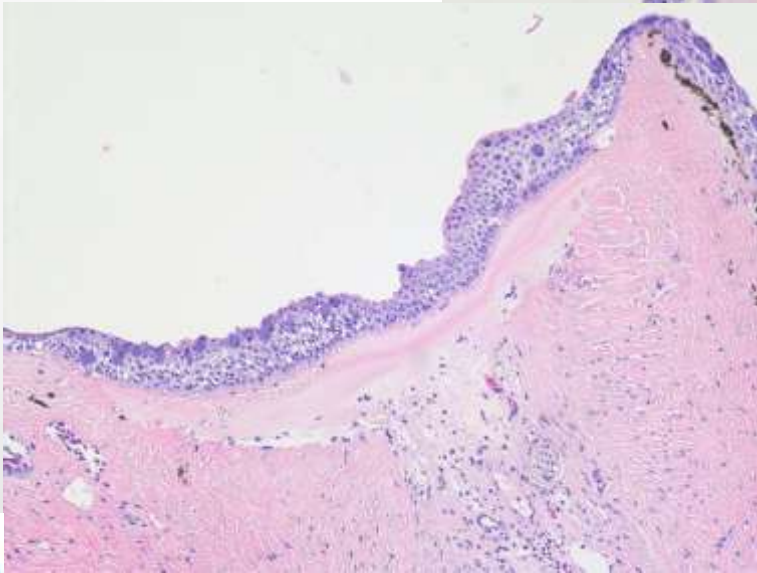
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# 36 h post-clipping:



