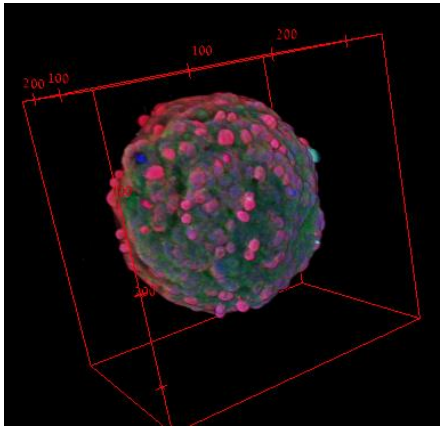
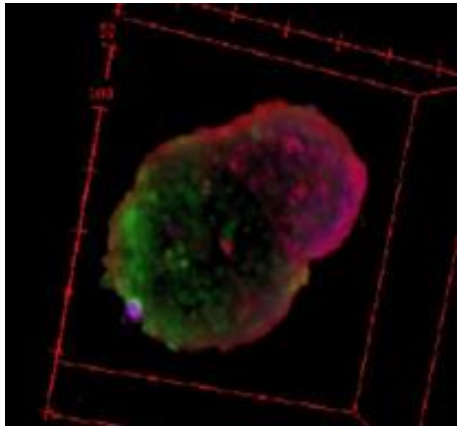
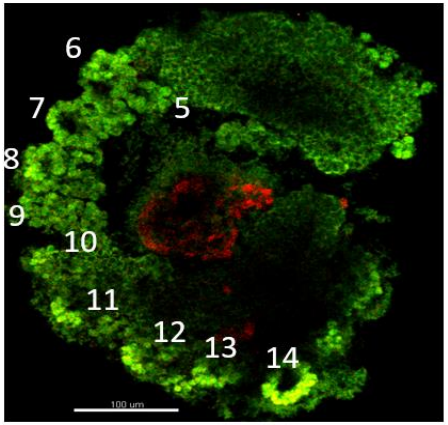
An embryo-like model inspired approach to cultured meat production







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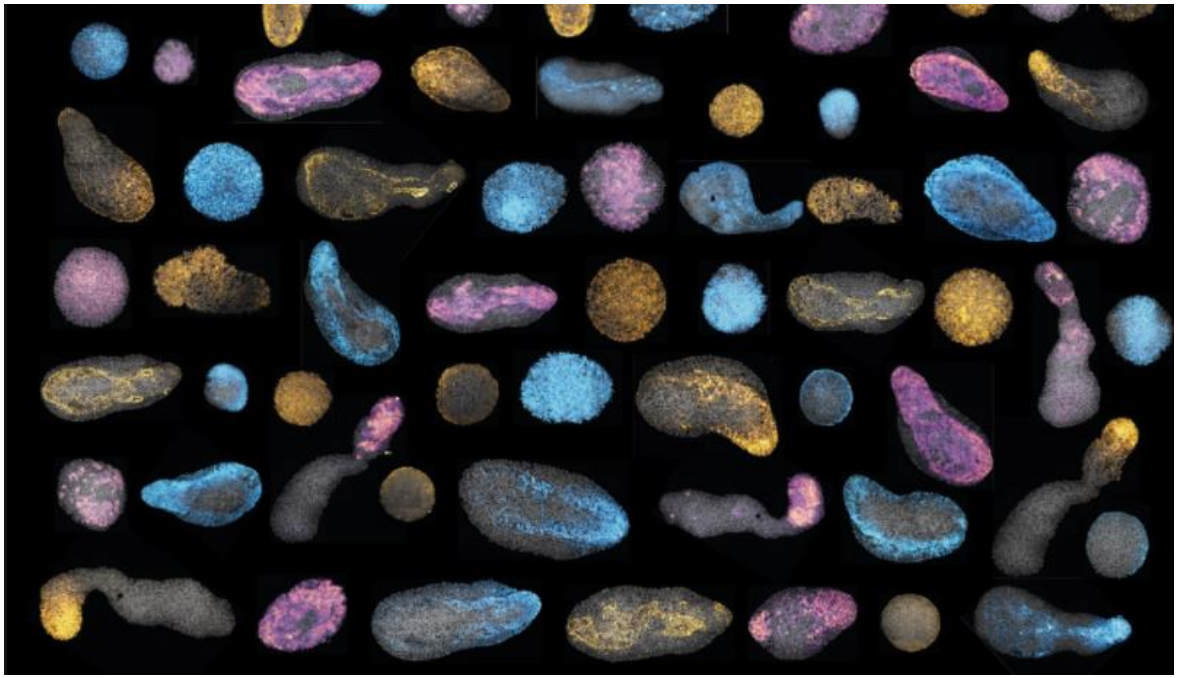
Embryo-like models

