

# Aims & Objectives of TCB

1. To be a Christian voice on ethical issues based on Biblical values



2. To analyze, interpret and engage with the existing and emerging bioethical issues pertaining to health care and research



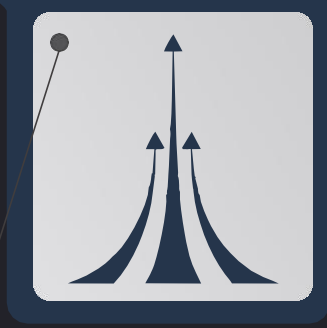
3. To facilitate upholding the sanctity of life and dignity of humans in medical practice and research



4. To promote ethical medical practice



5. To build leadership in the field of Bioethics, in the areas of Medical education, Medical practice and Medical research



The Centre for **Bioethics**



## Bioethics Bulletin

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## Advent of Newer Technologies

Greetings everyone!!

The advent of newer technologies: Are they redefining what it means to be human?

In this last edition of the year 2023, we look at ethical questions revolving around newer technologies. Artificial intelligence, robotics, genetic engineering and so on have been developed by human beings with a view towards improving their lot in life. They aim to ease our drudgery, make our tasks simpler, and even enable us to do things which some of our human limitations may not allow.

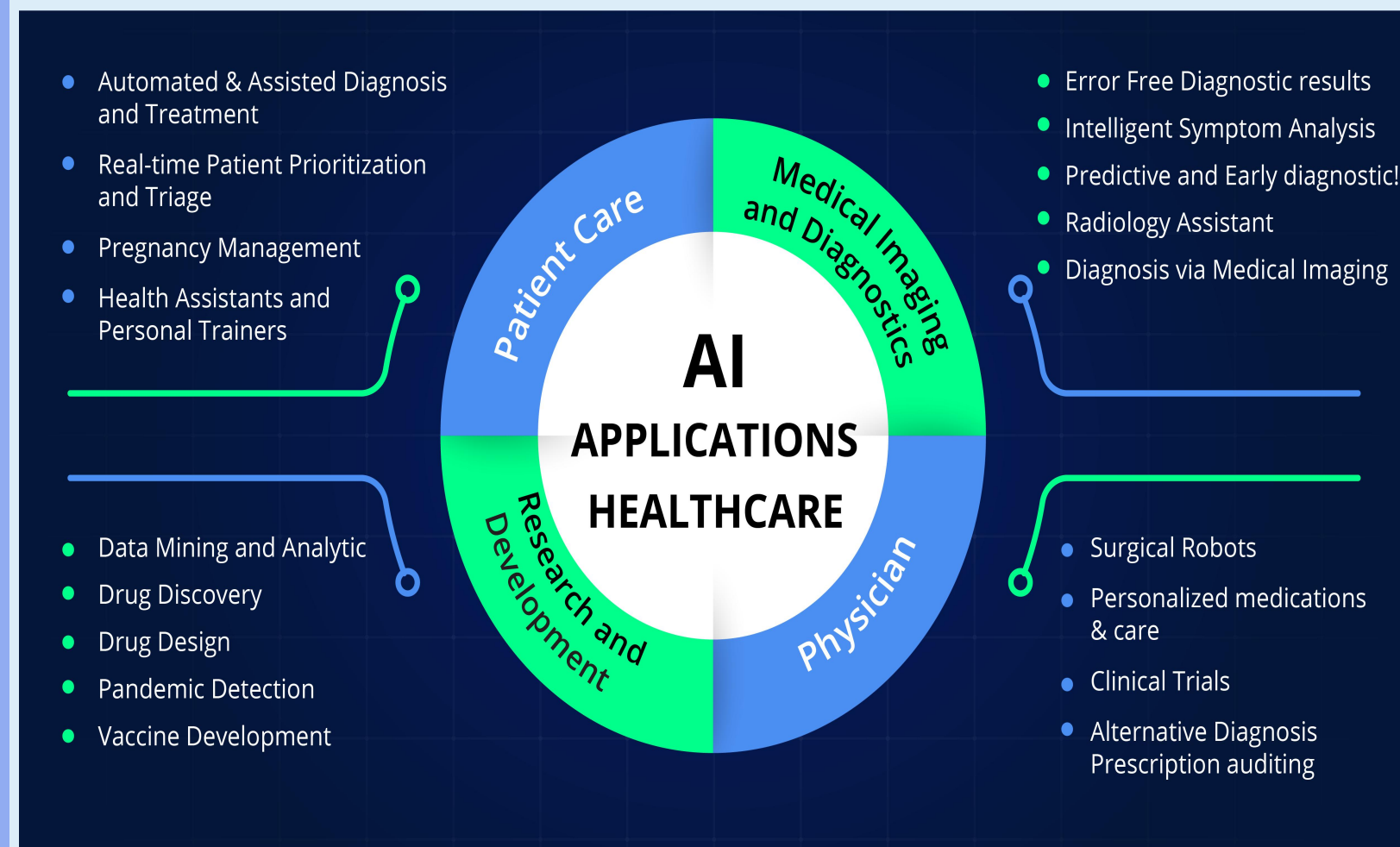
Every significant new technology raises the age-old recurring question, are we playing God here? As in every debate, there are people at either extremes. On the one hand, there may be people claiming that anything not amounting to accepting the status quo is going beyond our God given role. On the other, there may be people who draw no limits to what may be done. If something can be accomplished, it ought to be done. How do we as Christians faithful to the biblical revelation navigate our ethical compass amongst this maze of confusing questions?