10°C

4°C

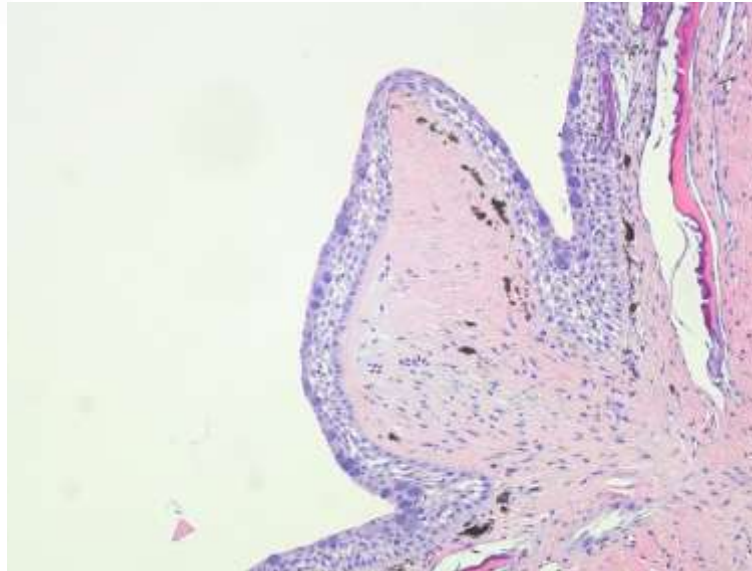


14°C



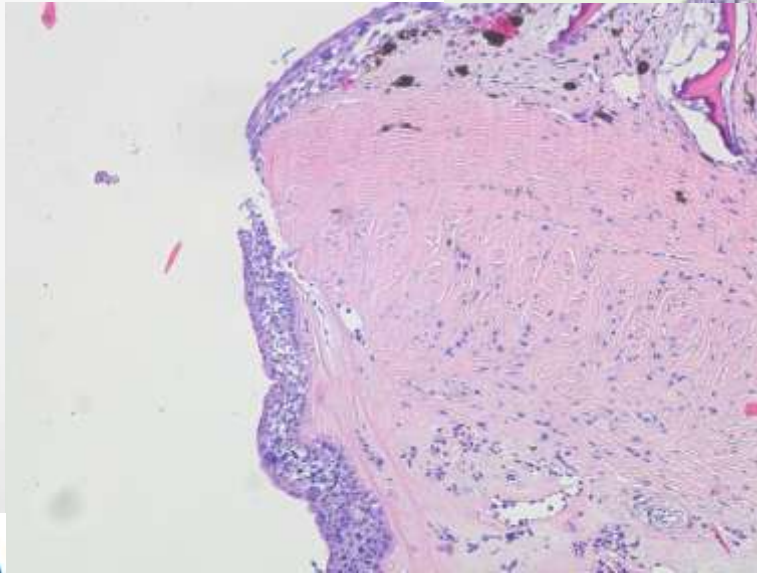
200x

# 48 h post-clipping:

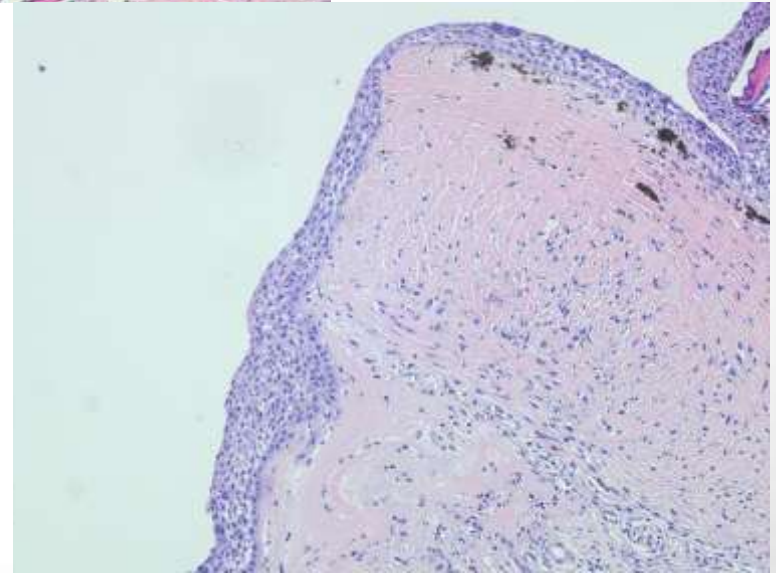


10°C

4°C



14°C

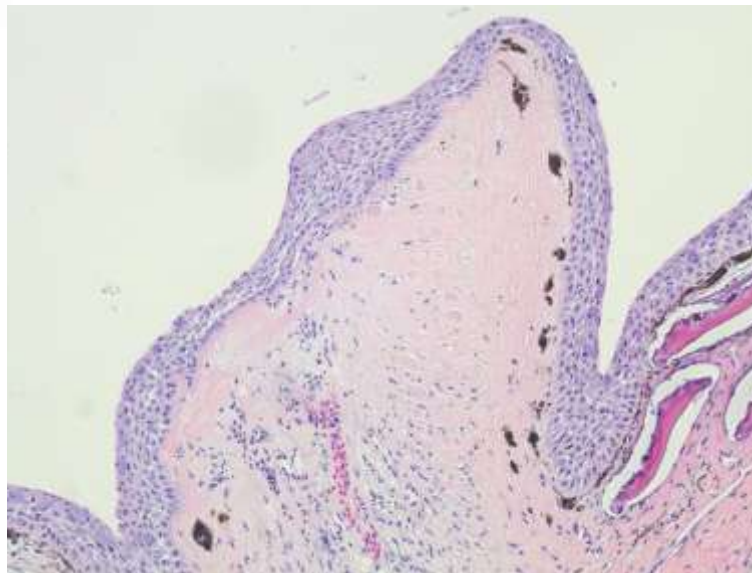


200x



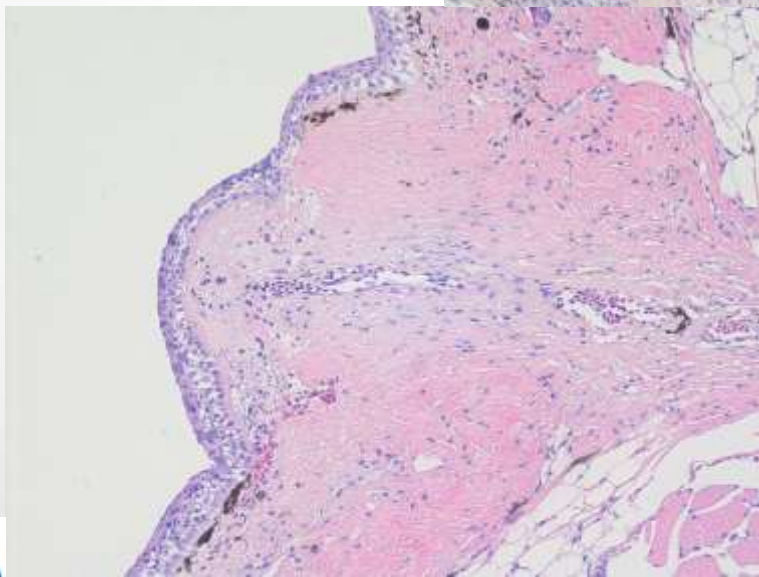


# 60 h post-clipping:

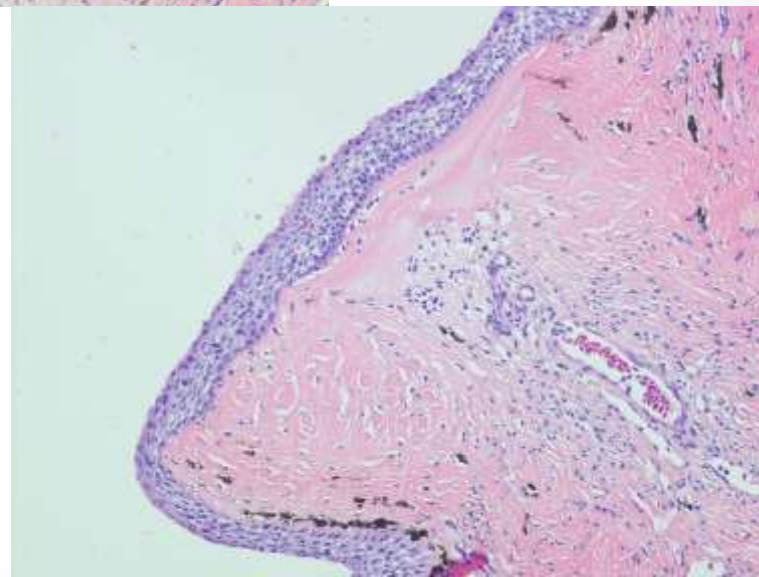


10°C

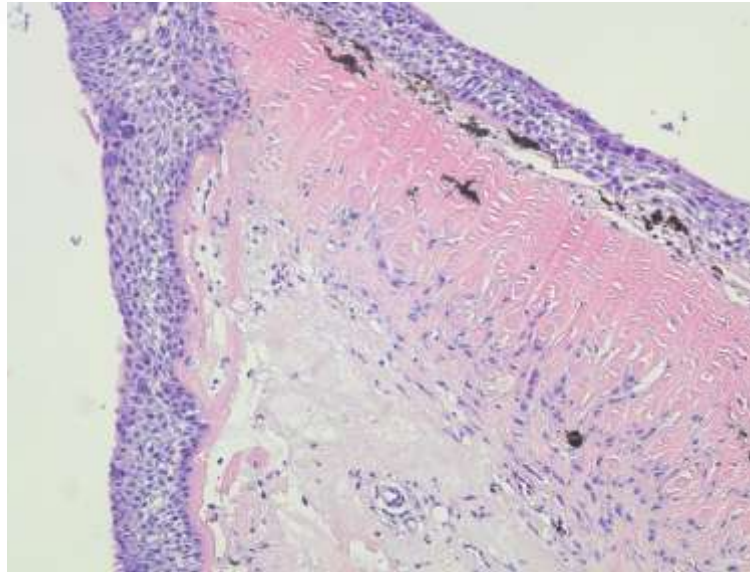
4°C



14°C

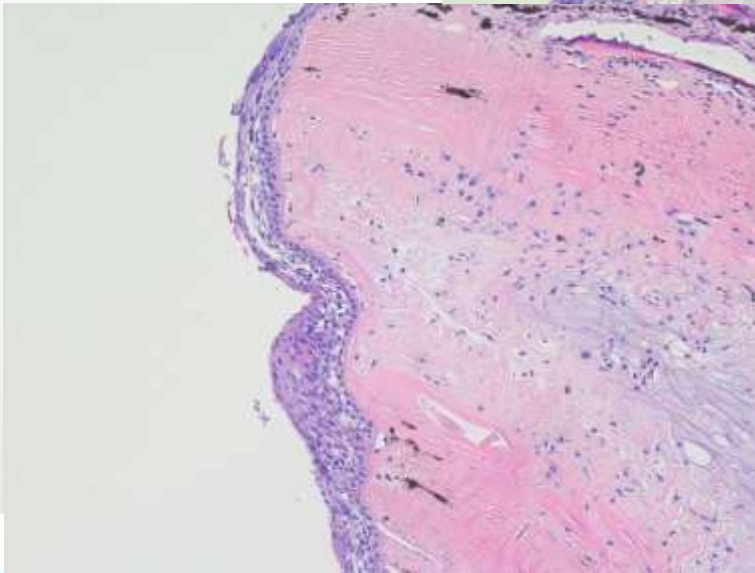


# 72 h post-clipping:

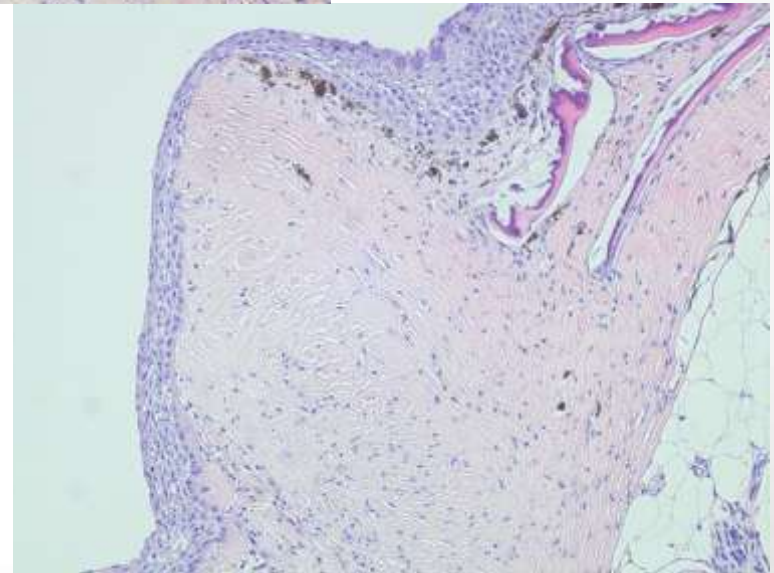


10°C

4°C



14°C



200x

# Conclusions

- We can conclude that water temperature does in fact slow wound closure and healing.



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- Time until wound closure was much shorter than expected
- The scoring system showed uniformity within groups and may be expanded to include additional factors.
- Decreased wound closure rates at lower temperatures.
- Longer exposure of the wound area results in large oedematous areas.
- 72 h post-clipping (all temperature groups):
  - Lack of pigment cells.
  - Low numbers of mucous cells.
  - Uneven thickness of the epidermal layer.
  - Non-uniformity throughout most epidermal and dermal layers.





# Conclusions

- Relatively rapid wound closure results in:
  - Reduced time exposed to possible infective agents.
  - Shortened period of challenge to the osmotic balance.
- Low levels of infiltrative agents may mean that no infectious agents are present,

This suggests that adipose fin clipping is a 'minimal invasive procedure'



# Conclusions

Adipose fin clipping is a good candidate for batch marking:

- Rapid wound closure and healing.
- Fast and reliable application
- Easy visual identification

