Histology Utilization in Biomedical Research
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Role of the histotechnician

- Biomedical
- Research (translation to human models)
- Direct involvement in sample collection and discussion
  - Identification of appropriate histological methods

Review of regenerative medicine

- Three interrelated approaches:
  - Rejuvenation
  - Replacement
  - Regeneration
Stem cell 101

- Stem cell basics
- Embryonic vs. adult stem cells
- Induced pluripotent stem cells

Stem Cells 101

https://www.youtube.com/watch?v=aAGaPH3s74g#action=share

https://www.rndsystems.com/resources/articles/differentiation-potential-induced-pluripotent-stem-cells

R&D Systems, Inc.
Examples in application

- Wound healing
  - Matrix (tissue engineering)
  - Processing and fixation
  - Staining
- Sucrose gradient processing
  - Endogenous fluorescent tags
  - Trace Whisk-lineage tracing
- Whole organ review (mega block)
  - Electron microscopy
  - Resin embedded samples

Examples in application

- Wound healing
  - Matrix (tissue engineering)
  - Processing and fixation
  - Staining

Examples in application

- Sucrose gradient processing
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  - Trace Whisk-lineage tracing
Examples in application

- Whole organ review (mega block)
- Sliding microtome
Examples in application

- Electron microscopy
- Resin embedded samples
- Ultra structure

Current and Future Trends

- Digital pathology
- Immunohistochemistry
  - Layered staining
  - Modern fluorescent staining
  - Infrared/photon
- Mega blocks

Immunohistochemistry staining

- Triple staining/ multiple color fluorescence (current)
  - Alexa Fluor
- Infrared (LICOR) (future)
  - Proton emission
Immunohistochemistry staining
- Triple staining / multiple color fluorescence (current)
  - Alexa Fluor

http://circinterventions.ahajournals.org/content/7/4/560.figures-only

https://www.license.com/bio/applications/tissue_sections/
Immunohistochemistry staining
- Infrared (LI-COR) (future)
- Proton emission

Needs of research
- Whole organ review
- Elimination of image stitching
- Efficiency and cost
- Multiple staining
- Co-localization
- Limited sample resources
- Vibratome
- Neurology
- Versatility
- Troubleshooting

The ultimate goal of regenerative medicine

Healing from Within: The Promise of Regenerative Medicine
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References


