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"Who could deny it to them?" Analysing Artificial Amnion and Placenta Technology as a selective reproductive technology

Zusammenfassung

„Wer könnte ihnen das verwehren?" Artifizielle Amnion- und Plazenta-Technologie als selektive Reproduktionstechnologie

Die Artifizielle Amnion- und Plazenta-Technologie (AAPT) soll extrem Frühgeborenen in einer Umgebung außerhalb des Körpers das Überleben sichern. Diese Technologie verändert auch das Verständnis fetaler Gesundheit, indem sie neue medizinisch-technische Möglichkeiten zu ihrer Optimierung bietet. Dadurch ändern sich Kriterien für Abweichungen von Gesundheit und folglich Selektionskriterien. Zudem gewinnen liberal eugenische Vorstellungen an Einfluss, die selektive Reproduktionstechnologien aus moralphilosophischer Sicht zu legitimieren versuchen. Dieser Artikel untersucht und kritisiert methodologische Ansätze der liberalen Eugenik und erörtert den Zusammenhang selektiver Praktiken und der Entwicklung von AAPT. Dabei wird aufgezeigt, welchen Einfluss Technologien auf die Entwicklung von Bedürfnissen haben und welche ethisch-politischen Spannungsfelder mögliche Therapiebegrenzungen, Rechte von schwangeren Personen und Ausweitungen selektiver Praktiken mittels AAPT mit sich bringen. Um zu diskutieren, inwiefern die AAPT selektive und ableistische Praktiken normalisieren und individualisieren könnte, ist es notwendig, die Technologie auch als selektive Reproduktionstechnologie zu analysieren.

Schlüsselwörter
Ektogenese/Ektogestation, disability futures, Selektive Reproduktionstechnologien, Reproduktive Gerechtigkeit, disability justice

Summary

Artificial Amnion and Placenta Technology (AAPT) is designed to ensure the survival of extremely premature infants in an environment outside the body. This technology will change our understanding of fetal health by introducing new medical and technical means of optimising it. As a result, the criteria for identifying health deviations – and consequently, for selection decisions – are also being redefined. At the same time, liberal eugenic ideas are gaining influence, seeking to legitimise selective reproductive technologies from a moral-philosophical perspective. This article examines and critiques methodological approaches to liberal eugenics and discusses the link between selective practices and AAPT development. It highlights the influence of technologies on the development of needs and the ethical and political tensions that arise from possible limitations on therapy, the rights of pregnant people, and the expansion of selective practices through AAPT development. In order to discuss the extent to which AAPT could normalise and individualise selective and ableist practices, it is necessary to analyse the technology as a selective reproductive technology.

Keywords
ectogenesis/ectogestation, disability futures, selective reproductive technologies, reproductive justice, disability justice

1 Introduction

Several international biomedical research teams are currently working on a technology that mimics the environment and conditions of uterus and placenta. This is known as Artificial Amniotic and Placental Technology (AAPT). AAPT research is aimed at providing an alternative treatment for extreme prematurity, i.e. births before 28 weeks' gestation (Partridge et al. 2017). The technical development is advanced to such a degree that the first application for approval of clinical trials in human fetuses[1] and pregnant individuals has been submitted to the U.S. Food and Drug Administration (FDA) in September 2023, but was not approved. The expert committee convened for this purpose calls for further non-clinical and experimental studies that will provide more adequate translational predictions and ensure greater minimisation of risk to the fetus (U.S. Food and Drug Administration 2023).

The headline quote "Who could deny it to them?" is from a journalistic article on the subject of "Are artificial wombs the future?". The use of this technology is still perceived as "extreme", but in the interests of a "healthy future" and as an option for extremely premature births to spare them a future with "illness and disability" (Kleemann 2020), the answer to the question of who could deny parents the choice of this approach is clear. Of course, no one would voluntarily choose not to save premature babies. But what about the decisions to save ill and disabled premature infants? How are treatment limits and ethical research issues regarding fetal health and selection within the AAPT currently being discussed? This article addresses these questions.

There are several reasons for analysing AAPT in terms of selective practices. Firstly, although AAPT is best known for improving survival rates and outcomes for extremely premature babies (Kozlov 2023), this technology will also change the concept of fetal health by providing new medical and technical methods for observing, monitoring and optimising it. Secondly, the change in the concept of fetal health brought about by AAPT means that further criteria for deviation from health are being established, thereby transforming the criteria for selection. Thirdly, the discussion on so-called liberal eugenics has been gaining popularity for several years and has been perceived as one of the most dominant schools of thought on the subject of enhancement – i.e. the improvement of characteristics by biotechnological means. It seeks to underpin and legitimise selective reproduction from a moral-philosophical perspective. The first chapter deals with liberal eugenic views on the future of disability. In order to understand how the intellectual orientation of liberal eugenics proclaims concepts of disability and influences current developments in reproductive technology, we will look at the methodological

1 It is worth noting that several scholars have criticised the term "fetus" because it is used to assert an entity independent of the pregnant person. Barbara Duden (1993) has shown that the visual isolation of the fetus through technologies such as ultrasound promotes its construction as an independent moral subject, often at the expense of the physical and relational experience of the pregnant person. Elizabeth Kingma emphasised that, particularly in debates about the AAPT, the dominant culturally transmitted metaphor of the "container model" of pregnancy in Western societies prevails. This refers to "a tendency to depict, speak of and imagine fetuses as already separate, individuated 'babies' that are incubated in pregnant [people]" (Kingma/Finn 2020: 358). The step towards outsourcing pregnancy then seems like a mere continuation, the only difference being that the container is artificial, while neglecting the central role of the pregnant person within a fetal translocation.

assumptions on which this influential theory is based. The second chapter examines the conditions of therapeutic limits and goals for an entity in the AAPT, as well as the ethical challenges in research and clinical application, taking into account that the cases for application will expand due to the possibilities offered by the technology.