As you can see from our sample of articles, ultimately our perspectives to these questions are shaped by our worldviews. In the article on genetic engineering, the author lays out how the argument would look like coming from a scientific naturalistic worldview.

We often hear these arguments which are quite prevalent because they arise from a Darwinian evolutionary view of human beings. The biblical perspective on what it means to be human is quite in contrast to this. Of all of God's creation, He intended human beings to uniquely bear His image and likeness. Thinking below the surface, we will end up at this basic question, "What does it mean to be human?"

And finding that the answer to this question will circumscribe the limits to which we ought to go in the use of any technological advancement. There is no better definition of a human than the imago dei of Genesis 1: 26. We hope that some of these beautiful articles written by our friends will enable us to think through these newer challenges confronting humanity through the eyes of imago dei.

*Wish you all a blessed Christmas season and a wonderful New Year!*



# *AI in Medicine*

Trevor Stammers

Artificial intelligence (AI) was first coined and defined in 1956 as ‘the science and engineering of making intelligent machines’ though it is now also used to refer to such machines as well. In the context of medicine AI generally refers to the simulation of human intelligence by machines programmed to mimic human thought patterns such as learning, adapting to new data, problem-solving, executing complex tasks, and even social interaction - without being assisted by humans.

## **The Scope of Medical AI**

There has been a dramatic increase in the medical use of AI over the last 15 years and such technology is now deeply embedded in almost every aspect of healthcare.

## **Diagnosis**

Machines can analyse data more quickly and accurately than humans and AI has been used in evaluating retinal scans and one such system to detect diabetic retinopathy became the first FDA approved autonomous AI device in the US in any field of medicine in 2018. AI either matched or exceeded the diagnostic expertise of ophthalmologists in grading accurately the severity of the retinopathy.

Radiology was also one of the first specialties to embrace AI, not only for reporting on films but also for computer assisted screening procedures. AI not only eliminates human error but can also detect abnormalities at an earlier stage than unaided human vision can. AI assisted diagnostic systems are now in use in clinics in many specialties.

## **Epidemiology and disease prevention**

With the capacity to process large quantities of data from computerised health records, AI can enable risk factors for disease to be identified and minimised both at population and individual patient level.

## **Drug development and personalised medicine**

AI can analyse vast amounts of pharmacological datasets to identify potential candidates for new drugs and to predict their likely interactions and side effects.

## **AI-assisted Surgery**

Robotic assisted surgery has been used for many years in specialities such as urology for example. Robotic prostate surgery is a highly precise procedure resulting in excellent cancer control and is considered very safe. Hong Kong surgeons have pioneered the first robotic neurosurgical AI to perform stereotactic brain surgery for such conditions as essential tremor and Parkinson’s disease.

## **Mental Health**

AIs are increasingly being used in all areas of mental healthcare both in diagnosis with AI assisted screening and diagnostic tool and in therapy and aftercare using chatbots and remote monitoring and support. The artfully named ‘Woebot’ is a phone app designed to provide cognitive behavioural therapy and be accessible whenever the user needs to talk day and night.

