Ethics: Comments on „iGem project Tel-Hai-Migal_Israel iGem 2019“

Preliminary considerations

In public discourse, there are widespread reservations concerning genetic engineering as such. While these reservations are directed against all kinds of genetic modifications, special fields of application like genetically modified crops are viewed more critically than e.g. applications in medicine. In the field of medicine, the hope for cure of diseases often outweighs fears stemming from *intuitions*[i] of non-experts – as long as e.g. basic religious beliefs of major societal groups (*moral positivism*) are not touched, as it is the case with stem cell research.

In the field of medicine cancer is a special case because (as stated in the project description) it is the leading cause of death globally. It is considered the scourge of humanity and sometimes even anthropomorphised as an evil enemy. Thus, means to overcome this enemy tend to provoke less suspicion, fear and risk-averse reactions than in other fields of application.

Ethical aspects

As mentioned above, providing a tool to improve treatment of cancer can be considered ‘good’. Additionally, the project itself wants to improve/build upon an already existing approach, which is promising but risky, to make it less risky (*safety*). From the perspective of the patients, this clearly follows their best interest to design treatments that bring as little side effects/potential harm as possible – both on a physical as well as on a mental level, as the project description states.

From a *utilitarian* point of view, the question is whether the (modification of the existing) treatment will in the end bring more good than harm. The utilitarian asks whether the treatment will bring the most benefits for the greatest number of those affected. Clearly, it is only possible to answer this question if the research is done, the efficacy is proven, and possible risks have been made calculable. Follow up questions will be what degree of efficacy is enough and what amount of risk is acceptable in specific circumstances (and even a high risk might be acceptable given the fact that cancer often is lethal). Given that the treatment works in the way described and the risks are acceptable, the utilitarian should consider it ethical. Questions of consent (of the patient) would only arise if e.g. parents would have to decide whether allowing such a therapy for their child. But given the beneficial effects of the therapy, given that it is not preventive (like vaccination) but curative, this is not a major ethical problem here. Difficulties for a utilitarian evaluation of the project’s aim would arise, if the project works, but with significantly less efficiency than the less safe, riskier approach. This would require thorough considerations of risks and benefits in individual situations.

For the utilitarian, the question whether genetically engineering human beings as such will benefit society (as a whole) is not easy to answer, maybe not answerable at all: What period of time are we talking about – 10 years or a hundred? Is there enough Data to make such a ‘big’ question ‘calculable’ – no. What is the meaning of ‘good’, ‘happiness’ or ‘harm’ on such a scale?

From an *intuitionist* or *emotive* perspective (especially from non-experts) the ethical dimensions of the project are not subject to the rational discourse common in ethics nowadays. Depending on their life and background (or experiences with cancer treatment) people will have different intuitions. A task for the scientists involved in any project is to be willing to explain what they are doing and why to laypeople, even in a rather hostile societal environment (stakeholder involvement).

A special case is the perspective from *moral positivism*, advocated by people who belief in a set of laws or commandments that (in their view) do not need justification. If e.g. a person says that a) There is a God, b) This God created humans in his image, and that thus c) genetically engineering humans is a 'sin', this position is not subject to rational discourse. To argue that there is no god or not the one they belief in is not ethics. To say that c) is wrong and that God would want humans to help this way is not an ethical but a theological argument. Still, an ethicist could try to argue that this person is not allowed to impose his or her views on other people (by trying to influence legislation etc.)

For the *deontological* ethicist, the possible beneficial results of the project are not important, only the nature of the action itself. With Kant's *categorical imperative* in mind one could argue that the aim of the project is to improve treatment of cancer (in the field of immunology) concerning effectiveness and side effects – therefore the 'action' is good.

All in all, the "project inspiration" makes a good case for science taking into account not only effectiveness of treatment, but also psychological aspects of patients and effects on their families/social environment. A large part of ethical considerations concerning the project also applies to other genetic engineering projects.

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[i] This text uses ethical terminology from the iGem Ethics Handbook prepared by the Team Technion in 2017 (http://2017.igem.org/wiki/images/0/07/T--TECHNION-ISRAEL--ethicshandbook.pdf) to make it possible for iGEMmers to look up concepts. Terms from the handbook are italicised here.