2 Technology, needs and disability in liberal eugenics

In philosophical bioethics, ethical and philosophical analysis is used to examine what constitutes reproductive selection today, and, above all, the moral convictions and judgements that gain traction in this context. So-called liberal eugenics has had a significant influence on the debate over selective reproductive technologies for some time now. In fact, it has been considered "the most popular position amongst philosophers writing in the contemporary debate about the ethics of human enhancement" (Sparrow 2011: 499), and it therefore shaped subsequent debates. Liberal eugenics makes every effort to distance itself from 'old' eugenics (Agar 2004), which aimed to achieve a specific fascist conception of population health through state coercion and authoritarianism. The 'new eugenics', on the other hand, is characterised by voluntarism and individualism, and appeals to the moral conscience of prospective parents (Savulescu 2005: 38).

The article follows the assumption that central methodological approaches of liberal eugenics are imprecise or underdetermined and avoid conceptual clarity in order to present selection and eugenics as morally indisputable. In the following, three methodological problems of conceptual vagueness are outlined in order to highlight their consequences for the current debate on new reproductive technologies, in particular AAPT.

2.1 The concept of technology

Although technology is a central concept in the thinking of liberal eugenicists about selective reproduction, it is not considered a relevant analytical category in itself.

According to Stephen Wilkinson, selective reproduction means, "to create one possible future child rather than a different possible future child" (Wilkinson 2010: 3). Wilkinson's definition of selective reproduction distinguishes between "high-tech" variants, such as pre-implantation and prenatal diagnostics, as well as "low-tech" variants that involve sexual abstinence or the use of contraceptives (Wilkinson 2010: 4). Both appear as techniques in a normative-pragmatic sense, as the practical *realisation* of what is possible under certain normative and epistemic conditions. The crucial difference between them, however, remains opaque, since as a means of selection both high and low techniques seem to aim at controlling reproduction, only with variations of cultural and artificial techniques to achieve this. The meaning of selective reproduction is underdetermined by this understanding, because it lacks a specification of the concept of technology. Technology has a constitutive, enabling role rather than merely a realising one. It enables and maintains theoretical and practical relations to the world (Hubig 2006: 13) rather than simply reproducing them.

Sexual abstinence, partner selection based on specific preferences, or contraceptives can all be techniques for making choices about reproduction. Unlike high-tech selection

methods, these techniques can largely be used independently. Individuals can control how they use a technique and can use it in their predominantly private space. The research and development of high-tech selective reproductive technologies, however, is carried out by private biotechnology companies. Therefore, considering all high-tech and low-tech technologies as equally selective leads to conceptual vagueness. Those, like partner selection or the decision to have sex, are always socially and politically shaped, but at least they are not technologies directly linked to ownership. In this sense, technologies must also be seen as products that are shaped and determined by their use. Regarding technologies as products or commodities also means that their conditions of use are based on valorisation criteria of profit-oriented markets. The possibilities offered by technological progress are therefore not contained in individual technical artefacts, but depend on the social contexts in which they are used (Wajcman 2004: 118). Therefore, it is crucial to understand how needs are constituted in relation to technological possibilities.

2.2 Needs

Proponents and supporters of liberal eugenics are primarily concerned with genetic diagnostic measures and their moral and philosophical legitimacy. The moral legitimacy of individual reproductive control is mainly based on the principles of procreative autonomy (Agar 2004: 6), justice (Buchanan et al. 2000: 15–16) or procreative beneficence (Savulescu/Kahane 2009). In contrast to procreative autonomy, which allows parents to choose their future children according to their own conception of a good life, the ideal of procreative beneficence goes a step further. Julian Savulescu and Guy Kahane argue that prospective parents have a moral obligation to not only choose what seems good for their individual preferences but to select the 'best possible' offspring to avoid a reduction in well-being (Savulescu/Kahane 2009: 278–279). What constitutes expected well-being or a good life is deliberately not explained. Rather, the authors make the alarmingly naive assumption of common-sense morality and the idea that this is simply a reflection of individuals' innate needs: "P[rocreative]B[eneficence] doesn't rely on some special and controversial conception of wellbeing. All it asks us is to apply in our procreative decisions the same concepts we already employ in everyday situations" (Savulescu/Kahane 2009: 279). The background to the constitution of needs and their interrelationship with social and political circumstances seems to remain unquestioned. From a social philosophical and psychodynamic perspective, however, needs do not simply exist; they arise in social practice. They are objectified in the context of social practice.

"So ist also das Bedürfnis an sich, als innere Bedingung für die Tätigkeit des Subjekts, nur ein negativer Zustand, ein Bedarfs-, ein Mangelzustand, seine positive Charakteristik erhält dieser Zustand erst als Folge eines Treffens mit einem Objekt […] und seiner 'Vergegenständlichung'" [Thus, the need itself, as an internal condition for the subject's activity is only a negative state, a state of need or deficiency; this state only acquires its positive characteristic as a result of an encounter with an object [...] and its 'objectification'] (Leontiev 1971: 4, translation S. W.) . The content of the need is not its base. "[D]ie Vorstellung von den Bedürfnissen [bildet] sich bei uns erst auf Grund von Beobachtungen post festum, d.h., wenn das Bedürfnis bereits den einen oder anderen

konkret-gegenständlichen Inhalt erhalten hat" [Rather, our idea of needs only develops based on post-festum observations, i.e. after the need has taken on an objective, concrete form] (Leontiev 1971: 4, translation S. W.). This is why the content seems to be inherent in the need. In fact, however, needs are formed by their objects. The development of needs therefore proceeds via the development of their objects. New objects (e.g. technologies) form new needs. It is in the nature and psychodynamics of needs that as these needs are met, new needs arise (Hubig et al. 2013: 36).