MIT has also developed an AI to alert patients of early signs of depression thus enabling them to seek appropriate help before the condition becomes worse.

## Direct Patient Care

There are two main types of AI powered robots which interact directly with patients. Social robots such as Paro and MARCo are being used particularly, but by not exclusively, in the care of the elderly, particularly with patients with dementia. These robots have been demonstrated to improve patients' sleep, mood and also to reduce pain. Physically assistive robots (PARs) help to mobilise patients, to lift them or in the case of robotic exoskeletons to enable them to walk.

Smart devices worn by patients can also detect early signs of disease and summon help. Empatica have developed a smartwatch in the AI can detect early sign of epileptic seizure from changes in the wearer's skin. It both alerts the patient and summons help if there is no patient response to the alert.

## Ethical Issues concerning AI

### Weak v Strong AI

One of the fundamental distinctions to make in the assessment of any claims about AI is to determine what kind of AI is being referred to. Weak AI, sometimes known as cognitivism, uses computer simulations to mimic the workings of the mind. On the Strong AI view however the appropriately programmed computer does not just simulate having a mind; it is a mind. The programme is to the hardware exactly analogous as the mind is to brain. The brain is merely a computer made of meat. Strong AI is sometimes also referred to as 'computer functionalism'.

Cognitivism does not present any specific ethical problems within a biblical worldview. Strong AI if true would imply that such a device was a person if sufficiently human like and hence passing the famous Turing test. The Jewish philosopher Hans Jonas, brilliantly criticised such a reductionist view in his paper, *Cybernetics and Purpose: A Critique* where he writes 'The pang of hunger, the passion of the chase, the fury of combat, the anguish of flight, the lure of love – these and not the data transmitted by the receptors imbue objects with the character of purpose ...and make behaviour purposive.' Human feelings and desires cannot simply be reduced to mere chemical reactions or algorithms.

The scriptures clearly indicate that humans have free-will (e.g. Ex 4v21, Deut 30v19, Matt 19 v 21-22) (though this paradoxically operates within the sovereignty of God, Ex 9v12) and indeed this is part of what it means to be made in the image of God. The same can only be said to a limited extent to a programmed AI.

### A form of immortality?

If Strong AI is true and the right programme is both necessary and sufficient for minds then this may pave the way for a form of immortality. As far back as 1981, Robert Jastrow, in his book *The Enchanted Loom: Mind in the Universe* wrote of his vision that 'Housed in indestructible lattices of silicon, and no longer constrained in the span of its years by the life and cycle of a biological organism, such a kind of life could live forever.'

More recently Yuval Harari has suggested that soon physical death will be eliminated by the advance of science. He states 'In reality...humans don't die because a figure in a black cloak taps then on the shoulder or because God decreed it or because mortality is an essential part of some cosmic plan. Humans always die due to some technical glitch' with the corollary that the glitch can in time be fixed.

The scriptures teach us however that 'people are destined to die once and after that to be judged (Heb 9v27) and Genesis 3 v22-24 even on a metaphorical interpretation clearly indicates that eternal life on this earth has been prohibited by God following the Fall.

Even if uploading of our minds should ever become possible – and that is big if in itself outside of sci-fi movies, there are no indestructible lattices of silicon. Machines malfunction and IT is as susceptible to glitches as the human body, so immortality by this route is in my view not going to happen. Combining AI with biological materials via neuro-silicon junctions may prove a more viable way of uploading human minds and the possibility of a human brain-cloud interface using neural nanorobotics technology has been recently postulated. Both of these are is a very long way off for use in humans.

## ”Accountable AIs?

As AI is increasingly incorporated into medicine whether in robotic surgery or assisted diagnosis the accountability for errors and adverse outcomes must ultimately rest with humans – those programming or operating the machine. Though Luciano Floridi and others have tried to invent a system of machine morality based on entropy of information systems, I and many others find this highly unconvincing. As I have argued in *The Ethics of Generating Posthumans*, ‘Human moral intuitions are inseparable from an internal emotional landscape moulded by decades of evaluation of experiences. Furthermore moral rules are developed and negotiated by social engagement with other members of the moral community.’ As St Paul states, ‘Bad company ruins good morals’ (I Cor 15v33). Recognising the challenges of ‘programming’ morals, some AI experts have recommended that in order to expose AIs to the vast array of human moral situations, the machines would need to be raised within human families.