- Embryoid bodies
- Gastruloids
- Trunk-like structures

Advantages:
- Controlled parameters
- Accessible
- Allow perturbations

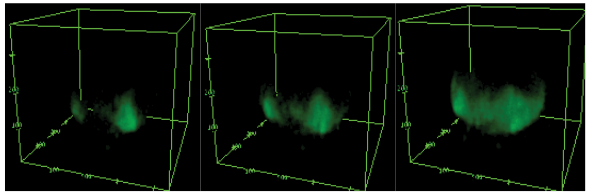
Disadvantages:
- Highly variable
- Are not embryos



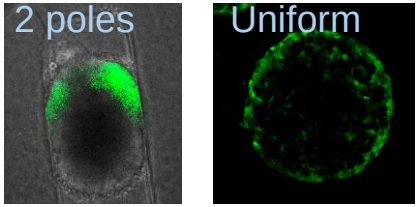
Our lab studies cell fate decision and patterning in embryo-like models

Mesendoerm (Brachyury):

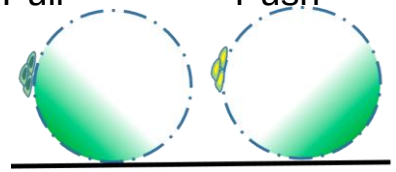
Polar; contact bias



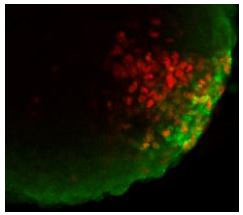
We can manipulate it:



Pull Push

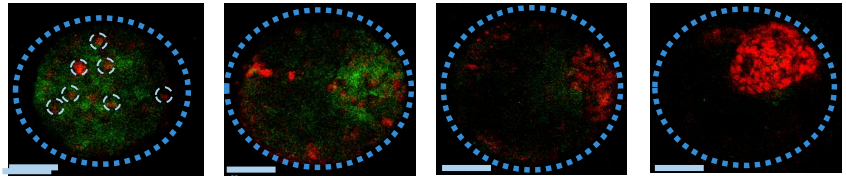


Earlier symmetry breaking (Foxa2)

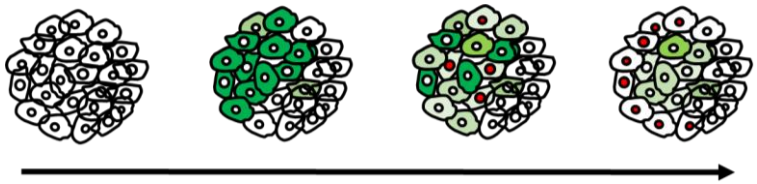


Definitive endoderm (Sox17):