Therefore, in our case there is an undeniable need for healthy children. However, the cause of this need is not an inherent human need for healthy children. On the contrary, the existence of techniques that promise healthy children and the fact that dealing with illness, care responsibilities and dependence on others is largely an individual responsibility in our society, creates a concrete desire to solve this problem individually. Assuming that common-sense morality alone provides a basis for legitimising the expansion of selective reproductive technologies distorts the causal relationship between the technical availability and the need for its use.

2.3 Disability

According to Savulescu and Kahane, we are all disabled in terms of developing our potential (Savulescu/Kahane 2009: 290). Since our biological nature is flawed and we do not all have the same characteristics, they argue that we should use genetic diagnostic measures to get as close as possible to the goal of a life that is "expected to go best" (Savulescu/Kahane 2009: 275).[2] This liberal eugenics approach individualises the social model of disability. In contrast to the medical deficit-oriented model of disability, which sees disability as an individual problem to be remedied by cure or therapy, the social model understands disability as a collective experience. Social barriers and discrimination, rather than primarily physical or mental limitations themselves, constitute the experience of disability, which is "based in navigating a world designed and defined by able-bodied people" (Sins Invalid 2019: 153). According to liberal eugenic ideas, dealing with disability is not seen as a task for society as a whole, but is transferred to the responsibility of the individual through the use of reproductive selection technologies. Disability as a concept loses its distinctiveness and political clout when everyone is seen as disabled, while at the same time claiming that everyone should be guided by a "curative imaginary" (Kafer 2013: 27): the idea that restoring health to a 'normal' state is the ultimate goal, while neglecting other aspects of illness and disability.

3 Scenarios for the development of AAPT

The following chapter examines the current and future development of AAPT from three angles: Firstly, it explores the therapeutic limits and goals that arise from the morally and legally unresolved status of the entity in AAPT. Secondly, research ethics chal-

2 This refers not only to the reduction of hereditary diseases or chromosomal variations, but also to autism and depression, and to a wide range of character traits such as intelligence, memory, sexual orientation, etc., as soon as this becomes possible (Savulescu 2005; Savulescu et al. 2006).

lenges are considered, with particular emphasis on the link between reproductive rights and social justice. Thirdly, assuming that AAPT is established experimentally and clinically, changes in the concept of health and an expansion of use cases are anticipated.

All three aspects are based on the aforementioned techno-philosophical considerations of selective practices and the constitution of needs. Risks of selective or ableist use of the technology will be analysed against the background of a probable expansion of its application.

3.1 Therapy limitations and objectives

Translocation of a fetus in AAPT is intended to maintain its physiological state so that it does not begin to breathe and its organs can continue to develop. For the transfer into AAPT, a "wet caesarean section"[3] (Schneider 2023: 25) would have to be performed on the pregnant person. Throughout this procedure the fetus remains surrounded by amniotic fluid to prevent it from breathing and damaging its lungs, which are not yet fully developed (De Bie et al. 2023). It is currently assumed, that a translocation could be possible from around the twenty-second to twenty-fifth week of pregnancy (De Bie et al. 2023; Usuda et al. 2019). The translocated entity can be seen as to be in a transition state: physically a fetus but simultaneously independent of the pregnant body (Romanis 2018: 753; Kingma/Finn 2020). Terminological clarification is therefore necessary to determine the legal and ethical status of this entity and to avoid misleading connotations of the two closely related concepts premature newborn and fetus. According to Chloe Romanis, the entity in AAPT requires its own term, which she refers to as "gestateling": a still developing fetus outside the pregnant body (Romanis 2018: 753).

The search for appropriate terminology raises difficult ethical questions, which become particularly salient when it comes to setting treatment goals and limits. Daniel Rodger, Nicholas Colgrove and Bruce P. Blackshaw have addressed the deliberate killing of a gestateling and refer to this act as "gestaticide" (Rodger/Colgrove/Blackshaw 2021). In doing so, they anticipate the withdrawal of life-sustaining measures for fetuses and newborns under specific circumstances and want to determine what conditions would actually apply in the case of a gestateling. The withdrawal of life-sustaining or therapeutic measures in viable fetuses occurs, for example, in the case of late-term abortion through induced fetocide. Such decisions are also made for newborns in intensive care units, for example when treatment is futile or death is imminent (Rodger/Colgrove/Blackshaw 2021: 4). However, gestaticide is more difficult to justify than abortion because there is no longer any dependence on the pregnant body, which would inevitably have to take into account the rights of the pregnant person. Thus, Rodger et al. conclude, killing a gestateling would be as morally impermissible as infanticide (Rodger/Colgrove/Blackshaw 2021: 1–2).

3 To perform a wet caesarean section, a two-ring retractor and a plastic tunnel must be attached to the uterus. The fetus is transported through the tunnel into a transparent transfer bag. The bag is then separated and the blood vessels of the umbilical cord are connected to the artificial placenta, which takes over the function of the lungs, i.e. the exchange of carbon dioxide and oxygen in the blood, and supplies the fetus with nutrients. The fetus with the artificial placenta can then be transferred to the artificial uterus (Schneider 2023: 20, 23).