Much of clinical decision-making depends on moral intuitions as much as on medical knowledge. One of my patients was told she would only live a matter of weeks if she did not have chemotherapy for her ovarian cancer. An algorithm would surely have indicated persuading her to have the chemo? Years of consultations with her however had taught me she would not go down without a fight and many months later she hosted a party of all her friends to which I was invited and you would not have known she was unwell at all.

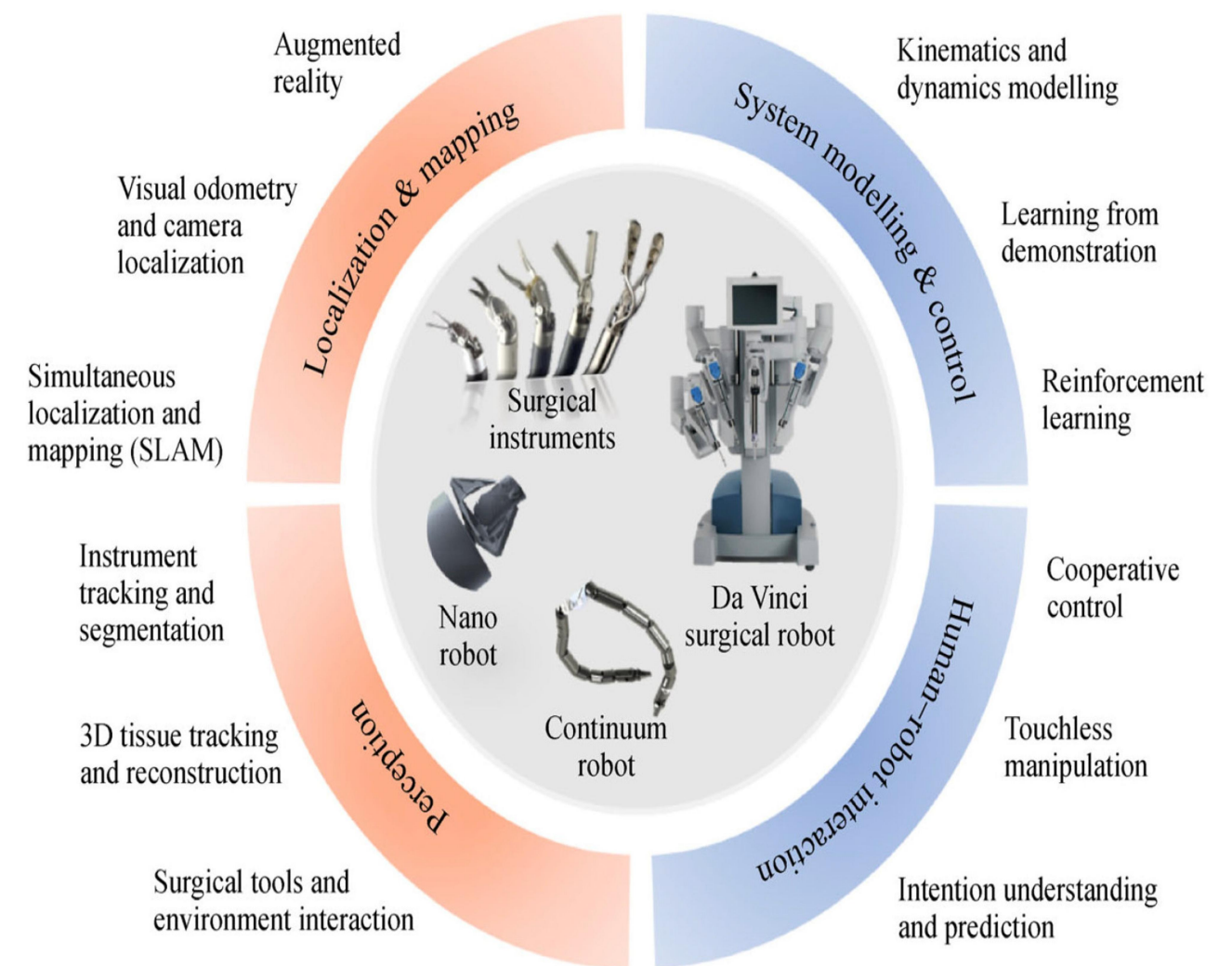
The potential of AI to improve future patient care and management is immense. But the false promise of computer functionalism is unlikely to dispense with the need for people in delivering healthcare. Indeed, it demonstrates clearly why humans will always be needed.