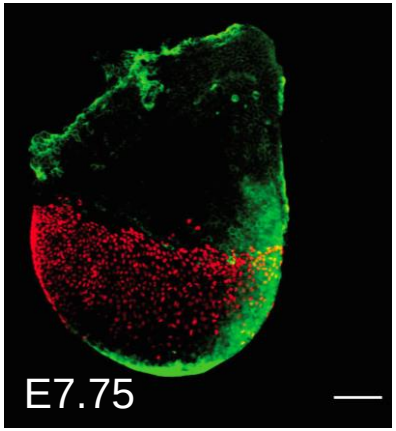
Salt & Pepper ➔ self sorting



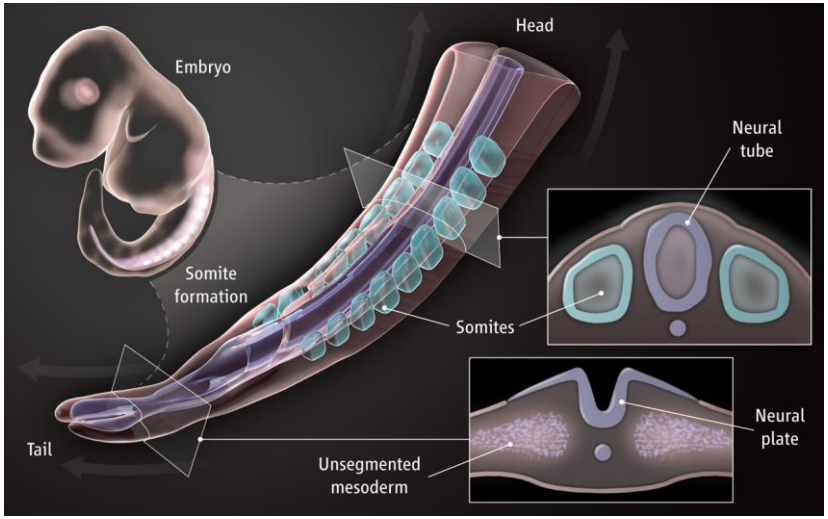
Sox17 ↑ => Late MET

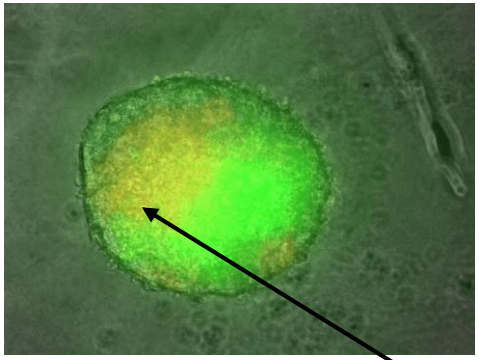


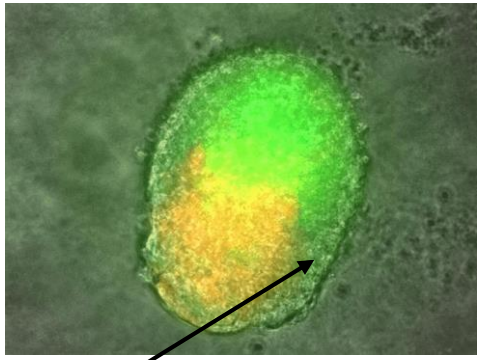
Why?



Getting closer to an embryo: TLS (trunk-like structures)