In fact, the term gestateling has its weaknesses when applied to decision-making about treatment limitations. As defined by Kingma and Finn, gestatelings have different physiological and physical characteristics that are comparable to the functions of a fetus and distinguish them to a newborn. Gestatelings, like fetuses, have a placenta, umbilical cord, they "oxygenate their blood via the placenta" (Kingma/Finn 2020: 358) but do not breathe and lack sensory perception. However, there are neonates that do not function like neonates and struggle with the transition from fetal to neonatal function. So, at least for decisions on limiting therapy for gestatelings, an unaccomplished transition to neonatal function cannot be considered a valid argument. Above all, this has ableist implications when we distinguish automatically between 'incomplete' or 'defective' newborns and 'complete' newborns. The concept of the gestateling is not intending to determine a moral status, because "assigning a moral status does not in itself immediately tell us how entities should be treated, [...] we must then make moral judgements about whether that status justifies certain treatment" (Romanis 2019: 729). While there is no objection to this, the exclusive determination by location and function of the gestateling can also lead to far-reaching ethically undesirable consequences. If the gestateling could be regarded as a physically disentangled entity without moral status, it could be perceived as object-like, and newborns who have not completed the physiological transition to newborn status could be denied their moral value (Rodger/Colgrove/Blackshaw 2021: 2).

If a gestateling were considered more like a fetus in the same gestational age – due to its fetal-like functions – this would mean that life-sustaining measures could be withdrawn in accordance with a medical indication in the AAPT. According to German law, a medical indication for an abortion applies if prenatal diagnostics have detected a probable impairment or genetic variation of the fetus or if there is a severe risk to the health of the pregnant person. However, medical indications are proven to be rare after the twelfth week of pregnancy (until then termination is not punishable if certain conditions are met in Germany) without the presence of fetal impairments (ProFamilia 2017: 30). Gestaticide could then be justified on similar grounds to abortion in the case of variations and anomalies.

On the other side, if the gestateling were to be classified as a neonate, deliberately killing it would be "a form of infanticide" (Rodger/Colgrove/Blackshaw 2021: 2). According to Rodgers et al., decisions about withdrawing life-sustaining treatment for gestatelings should be made under the same conditions that apply to newborns in intensive care units. This means, gestaticide is permissible or would not count as such "in cases where the gestateling is having some serious health problem(s)—specifically, where continued treatment is futile, death is imminent and the death of the gestateling is not intended" (Rodgers et al. 2021: 4).[4]

4 Anna Nelson et al. (2024) have highlighted that the established categories for deaths before or immediately after birth do not apply to gestatelings. The authors address the ambiguity of the status of gestatelings, the challenges this poses for death certification and the legal recognition of the loss. The current legal definitions of miscarriage, stillbirth and neonatal death are based on indicators such as gestational age, place of birth and signs of live birth, which may not be sufficient, particularly in the latter two cases, due to the technological environment of gestation in the AAPT. In line with Nelson et al., it should be emphasised once again that the lack of clarity in the recognition and classification of gestatelings is a problem that could lead to inconsistent recognition and treatment of gestatelings, resulting in unequal legal and social responses to their deaths. How death is assessed legally, morally and socially can give insights about the criteria used to determine the value of life or a 'life worth living'.

This represents a line of conflict that illustrates the political dimension of the moral negotiation about the status of the fetus. On the one hand, granting the same subject status and legal rights to a gestateling as to a newborn child could jeopardise abortion rights, because the same rights could be applied to a fetus of the same gestational age. This would make it impossible to justify decisions to terminate pregnancies. On the other hand, if the fetus is denied any moral and legal status, there is no logical basis for discussing the risks of extending selective practices, which in turn may reduce the social acceptability of vulnerable groups, such as sick or disabled individuals, those in need of care, those who deviate from norms and those who are dependent, which in fact always will be constitutive to societies.

How the gestateling is ultimately defined therefore has a significant influence on how genetic variants and impairments of the fetus are dealt with once it is transferred to AAPT. With detachment from the pregnant person's body, AAPT has a significant impact on prenatal therapy, offering new treatment options for diagnosed conditions that could not be treated intrauterine or are associated with higher risks and complications (De Bie et al. 2023). The possibility to correct detected, treatable anomalies prenatally would provide pregnant people an additional viable option following a conspicuous prenatal diagnostic finding. This is because in such cases, it is often only suggested to continue or terminate the pregnancy, rather than considering the option of (prenatal) therapy (Hübner 2014). However, the question remains as to whether prenatal therapy in the AAPT would be an option for premature births that would be transferred to an AAPT anyway or if this is considered as an option specifically because of a prenatal diagnosis. This raises the question of which diagnoses and prenatal findings would fall within the spectrum of treatable and correctable variations, and how these decisions will be made. Until now, genetic diagnosis has been the only way to determine the developmental characteristics of a future child, although it should be noted that it is not possible to make concrete statements about the degree of variation or severity or even the quality of life of a potential child with a disability during the prenatal stage (Baldus 2016: 35). However, what will be considered if changes to the assumed characteristics can still be made during the fetal stage?

Extremely premature infants are regarded as a high-risk population, and prenatal interventions aiming to correct non-lethal conditions are only possible through invasive procedures (Pence 2006). Thus, prenatal therapy in AAPT cannot be classified as low-threshold and will certainly not be carried out unless it is deemed necessary. However, an increase in medical and technical possibilities is likely to expand the range of applications, which could lead to increased use of interventions and calls for optimisation, including stricter restrictions on the setting of treatment thresholds in AAPT.