## Recommended Reading

2084: Artificial Intelligence and the Future of Humanity, John C Lennox 2020 Zondervan  
<https://www.amazon.in/2084-Artificial-Intelligence-Future-Humanity/dp/0310109566/>

The Robot will See You Now, John Wyatt and Stephen N Williams 2021 SPCK  
<https://www.amazon.in/Robot-Will-See-You-Now/dp/0281084351/>

The Ethics of Generating Posthumans, Calum MacKellar and Trevor Stammers 2023 Bloomsbury  
<https://www.amazon.in/Ethics-Generating-Posthumans-Philosophical-Theological/dp/1350216585/>



# AI in Healthcare: Charting an Ethical Course

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**Purpose:** In healthcare, Artificial Intelligence (AI) spans a diverse array of current, evolving, and prospective technologies designed to assist healthcare professionals in patient care. As novel technologies continually unfold, one requires guidance on the ethical, compassionate, and safe use of these advancements in healthcare. The purpose of this position paper is to provide healthcare professionals guidance on the ethical considerations of Artificial Intelligence in health and to highlight differences from medical ethics as we know it. This statement also outlines some tangible instances of AI applications in health to offer practical insights.

**Statement:** Christian Medical College Vellore stands with the community that emphasizes on the responsible integration of AI in healthcare and that it should align with and enhance the core values and ethical commitments of the profession[1–3]. We also believe that as a healthcare provider, we have a crucial role in ensuring that advanced technologies do not jeopardize the essential aspects of human interactions and relationships that are fundamental to the healthcare profession[4]. Only if we in healthcare develop a comprehensive understanding of AI can we provide informed decision to patients and families, dispelling misconceptions and alleviating concerns, thereby fostering a more informed and collaborative healthcare ecosystem[5].

## Background

### What is AI?

Artificial Intelligence (AI) is a transformative domain of computer science that is focused on building software and systems capable of mimicking human-like cognition and learning from data. What differentiates today's AI from previous technologies is the demonstrated capabilities of being able to learn or be trained for specific tasks, process, retain and recall large volumes of multi-modal data, and with more recent developments be able to interact with humans using natural language.

### How is it applied in healthcare?

Massive amounts of data are generated by the healthcare industry for diagnosis, therapy, and monitoring of patients. The last two-three decades have seen progressive computerization to manage operations, store data and enhance patient care. This large volume of data includes medical images, lab reports, machine generated diagnostics for an individual patient and collectively as a region or country (Big Data) [6]. This data may available be in structured or unstructured formats. Data collected is often not standardized, used largely in the delivery of patient care, and sometimes analysed for research or management outputs. Over the last two-three years there have been efforts to re-purpose stored healthcare data, to derive new knowledge and development of platforms, and develop diagnostic tools that use artificial intelligence [7].

For instance, AI algorithms are used to analyse radiological scans, to assist in early and accurate diagnosis of diseases like cancer, predict patient outcomes, personalize treatment plans, and identify potential complications before they become critical [8]. In drug development, AI accelerates the discovery of new pharmaceuticals by analysing vast datasets to identify potential drug candidates [9,10]. AI-powered robots are used to assist in surgeries, offering precision and control beyond human capabilities.[2] Chatbots and virtual health assistants are being piloted to support and provide information to patients, improving patient engagement and adherence to treatment[11]. AI's predictive capabilities are also being utilized in managing healthcare resources[12], optimizing hospital operations[13], and in public health for disease surveillance[14] and outbreak prediction [15].

However, it is imperative to emphasize here that AI technology is not magic that will solve all problems in health. It also cannot exist without the work of many people and resources that are continually required to care for the sick, make decisions on their diagnosis and treatments etc.[3] Yet, the use of all this data generated from various data sources is an important aspect of AI because its ethical use influences how AI functions and thus how it affects patients. [16]

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Before we proceed to AI applications, we should review the ethical principles that are paramount in healthcare. These principles still hold while we acknowledge that there are some areas where the capability of emerging technologies challenge the boundaries of our current understanding of the application of ethical frameworks. [17]

### **Ethical Principles in healthcare**

The core ethical principles in healthcare are 1) Autonomy - ensuring decisions about care are informed and voluntary 2) Beneficence (do good) and 3) Non-maleficence (do no harm) create the imperative to always act in the best interest of patients by providing beneficial interventions while diligently avoiding harm and 4) Justice that mandates equitable access to medical services, advocating for fairness in treatment, and the allocation of healthcare resources [18,19].

