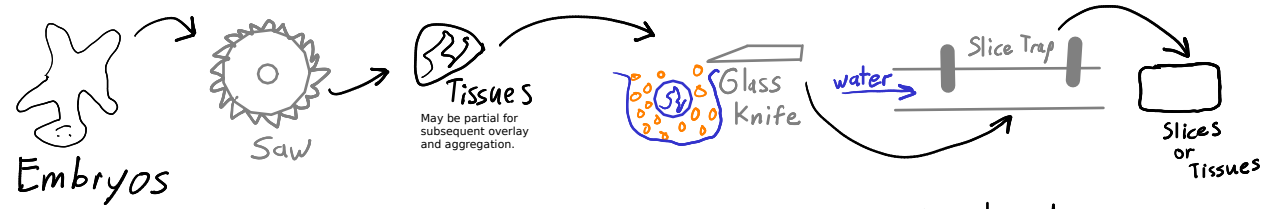
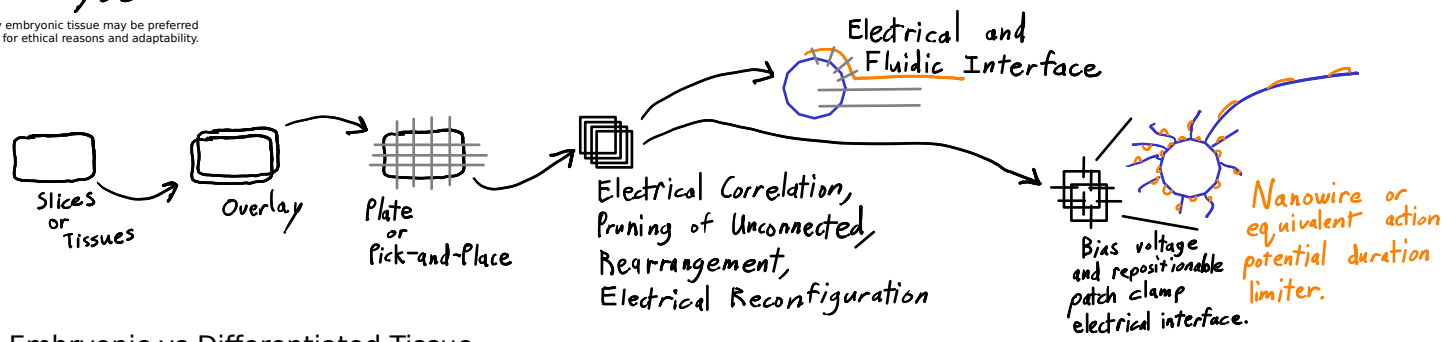
Automated, Fast - Extraction, Slicing, Dicing (of brain tissue)



Early embryonic tissue may be preferred both for ethical reasons and adaptability.

May be partial for subsequent overlay and aggregation.

Each step may be optional, chosen and configured according to desired tissue, shape, and efficiency.



Embryonic vs Differentiated Tissue

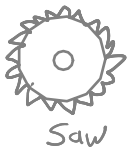
Early embryonic tissue may be better able to establish long efferent axons. Slightly more differentiated embryonic tissue may still be preferable rather than adult tissue - ethically - due desirability of minimizing erasure of memories, regardless of whether tissue is from a species or artificial genome with any capacity for sentience.

Obtaining tissue from highly specific locations or extents of differentation, and cataloging these samples properly, may allow automatic iteration through topographic map origins, efferent axons, and destinations, prior to electrical reconfiguration. Such may be particularly helpful if any sensory precepts correspond to specific biological molecules (ie. if not merely the structure of information input and processing but proteins or shapes of proteins account for such distinctively different quallia as sight, sound, touch, taste, smell, etc).

In any case, avoiding too much electrical reconfiguration in favor of preserving molecularly determined connectome to the extent possible, may be much safer. Nevertheless, beware synsthesia, loss of resolution, or at least longer delays in synaptic pruning, from inaccurate blending or geometric assignment of cells from different topographic map positions.

Extraction Saw

Whole brains are routinely extracted. Nevertheless, if some brain tissue is desired that is not so available, slicing three brains will allow extraction of tissue from all parts of brain from surrounding skull, regardless of tissue ablated by thickness of saw. Arguably inefficient and crude, but effective.



Slicing Knife

Glass (or diamond) knife takes micrometers thin tissue slices with negligible or <50% ablation.

If tissue is not sufficiently rigid, or is not easily anchored to a surface, fast light-cured epoxy resin may be added around tissue or before each slice.

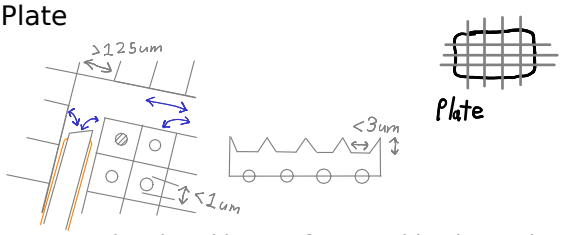
Surrounded by rigid cured hardened resin, removed from mold as a composite workpiece, glass knife may slice through precisely. Resin form an expendable slicing jig as such.

Overlay (mechanical)

Relative positions of tissue must be tracked if possible, especially if sensory precepts may result from biological molecules unique to specific topographic maps.

Blended tissue (if unavoidable) should if possible only mix tissue from adjacent locations.

Plate



Neurons may be placed in a surface-machined or resin 3D printed grid container scaffold, with drilled holes for open circulatory nourishment, accessible corridors for needles, edge slots between container walls for axons, resembling a waffle.