3.2 Research ethics challenges for pregnant persons and fetal health and selection

One of the FDA pediatric advisory committee documents identifies "parental permission and informed consent" (Durmowicz 2023: 14) as a particular challenge in AAPT research trials. This is because obtaining informed consent is particularly complex, as the pregnant person is also a potential research subject, and because of the risk of thera-

peutic misconception, i.e., false expectations regarding the therapeutic benefits of the treatment for the pregnant person and the unborn entity, especially in the absence of effective alternatives. Perceived pressure to agree to the experimental procedure is also mentioned, as well as the highly emotional and time-sensitive situation that makes it difficult to obtain informed consent.

Although important points are made by the FDA committee, there is a lack of reflection on the specific vulnerabilities of pregnant people, which may expose them to additional inequalities in a preterm birth setting. Nor are any safeguards proposed for the anticipated challenges, even though it is expected that the doctor-patient relationship will change, as it will be difficult for pregnant people to assess the recommendation of fetal transfer (Räsänen 2017; Segers et al. 2020). "[D]octors may assume greater authority in the management of […] [their] pregnancy" (Adkins 2021) and pregnant people could be pressured to follow the medical advice to transfer in order to avoid risks to the fetus. A transfer is a major intervention in their bodily autonomy and a more invasive procedure with a higher risk than a conventional caesarean section. "As the incision happens on a comparatively smaller uterus, with the correspondingly more onerous venture of cutting through muscular tissue, the risk of excessive bleeding and surgical complications will likely be greater" (Segers/Romanis 2022: 2210). It seems that the safety assessment of what may soon be the first in-human trials focuses on the health of the fetus, without careful consideration of the central person who contributes to and enables the research.

AAPT research requires pregnant people who give birth prematurely to participate. The causes of preterm birth are complex and may include physiological or genetic factors. However, increased stress is also an essential component, "which can be triggered by factors such as structural discrimination and financial strain" (Romanis/Horn 2020: 187). This has a particularly strong impact on pregnant people with a low income or precarious housing status, who are racialised, who experience ableist obstetric care (Rodríguez-Garrido 2023), or who are exposed to other forms of violence and discrimination. Additional complications arising from structural barriers or discrimination, such as language barriers and racial stereotypes leading to misperceptions of the pain experienced by pregnant bodies (Nguyen et al. 2023), and the increased risk of violence faced by trans*, inter* and non-binary people in clinical birth settings (Salden/Netzwerk Queere Schwangerschaften 2022) are likely to exacerbate. This is probable because AAPT researchers consider the transfer to be a 'supererogatory' act (De Bie et al. 2023: 73) that aggravates the already exceptional conditions and difficulties of making informed and voluntary choices during childbirth.

People exposed to increased stress are more likely to give birth prematurely, which makes them more likely to be included in AAPT experimental trials. For people from low-income backgrounds, a long history of exploitation in biomedical research[5] raises

5 Notable examples of ethical violations in biomedical research include the Puerto Rico contraceptive trials in the 1950s, where low-income women were subjected to testing of early oral contraceptives without proper informed consent, leading to severe side effects and several deaths – yet without benefiting from the pill's eventual success (Watkins 1998). More recently, during the COVID-19 pandemic, unauthorised trials of proxalutamide in Brazil exposed hospitalised patients to unapproved treatments without adequate consent, resulting in harm and death; the study has been called one of Brazil's most serious medical ethics breaches (Taylor 2021).

legitimate doubts about whether research ethics assessments adequately consider pregnant people, particularly those who are particularly vulnerable. In addition, structurally disadvantaged individuals are less likely to benefit from the development of the technology or product once it has been clinically established after the experimental phase due to structurally discriminatory barriers to accessing health services, and the limited availability of the technology, which is likely to be provided only in a few metropolitan clinics (Segers/Romanis 2022: 2211; Segers 2020). One way of avoiding reinforcing discriminatory effects in both initial human trials and the clinical phase could be to incorporate the experiences of marginalised groups in the context of (premature) birth into the decision-making process (Vedam et al. 2024).

3.3 Fetal health and selection

The development and application of AAPT promises to expand knowledge of fetal health and development, which may provide a strong incentive for researchers to actively advance this technology. Identifying the research population and designing the study are critical issues. Randomised controlled trials (RCTs) have a treatment arm and a control arm, and subjects are randomly assigned. This would be a more robust method of testing the efficacy of AAPTs, but it is considered ethically controversial in the early stages of AAPT development (De Bie et al. 2023). In RCTs, participants are only assigned to different treatments if there is good reason to believe that none of the available options is clearly preferable. However, if the technology is deemed safer in future, RCTs should be considered. In this case, treatment with AAPT for pre-viability entities (the point in time at which a fetus can survive outside the pregnant body) would probably be ethically justifiable, as there is no comparable conventional treatment at this stage of development. However, the lack of treatment alternatives may also make it easier to justify interventions. Whether RCTs or single-arm studies, there is a risk that entities that would have no chance of survival under normal conditions will increasingly become research subjects (Segers/Romanis 2022: 2210; Romanis 2020). It then also depends on whether the AAPT is declared to be medical research or already a medical treatment. For the latter, lower ethical standards apply to the protection of test subjects, so that "there is not the same guarantee that the investigator is acting in their [the gestatelings'; *my addition*] interests" (Romanis 2020: 393).

Interestingly, it is emphasised in this context that entities could be included "that would not otherwise be treated since there is a much greater likelihood that the entity will have its suffering prolonged without utility" (Segers/Romanis 2022: 2210). Applying a concept of suffering to fetal life is not evidence-based; at most, demonstrable stress reactions can currently be assumed (Mohamed et al. 2024), but it is not sufficient to speak of a pain sensation that would be associated with suffering, especially before the 29th week (Lee et al. 2005). The assumption that a fetus can feel pain is often used to argue for the restriction of abortion rights (Derbyshire 2006). The concept of suffering is therefore not useful for constructing a plausible argument against the possibly more frequent inclusion of fetuses with health impairments in AAPT trials compared to fetuses without impairments. It remains unclear what "would not otherwise be treated" actually entails. However, it can be assumed that the fetuses referred to are viable and not dead.