### **ELSA of AI in healthcare**

When considering integration of AI into healthcare practices, beyond the ethical principles mentioned above, there is a call to consider **Ethical, Legal, and Social Aspects, which are called ELSA**. [20]

Ethically, the confidentiality and privacy of the patient's health information is a fundamental requirement. AI algorithms should be developed and tested to avoid bias that could lead to unequal care or discriminatory health outcomes [4,21].

Furthermore, determining who is responsible when AI in healthcare goes wrong is a significant ethical challenge. The lines of accountability must be clear, whether it's the developers of the AI solution, the healthcare providers, or the institutions that use it. AI systems can be complex and opaque, making it difficult to understand how they reach certain decisions[21]. Hence, transparency in algorithmic decision-making processes will provide an opportunity for clinicians, patients, and other stakeholders to foster confidence in its use in clinical decisions. [22,23]

Legally, AI applications must align with stringent healthcare regulations including those related to patient safety and privacy (e.g. The IT Act (2000) in India with its amendments and Digital Personal Data Protection Act, 2023 ("DPDPA")[24] compliant. A regulatory framework designed to facilitate licensing, post-market monitoring and address liability of these applications is required. Intellectual property concerns also merit attention, optimally balancing innovation with ethical considerations[25]. Additionally, as AI becomes more autonomous, legal frameworks must adapt to clarify liability in instances of AI-related errors.[20,23,26]

Social considerations include ensuring that AI in healthcare does not exacerbate health disparities. Also, access to AI-driven healthcare should not be a luxury but should be accessible to all segments of the population, including underrepresented and traditionally marginalized groups. Building public trust in AI involves clear communication of its benefits and limitations, ensuring informed consent and engagement. Moreover, AI will impact healthcare employment and professional roles due to AI automation [27]. We must navigate these possibly adverse changes with social sensitivity, while supporting healthcare professionals through these transitions, to identify new opportunities and re-train personnel to build new capacities.

## What's similar?

Both healthcare and AI must be deeply rooted in beneficence and non-maleficence, this proposition must manifest in providing the best possible care to patients, while in AI alone, it's about ensuring that technology is used to enhance human well-being and societal good [28].

The focus of confidentiality and privacy in healthcare has always been on protecting patient information which must also be echoed in AI. It is important to ensure that this data is used responsibly and kept secure[29]. Transparency is another common theme. In healthcare, this translates to being clear with patients about their treatment options and what it entails. In the world of AI, transparency takes on a slightly different aspect: it's about understanding how AI systems make their decisions, particularly in healthcare settings. Clinicians and patients alike need to be able to trust and comprehend the AI tools they use. [30,31]

## Where do they differ?

While respecting autonomy in healthcare remains paramount; in AI, there must be an added layer to ensure that these systems support and do not override human choices (patient's or healthcare worker's), especially in clinical decisions.[28]

The use of patient data for AI in healthcare differs from conventional research in its scale, and the need for interconnected data sources. Large datasets are required for continuous development/training of the AI applications[16,29].

While healthcare focuses on equitable access; in AI, one must work at preventing biases in algorithms from the data made available for training that could skew treatment recommendations or health outcomes[21,29].

Healthcare professionals are directly accountable for their clinical decisions. With AI, it gets trickier – responsibility and liability stretch across developers, users, and regulators. It then becomes more about ensuring AI assists and does not replace medical judgment [32]. To this end Human-in-the-Loop (HITL) is a pathway that incorporates human oversight, ensures accountability in AI systems while integrating human judgment with machine efficiency[33,34].

Let us consider two case studies to understand these principles and their challenges in implementation.

### Scenario 1

Dr. Singh, Radiologist

45 years old, mid-career

Practices at a leading diagnostic hub in Mumbai

Has embraced AI-based imaging tools to transform cancer diagnostics

**Ethical Challenges:** Dr. Singh is happy with the number of scans he can handle each day and how the AI assistant supports him in identifying suspected malignancy and allows him to report his findings systematically. However, he worries that his diagnostic hub is currently unable to integrate with smaller hospitals who do not have digital radiographs. He is sometimes concerned about the AI tool's accuracy across the diverse patient scans he views but is happy that he can override the AI solution's triage decision based on his experience about the severity of some cases.