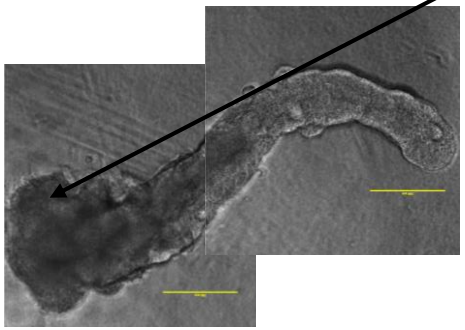


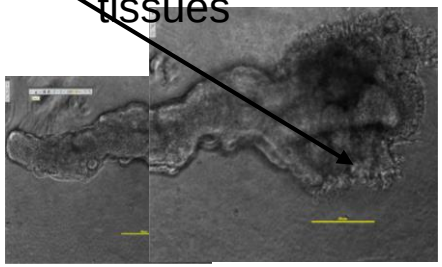


Mesoderm marker
Endoderm marker

Somites

Source for muscles, fat and connective tissues



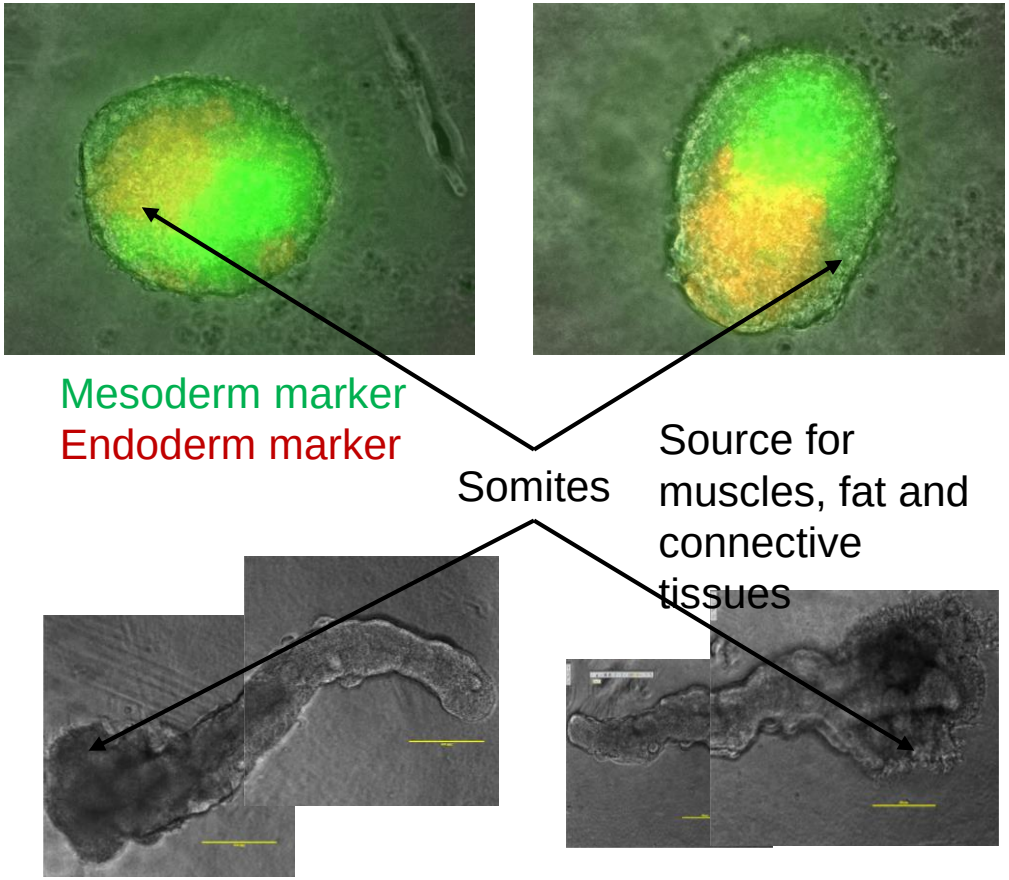


Cultured meat: a developmentally-inspired approach

Aim: push differentiation forward towards mature muscle cells.

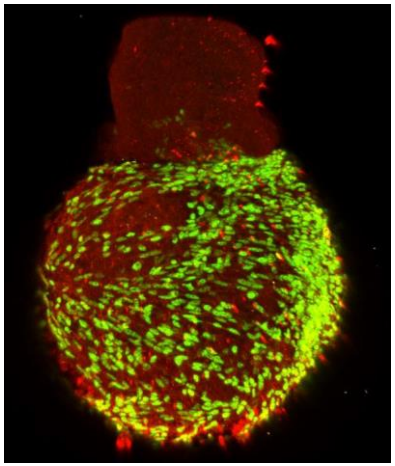
Advantages:

- Scalable
- Carrier-free
- Inexpensive medium
- Natural cell mixture.