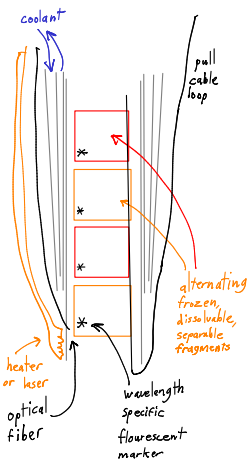
Tops of containers are closed by another layer of such scaffold plate, a stack of waffles. Electrical interface may be the scaffold substrate itself, or added after.

Gaps between containers must prevent multiplying cells from spreading. Bacteria (other than mitochondria) may be treated by antibiotics or similar.

Pick-and-Place (bioprinting)

Tissue fragments may be extracted from tissue, then deposited within other tissue or at specific locations, assembling geometric arrangements of cells, or possibly fragments of cells. In the most extreme case, fragments of axons may be placed, experimentally, effectively grafting into arbitrary tissue.

Slicing or boring through tissue may pick tissue fragments. A conveyor belt with attachable/detachable fragments may place tissue fragments without the disruptive collateral damage of repeated insertions through the workpiece. Bioprinting, by a pick tool, a place tool - assembly by 'pick-and-place' tool.

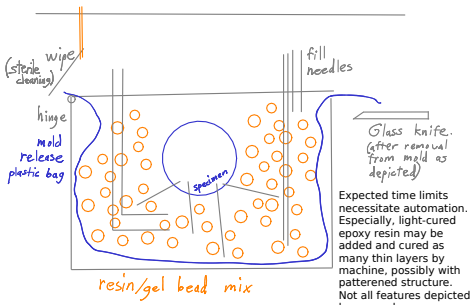


Bulk Tissue - Framing, Nourishment, Interfacing

Framing

Coagulation and mechanical stabilization of tissue surfaces by resin 3D printing may maintain correct fluid flow or prevent tearing as appropriate in many situations, both while slicing tissue, or if tissue is never sliced. Such filler may also include quick-set epoxy, cyanoacrylate, or merely shredded materials such as micrometer gelatin cubes/spheres.

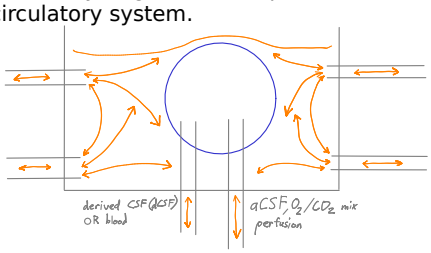
Using sub-mm resin 3D printing, instead of curing all resin around tissue, may reduce tissue exposure to near-UV curing light, and may ensure internal structures (ie. blood vessels) are not inappropriately filled and hardened.

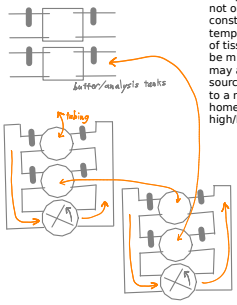


Expected time limits necessitate automation. Especially, light-cured epoxy resin may be added and cured as many thin layers by machine, possibly with patterened structure. Not all features depicted here may be necessary.

Nourishment, Interfacing

Precise control of blood/CSF flow rates at specific tissue locations may be necessary, regardless of open or closed circulatory system.

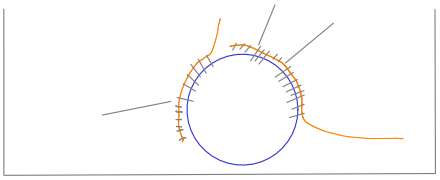




Multiple buffer tanks may be required not only to change fluid (ie. aCSF) constituents but also to rapidly change temperature, especially during transfer of tissue (when time and trauma must be minimized). Mutliple buffer tanks may also be helpful with natural fluid sources (ie. dCSF) to more rapidly shift to a mixture usual of a different homeostasis condition (eg. day/night, high/low metabolism).

Appropriately sterile tubing supplies may have a narrow selection of components, and turbulence minimization may be required.

Rapidly and gently filling, draining, and recirculating nourishment fluid may require some clever arrangements of appropriate commodity tubing and pumps.



Instead of slicing and/or dicing, neural interface (ie. 'neuralBits') may be added to neural tissue as extracted (eg. 'whole brain'). Obviously should be arranged before embedding in hardened resin.

Whole Organism - Natural dCSF, Homeostasis Sensation, Harnessing

Some specifc homeostasis sensations (eg. breathing, soporific digestion) reinforce important motivations (eg. exploration risk, competitve energy management, competitive short-term planning), and may be desirable as such. Biological organisms already inherently having such homeostasis management, reported to the embodied person, may be a feature, instead of a defect.

Combining a biological organism with disembodied brain tissue has several advantages, although emulation of homeostasis sensations for disembodied brain tissue by software modeling is possible and may also be economical in some situations.
*) Economic efficiency. By combining ion channels with membranes, may be able to more economically recycle such fluid constituents than synthetic industry (which often disposes of salts open-loop after obtaining from raw minerals).
*) Inherent homeostasis sensation, at least when reasonably healthy.
*) Obviates possible significant technological issues (eg. possible complexity of blood constituents if aCSF may be insufficient).
*) May combine whole brain of organism (original connectome between topographic maps) with a more reconfigurable nerveDish simultaneously (eg. to emulate at least most of a previously human connectome and synaptic weights).