Consequently, it is clear that the same research ethics standards must be applied to all viable fetuses. Otherwise, the new possibilities for optimisation and intervention resulting from the technology will inevitably lead to an unequal treatment of viable fetuses that is both ethically and legally unjustifiable.

This is a realistic consequence of medical technological possibilities, especially against the background of current developments in the routine use and expansion of prenatal diagnostic procedures. The ethically and legally unjustified unequal treatment of viable fetuses applies in the case of current abortions due to prenatal selection: Abortions carried out because the life of the pregnant person is at risk or because the necessary medical treatment would cause harm to the child, an attempt is always made to keep the fetus alive (Graumann 2011: 133). In the case of late-term abortions following prenatal diagnosis (PND) for medical reasons, a so-called feticide is performed.

3.4 The conceptual change of health and the expansion of applications

The concept and understanding of health are changing fundamentally with technological advances. Health is increasingly understood as a quantifiable state that can be optimised through continuous monitoring and high-tech assessment algorithms. This is leading to a shift from a curative to a preventive-optimising understanding of health (Wieser 2019). The integration of technical enhancement to create life is creating new ideas of health and normality. What is considered to be optimal health is subject to change through medical and technical knowledge and can alter our relationship to the contingency of life to the extent that contingency and deviations in development become increasingly unacceptable because they seem to be preventable prenatally. Consequently, the AAPT has the potential to not only reproduce but also structurally reinforce the medical deficit-oriented model of disability. Each new technological possibility not only expands the scope of action, but also shifts social expectations and ethical standards – for example, what is considered healthy, worth surviving, or optimisable. Furthermore, achieving equal opportunities for people with disabilities or promoting a greater need for social safety nets could become more difficult if disability is increasingly viewed as a deviation from what is technically 'feasible' (Maskos 2010).

Prenatal therapy for AAPT has the potential to detect and correct developmental abnormalities at an early stage, e.g. through targeted interventions during extracorporeal fetal development. To date, there has been no in-depth, comprehensive bioethical discussion on the extent to which AAPT could be used as an extension of selective options.

4 Conclusion

AAPT is not an exclusively selective technology. However, it is in the nature of technology that, as it develops, its initial concept will generate new needs which in turn will justify new technical means. Therefore, it is reasonable to expect that once AAPT is clinically established, the range of applications will expand. This is not necessarily a bad or unstoppable development, but there needs to be a discussion about the values and

norms involved in the technical implementation and application, and the responsibilities this entails. Given the current influence of liberal eugenics in bioethics and the routine use and expansion of selective reproductive technologies, it is necessary to examine new emerging technologies as selective reproductive technologies as well.

Ultimately, pregnant people and parents-to-be will be faced with difficult and complex issues that initially seem purely individual and private. This is one of the basic tenets of liberal eugenics: Parents should make responsible choices for the children they consider healthy enough for society. The possibility of disability is thus pre-structured as a concern about not conforming to the social consensus of normality and health.

Therefore, it is important to observe how these values are being transformed and which dominant ideological influences are shaping current technological developments. In examining writings by liberal eugenicists, it has become clear that a concept of technology is lacking. It has been demonstrated that a social, philosophical and psychodynamic understanding of technology is useful when considering selective reproductive technologies. This helps us to understand that the creation of needs is mediated by technical products. Therefore, the individualisation of responsibility within selection, as demanded in the liberal understanding, is not an end in itself, and above all is not promoted by user control, but by a deregulated private market logic. Highly technical selection also means that ethical values are linked to economic expediency. As Savulescu and Kahane put it in relation to procreative beneficence: "In many cases, the more an act promotes well-being (e.g., taking a child to speech therapy), the greater its cost (in time and money)" (Savulescu/Kahane 2009: 283).

It has been shown that questions about treatment goals and limits are not purely private matters, but are also subject to scientific and public disputes about the interpretation of terms: The future moral and legal definition of the entity in AAPT will determine which selective options are conceivable; How initial experimental research is conducted will determine the rights of pregnant people who may be faced with the choice of transferring their fetus to an AAPT or opting for a conventional incubator; What is commonly understood and assumed to be suffering – in the fetal stage and beyond – will determine how and what attempts are made to prevent this anticipated suffering.

References

Adkins, Victoria (2021). Impact of Ectogenesis on the Medicalisation of Pregnancy and Childbirth. *Journal of Medical Ethics, 47*(4), 239–243. https://doi.org/10.1136/medethics-2019-106004

Agar, Nicholas (2004). *Liberal Eugenics: In Defence of Human Enhancement.* Oxford: Blackwell. https://doi.org/10.1002/9780470775004

Baldus, Marion (2016). Selbstbestimmtes Entscheiden? Zugzwänge und Wirkmächte im Kontext pränataler Diagnostik. In Wolfgang Kröll & Walter Schaupp (eds.), *Medizin – Macht – Zwang: Wie frei sind wir angesichts des medizinischen Fortschritts?* (pp. 27–48). Baden-Baden: Nomos Verlag. https://doi.org/10.5771/9783845273587-27

Buchanan, Allen; Brock, Dan W.; Daniels, Norman & Wikler, Daniel (2000). From Chance to Choice: Genetics and Justice. *Philosophy, 76*(297), 472–475. https://doi.org/10.1017/s0031819101240406

De Bie, Felix R.; Kim, Sarah D.; Bose, Sourav K.; Nathanson, Pamela; Partridge, Emily A.; Flake, Alan W. & Feudtner, Chris (2023). Ethics Considerations Regarding Artificial Womb Technology for the Fetonate. *The American Journal of Bioethics, 23*(5), 67–78. https://doi.org/10.1080/15265161.2022.2048738

Derbyshire, Stuart W. G. (2006). Can Fetuses Feel Pain? *British Medical Journal, 332*(7546), 909–912. https://doi.org/10.1136/bmj.332.7546.909

Duden, Barbara (1993). *Disembodying Women: Perspectives on Pregnancy and the Unborn.* Cambridge: Harvard University Press.