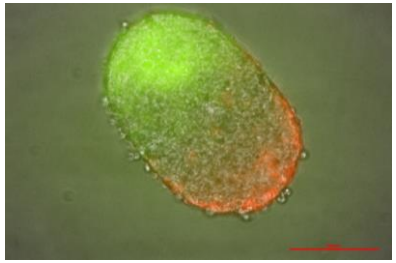


Stages in muscle organoid development

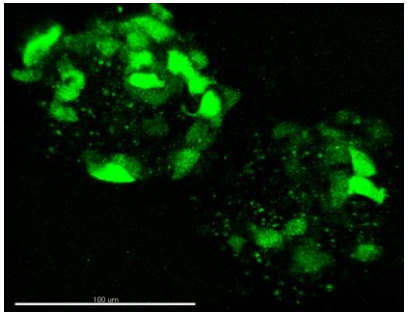
Muscle fibers

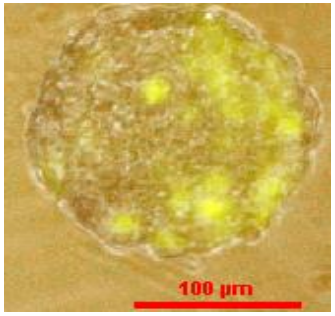


Mesoderm Endoderm

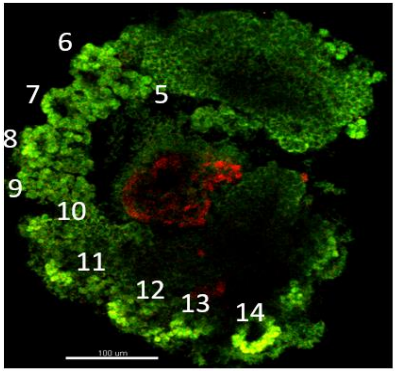


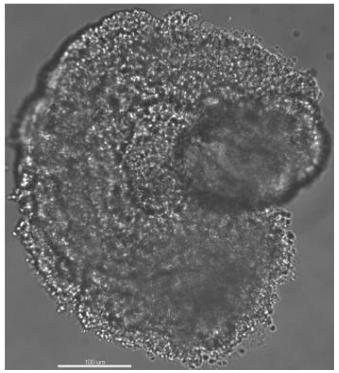
Pre-somitic mesoderm



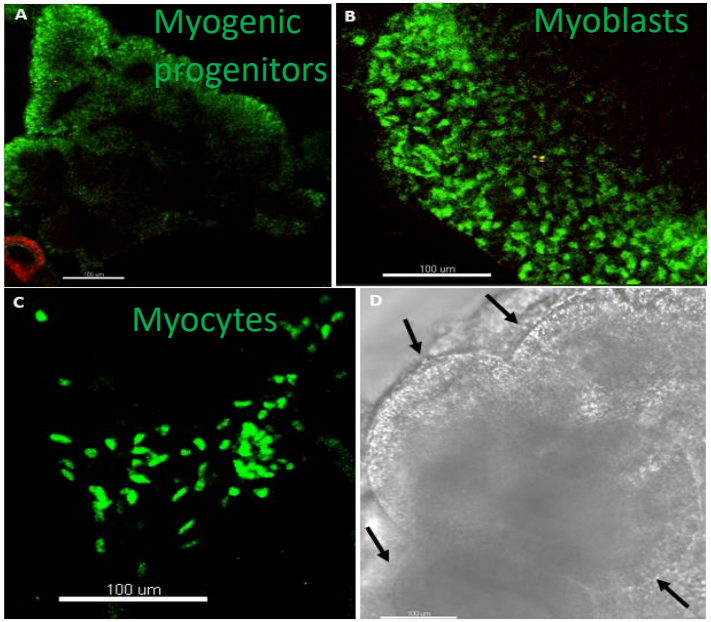


Early Somites

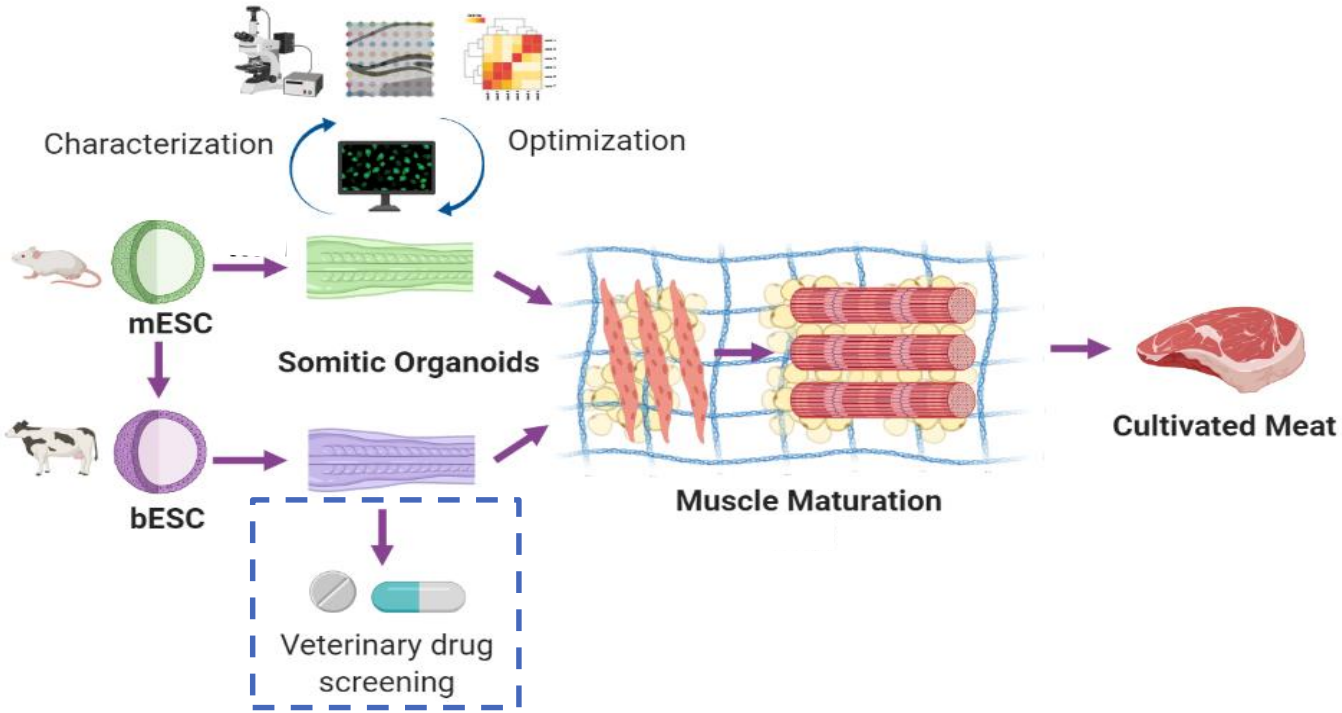




Muscle progenitors



3D muscle organoid – development plan



- Develop in model organism (from mouse ESCs).
- Port to edible species (cow, fish).
  - Muscle development – conserved in evolution.
- Maturation step by embedding.