**Legal Challenges:** Dr. Singh faces uncertainty about legal responsibility. He is sometimes worried that he does not understand why the algorithm decided to label a certain area as a suspicious lesion. It is also a challenge to keep up with evolving healthcare regulations related to AI applications.

**Societal Aspects:** Dr. Singh also contemplates the societal implications of using AI in radiology. He wonders how patients from different socio-economic backgrounds perceive AI. He is happy that at his diagnostic hub; all the AI-assisted diagnoses are reported by a trained radiologist like himself. However, he sometimes wonders if it has been explained to the patients that their images will be reported using AI assistance and if they have consented to their images being reported and stored for further research and analysis.

## Senario 2

Priya  
Patient, Type 2 Diabetes  
35 years old, College lecturer  
Uses AI-based mobile application to monitor her diabetes.  
The app tracks her

## Ethical Challenges:

Ms. Priya is concerned about the privacy of her health data. She wonders who has access to her health data and how it might be used, highlighting issues of data security and patient privacy.

**Legal Challenges:** Priya is also unsure about the legal aspects of relying on a digital health assistant. If she does follows the app's recommendations and her condition worsens, what are her rights? This reflects the need for clear regulations on AI health applications.

**Societal Aspects:** Priya's use of the mobile application mirrors a trend in India towards digital health management. This raises broader questions about digital health literacy in India, the digital divide between urban and rural areas, gender inequalities and how such technologies might transform patient engagement in managing their own healthcare.

In both these two scenarios, Dr. Singh and Priya represent the diverse faces of India grappling with the ELSA challenges of AI in healthcare.

## Summary

This short discussion on ethical considerations of AI in healthcare and the case studies presented highlight the need for AI technologies to be not only advanced and accurate but also inclusive, respectful of privacy, and legally and ethically sound, especially in a diverse and multifaceted country like India. The healthcare community should make an active effort to keep themselves abreast of these changes and actively participate in efforts to ensure that the ethical underpinning of these applications is sustained.

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# THE ETHICS OF GENETIC ENGINEERING

Dr. Kuryan George & Dr. Anupama Nambiar



Human beings have evolved to the current form through a process of gradual genetic change. The process of natural selection is dependent on random mutations that enhance certain traits. The traits advantageous for the survival of the species become more widespread. However, these mutations are also responsible for the emergence of genetic diseases. In some instances, the errors which conferred a survival advantage in some environments were subsequently classified as a disease in other environments, e.g. Sickle cell anemia.

Today's technology is capable of bypassing the uncertain genetic lottery and chooses the precise genes that we wish to pass onto our future generations. We can transform, manipulate, and create organisms for any number of purposes. We can alter the way we relate to the natural world by manipulating the genetic codes of various organisms or engineering entirely new organisms. Genetic engineering has the potential to improve our health dramatically, revolutionize our way of living, conserve limited resources, and produce new wealth.

We have begun reaping the rewards of genetic engineering such as newer medical therapies and increased crop yields and so far, only a few instances of measurable harm have resulted. We don't have to solely rely on natural selection for evolution anymore. '

Genetic engineering can potentially customize our babies according to our will and give parents the ability to screen and select specific genetic traits in their children. Today the odds of selecting the sex of a child can be modified by sperm sorting. Parents-to-be can test embryos for certain genetic diseases to have the healthiest child possible. It is possible to detect potential genetic predisposition for Down's syndrome Huntington's disease and hemoglobinopathies by analyzing cells containing the embryo's genetic information. This prevents women from having to decide whether to abort an abnormal fetus and eliminates the deep grief and economic difficulties that many families are forced to cope with. As more and more genes are discovered to be associated with specific functions, parents could potentially examine the genetic makeup of their fetuses and modify them by inducing changes in their embryonic stem cells

