




NAME: Muscle tissue bio reactor 

DATE: May 15, 2026 2:38 PM


DESCRIPTION OF TECHNOLOGY
 A Muscle tissue bio reactor in which implantable intercostal muscles can grow. This is done by stimulating the muscle with electrical and mechanical stimulation. First the muscle cells are mixed in with a hydrogel. This hydrogel is then stored inside a chamber. This chamber is then heated. The cells are stimulated and the motors start pushing and rotating. Eventually the muscle cells will attach themselves to the...

HUMAN VALUES 


With this technology, medical officers will allow to help people who have lost function of a muscle and have this be restored in a way that won't require immune suppressants. This will influence patient's: (bodily) autonomy, self perception, feelings of helplessness, ability to integrate with society, ability to function in the workforce and feelings of security. It could have a negative effect on donors who *want* to donate a muscle of theirs.

TRANSPARENCY 


The users will receive a detailed guide on how the cells should be inserted into the machine and how the muscle should be removed from the chamber. Without this, the machine can be destroyed. Stakeholders will be referred to stem cell culturing fluid suppliers. Investors, medical regulation services and hospitals will receive detailed instructions along with preliminary results. Surgical transplantation method for grown muscles isn't known.

IMPACT ON SOCIETY 


This technology wants to create an opportunity for hospitals to grown artificial muscle implants from muscle cells, with immune data, directly sampled from a patient. When people lose a muscle/muscular function, they can either get a prosthesis or look for a donor. Movement of a prosthetic is clunky. Donors require genetic matching and immune suppressing drugs to prevent rejection. These muscles will have the DNA of a patient so they won't be rejected.

STAKEHOLDERS 


- Laboratory Assistants
- Doctors
- Patients
- Hospitals
- Medical Regulation Services
- Dutch Board of Human Medical Experimentation
- Surgeons
- Investors
- Registered donors...

SUSTAINABILITY 


The proof of concept is made on a budget. It will have an Arduino, simple motors, minimal sensors, no environment regulation unit, a budget pump and low run times. With the current budget and project scope, the team can not say with certainty what the direct and indirect energy use of the ideal and complete tissue bioreactor will be. This will have to be reviewed by a team with a larger budget.

HATEFUL AND CRIMINAL ACTORS 


People can include toxins/viruses/foreign objects into the muscle that can deteriorate the health of a patient. People can create cell samples with patient's DNA data & leave this on crime scenes. People can lie about failed samples, falsify test data and have a bad sample be implanted into a human host.

DATA 


The team that makes the proof of concept does not have the budget to buy the chemicals required for muscle cultivation, nor do they have access to the equipment required to work with actual stem cells. The team also cannot manufacture a component that is able to keep the culturing environment in check. Thus it can't be verified that the muscles are able to stay alive. Thus all data regarding the cells is based on hypotheses that need to be verified by biomedical engineers.

FUTURE 

There could be a decreased need for donors. Patients could gain easier access to muscle replacements. Recovery plans can become less invasive due to the reduced need for immune suppressing drugs. There will be ethical concerns in religious communities such as Jehovah's Witnesses, which can cause people to create an alternative technology that won't require human or animal based cells.

PRIVACY 

Yes, this technology registers one's genetic data. It requires doctors to extract stem cells + immune data and Laboratory Assistants to cultivate these cells into a petri dish and mix this with a hydrogel. It also requires the operators to know patient data, as they'll have to know which muscle has to be replaced.


INCLUSIVITY 

It is assumed that hospitals actually have the space for this equipment and that they can include these machines into their energy grid. It is also assumed that this project will be a better alternative than pig grown human muscles as it does not require the slaughter of an animal. There's a risk for a confirmation bias due to the limited knowledge on muscle cell culturing. Muscle cell data also can't be verified.

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HUMAN VALUES 

How is the identity of the (intended) users affected by the technology?

To help you answer this question think about sub questions like:

- If two friends use your product, how could it enhance or detract from their relationship?
- Does your product create new ways for people to interact?...

TRANSPARENCY 

Is it explained to the users/stakeholders how the technology works and how the business model works?

- Is it easy for users to find out how the technology works?
- Can a user understand or find out why your technology behaves in a certain way?
- Are the goals explained?
- Is the idea of the technology explained?
- Is the technology company transparent about the way their...

IMPACT ON SOCIETY 

What is exactly the problem? Is it really a problem? Are you sure?

Can you exactly define what the challenge is? What problem (what 'pain') does this technology want to solve? Can you make a clear definition of the problem? What 'pain' does this technology want to ease? Whose pain? Is it really a problem? For who? Will solving the problem make the world better? Are you sure? The problem definition will help you to determine...

STAKEHOLDERS 

Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by...

When thinking about the stakeholders, the most obvious one are of course the intended users, so start there. Next, list the stakeholders that are directly affected. Listing the users and directly affected stakeholders also gives an impression of the intended context of the technology.

...

SUSTAINABILITY 

In what way is the direct and indirect energy use of this technology taken into account?

One of the most prominent impacts on sustainability is energy efficiency. Consider what service you want this technology to provide and how this could be achieved with a minimal use of energy. Are improvements possible?

HATEFUL AND CRIMINAL ACTORS 

In which way can the technology be used to break the law or avoid the consequences of breaking the law?

Can you imagine ways that the technology can or will be used to break the law? Think about invading someone's privacy. Spying. Hurting people. Harassment. Steal things. Fraud/identity theft and so on. Or will people use the technology to avoid facing the consequences of breaking the law (using trackers to evade speed radars or using bitcoins to launder...)

DATA 

Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into...

There are fundamental issues with data. For example:

- Data is always subjective;
- Data collections are never complete;
- Correlation and causation are tricky concepts;
- Data collections are often biased;...

FUTURE 

What could possibly happen with this technology in the future?

Discuss this quickly and note your first thoughts here. Think about what happens when 100 million people use your product. How could communities, habits and norms change?

PRIVACY 

Does the technology register personal data? If yes, what personal data?

If this technology registers personal data you have to be aware of privacy legislation and the concept of privacy. Think hard about this question. Remember: personal data can be interpreted in a broad way. Maybe this technology does not collect personal data, but can be used to assemble personal data. If the technology collects special personal data (like...

INCLUSIVITY 

Does this technology have a built-in bias?

Do a brainstorm. Can you find a built-in bias in this technology? Maybe because of the way the data was collected, either by personal bias, historical bias, political bias or a lack of diversity in the people responsible for the design of the technology? How do you know this is not the case? Be critical. Be aware of your own biases....

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