Durmowicz, Elizabeth L. (2023). *FDA's Regulatory Safeguards for Children Involved in Clinical Trials: Considerations for Artificial Womb Technologies*. Date of access: 11 May 2025 at https://www.fda.gov/media/172253/download?attachment.

Graumann, Sigrid (2011). Zulässigkeit später Schwangerschaftsabbrüche und Behandlungspflicht von zu früh und behindert geborenen Kindern – ein ethischer Widerspruch? *Ethik in der Medizin, 23*(2), 123–134. https://doi.org/10.1007/s00481-010-0072-1

Hubig, Christoph (2006). *Die Kunst des Möglichen I.* Bielefeld: transcript. https://doi.org/10.1515/9783839404317

Hubig, Christoph; Huning, Alois & Ropohl, Günter (2013). *Nachdenken über Technik: Die Klassiker der Technikphilosophie und neuere Entwicklungen* (3., neu bearb. u. erw. Aufl.; Darmstädter Ausgabe). Baden-Baden: Nomos Verlag.

Hübner, Christian A. (2014). Pränataldiagnostik. *Medizinische Genetik, 26*(4), 372–373. https://doi.org/10.1007/s11825-014-0019-x

Kafer, Alison (2013). *Feminist, Queer, Crip*. Bloomington: Indiana University Press. https://doi.org/10.2979/6841.0

Kingma, Elselijn & Finn, Suki (2020). Neonatal Incubator or Artificial Womb? Distinguishing Ectogestation and Ectogenesis Using the Metaphysics of Pregnancy. *Bioethics, 34*(4), 354–363. https://doi.org/10.1111/bioe.12717

Kleemann, Jenny (2020). "Parents Can Look at Their Foetus in Real Time": Are Artificial Wombs the Future? *The Guardian,* 27 June 2020.

Kozlov, Max (2023). Human Trials of Artificial Wombs Could Start Soon. Here's What You Need to Know. *Nature, 621*(7979), 458–460. https://doi.org/10.1038/d41586-023-02901-1

Lee, Susan J.; Ralston, Henry J. Peter; Drey, Eleanor A.; Partridge, John Colin & Rosen, Mark A. (2005). Fetal Pain: A Systematic Multidisciplinary Review of the Evidence. *Jama, 294*(8), 947–954. https://doi.org/10.1001/jama.294.8.947

Leontiev, Aleksei N. (1971). *Bedürfnisse, Motive und Emotionen. Ein Vorlesungskonspekt [Needs, motives and emotions. A lecture summary]*. Universitätsverlag Moskau. Date of access: 13 May 2025 at http://www.ich-sciences.de/media/texte/Leo156.pdf

Maskos, Rebecca (2010). Was heißt Ableism? Überlegungen zu Behinderung und bürgerlicher Gesellschaft. *arranca!, 43*, 30–33.

Nelson, Anna; Romanis, Elizabeth Chloe; Adkins, Victoria; Weis, Christina & Kuberska, Karolina (2024). Death and the Artificial Placenta. *Journal of Law and the Biosciences, 11*(2), 1–24. https://doi.org/10.1093/jlb/lsae013

Nguyen, Thu T.; Criss, Shaniece; Kim, Melanie; De La Cruz, Monica M.; Thai, Nhung; Merchant, Junaid S.; Hswen, Yulin; Allen, Amani M.; Gee, Gilbert C. & Nguyen, Quynh C. (2023). Racism During Pregnancy and Birthing: Experiences from Asian and Pacific Islander, Black, Latina, and Middle Eastern Women. *Journal of Racial and Ethnic Health Disparities, 10*(6), 3007–3017. https://doi.org/10.1007/s40615-022-01475-4

Partridge, Emily A.; Davey, Marcus G.; Hornick, Matthew A.; McGovern, Patrick E.; Mejaddam, Ali Y.; Vrecenak, Jesse D.; Mesas-Burgos, Carmen; Olive, Aliza; Caskey, Robert C.; Weiland, Theodore R.; Han, Jiancheng; Schupper, Alexander J.; Connelly, James T.; Dysart, Kevin C.; Rychik, Jack; Hedrick, Holly L.; Peranteau, William H. & Flake, Alan W. (2017).

An Extra-uterine System to Physiologically Support the Extreme Premature Lamb. *Nature Communications, 8*(1), 15112. https://doi.org/10.1038/ncomms15112

Pence, Gregory (2006). What's so Good about Natural Motherhood? In Praise of Unnatural Gestation. In Scott Gelfand & John R. Shook (eds.), *Ectogenesis: Artificial Womb Technology and the Future of Human Reproduction* (pp. 77–88). Leiden: Brill. https://doi.org/10.1163/9789401203456_009

ProFamilia (2017). *Schwangerschaftsabbruch – Fakten und Hintergründe*. ProFamilia Bundesverband. Date of access: 14 May 2025 at https://www.profamilia.de/themen/schwangerschaftsabbruch.

Rodger, Daniel; Colgrove, Nicholas & Blackshaw, Bruce P. (2021). Gestaticide: Killing the Subject of the Artificial Womb. *Journal of Medical Ethics, 47*, e53. https://doi.org/10.1136/medethics-2020-106708

Rodríguez-Garrido, Pia (2023). Ableist Obstetric Violence against Women with Disabilities: An Integrative Literature Review. *Salud Colect, 19*, e4676. http://doi.org/10.18294/sc.2023.4676

Romanis, Elizabeth Chloe (2018). Artificial Womb Technology and the Frontiers of Human Reproduction: Conceptual Differences and Potential Implications. *Journal of Medical Ethics*, *44*(11), 751–755. http://doi.org/10.1136/medethics-2018-104910

Romanis, Elizabeth Chloe (2019). Artificial Womb Technology and the Significance of Birth: Why Gestatelings are Not Newborns (or Fetuses). *Journal of Medical Ethics*, *45*(11), 728–731. http://doi.org/10.1136/medethics-2019-105723

Romanis, Elizabeth Chloe (2020). Artificial Womb Technology and Clinical Translation: Innovative Treatment or Medical Research? *Bioethics, 34*(4), 392–402. https://doi.org/10.1111/bioe.12701

Salden, Ska & Netzwerk Queere Schwangerschaften (2022). *Queer und schwanger. Diskriminierungserfahrungen und Verbesserungsbedarfe in der geburtshilflichen Versorgung*. Heinrich-Böll-Stiftung Policy Paper. Date of access: 22 May 2025 at https://www.gwi-boell.de/sites/default/files/2022-02/E-Paper%20Queer%20und%20schwanger%20Endf.pdf.

Savulescu, Julian (2005). New Breeds of Humans: The Moral Obligation to Enhance. *Reproductive BioMedicine Online, 10*(1), 36–39. http://doi.org/10.1016/s1472-6483(10)62202-x

Savulescu, Julian; Hemsley, Melanie; Newson, Ainsley & Foddy, Bennett (2006). Behavioural Genetics: Why Eugenic Selection is Preferable to Enhancement. *Journal of Applied Philosophy*, *23*(2), 157–171. http://doi.org/10.1111/j.1468-5930.2006.00336.x

Savulescu, Julian & Kahane, Guy (2009). The Moral Obligation to Create Children with the Best Chance of the Best Life. *Bioethics, 23*(5), 274–290. http://dx.doi.org/10.1111/j.1467-8519.2008.00687.x

Schneider, Reto U. (2023). Operation Fruchtwasser. *Neue Zürcher Zeitung Folio: Fokus Wunschkind*, 2. Mai 2023, 18–27.

Segers, Seppe & Romanis, Elizabeth Chloe (2022). Ethical, Translational, and Legal Issues Surrounding the Novel Adoption of Ectogestative Technologies. *Risk Management and Healthcare Policy, 15*, 2207–2220. http://doi.org/10.2147/rmhp.S358553

Sins Invalid (2019). *Skin, Tooth, and Bone: The Basis of Movement is Our People – A Disability Justice Primer*. Berkeley: Sins Invalid.

Sparrow, Robert (2011). Liberalism and Eugenics. *Australasian Journal of Philosophy, 89*(3), 499–517.

Taylor, Luke (2021). Covid-19: Trial of Experimental "Covid Cure" is among Worst Medical Ethics Violations in Brazil's History, Says Regulator. *British Medical Journal, 375*, n2819. http://doi.org/10.1136/bmj.n2819

U.S. Food and Drug Administration (2023). *Presentations for the September 19, 2023 Meeting of the Pediatric Advisory Committee*. Date of access: 31 Oktober 2024 at https://www.fda.gov/

advisory-committees/pediatric-advisory-committee/presentations-september-19-2023-meeting-pediatric-advisory-committee.
Usuda, Haruo; Saito, Masatoshi; Watanabe, Shimpei & Kemp, Matthew W. (2019). Reply. *American Journal of Obstetrics & Gynecology, 221*(4), 369–370. http://doi.org/10.1016/j.ajog.2019.06.036
Vedam, Saraswathi; Stoll, Kathrin; Tarasoff, Lesley; Phillips-Beck, Wanda; Lo, Winnie; MacDonald, Kate; Metellus, Ariane; Rost, Michael; Scott, Muriel; Hodge, Karen; Korchinski, Mo; Pijl, Marit; Alonso, Cristina; Clark, Esther; Tatum, Ali; Olson, Rachel; Xie, Kathy; Decker, Mary; Wenzel, Karolina & Hall, Wendy (2024). The RESPCCT Study: Community-led Development of a Person-centered Instrument to Measure Health Equity in Perinatal Services. *Journal of Participatory Research Methods, 5*(1). http://dx.doi.org/10.35844/001c.94399
Wajcman, Judy (2004). *TechnoFeminism*. Cambridge: Polity Press.
Watkins, Elizabeth Siegel (1998). *On the Pill: A Social History of Oral Contraceptives, 1950–1970*. Baltimore: Johns Hopkins University Press.
Wieser, Bernhard (2019). Digitale Gesundheit: Was ändert sich für den Gesundheitsbegriff? *Österreichische Zeitschrift für Soziologie, 44*(4), 427–449. http://doi.org/10.1007/s11614-019-00389-6
Wilkinson, Stephen (2010). *Choosing Tomorrow's Children: The Ethics of Selective Reproduction*. Oxford: University Press. https://doi.org/10.1093/acprof:oso/9780199273966.001.0001

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