The technologies in the future may offer parents the possibility to "enhance" their children, and possibly design' their babies while they are still embryos. This could enhance a child's mental and physical abilities, from being taller to having the potential to master music and chess. Someday, it may be possible to choose children's hair color, eye color, and even intelligence level. Parents have two diametrically opposite fundamental ethical obligations. The first requires parents to shape their children to be the best they could be and shape the child mentally, emotionally and physically after birth through upbringing and the environment they provide for the child. This is currently achieved through better schools, religious traditions, music lessons, coaching classes, coaching in games and sports and household chores. One could argue that everything we do to develop ourselves is 'enhancement' of our natural state, whether it's learning an instrument, foreign language, or social skills. The question really is what is the role of science in providing the child a head start. On the physical side, parents paying for orthodontics and even breast enhancements for their children are accepted by society, so why not enhance the more fundamental and arguably more important aspects of our children like intelligence or memory before birth?

Many people do not like 'playing God' being able to change someone else's destiny. Selecting these types of traits presents a dilemma. There are many social ramifications of manipulating a child's genetic makeup. Currently, enhancements chosen by an individual die with him.

When we select traits that can be passed on to our descendants, we will have the power to design future generations. This step needs to be taken cautiously. Choosing traits in order to “improve” the human bloodline sounds eerily reminiscent of efforts in the twentieth century to rid society of those considered “unfit” by forced sterilization or of efforts to create a master race, understandably raising concerns about abuse and “playing God.”

On the other hand, since genes influence behavior, it is responsible parenting and a positive obligation to weed out negative tendencies after conception. We should allow the parents a free choice in situations where genetic selection aims to benefit an individual and society. This would ultimately lead to a better and more intellectual society in the future. Whenever human beings try to interfere with the law of nature, it is likely to have some benefits, but not without some greater flaws. It has always been believed that nature should be allowed to take its course of action, and that interfering with this course is not acceptable. Yet, to ensure the survival of humans, we have tried everything, from animal testing, to human cloning, to designer babies.

The second obligation requires parents to accept their children as they are, to nurture their natural dispositions and talents whatever they may be. Balancing competing obligations is one of the central challenges of being a parent. A parent must acknowledge the unique qualities and the giftedness of life and accept their children as they are. For many parents, the sense of achievement lies in the success of their kids, through the combined effort of a child’s endeavors and the transforming love of the parent.

## **What are Pros and Cons of allowing humans the choice of being genetically modified?**

### ***Pros***

1. Parents have a right to do what they wish to their children. If the child is theirs, they have the right and it is ethical for them to consent to what their child should or should not have.
2. Genetic engineering can cure more diseases and provide greater possibility of babies free from diseases and mutations. Screening embryos for predisposition and risk for genetic diseases is also possible. This would enable parents to avoid the emotional hardships and economic burdens that accompany the birth of a child with an incurable disease. This is beneficial to both individual and society.
3. As the new technology becomes more widely available, new and better genes will be passed onto others. The social gap between the naturally endowed and everyone else, between those who can afford the technology and those who cannot, will ultimately narrow and disappear—creating a new age of human beings who are happier, smarter, and healthier. Smarter, more capable children are likely to make a difference to societies.

## **Disadvantages** *Ethical Concerns*

1. No one knows for sure what the social consequences are if we play our own “God.”
2. Most parents will want the same basic ‘good traits’ for their kids. This will lead to decreasing biodiversity
3. From a child’s point of view, the genetic enhancements imposed upon him or her by parents may pose a threat to freedom of action. Whether the child succeeds in life is not primarily determined by his or her own efforts, but from parental decisions made prior to birth. Altering a baby’s genetic traits and manipulating our own nature demeans the uniqueness of each individual and thus undermines our humanity. Genetic engineering with life-enhancing procedures devalues the meaning of parenthood, and parents may not look upon their children as something they are obligated to nurture and care for, but as mere consumer objects with expectations made even before the child is born.
4. The price is likely to be high. Those who can pay for the new technology will make themselves “better than well,” widening the existing social gap between them and those who cannot afford it. If it is not universally available, it would be unfair to those to whom the technology is not available.

## **Genetic Engineering as Inherently Wrong**

### *a) Religious objections*

Many perceive genetic engineering as “playing God” and object to it on the grounds that life is sacred and ought not to be altered by human intention. It violates the inherent “dignity” of humans and other life-forms to alter their DNA under any circumstances. However, most philosophers and theologians agree that God’s will is expressed in every facet of creation. Furthermore, consistent with the creator’s will, mankind has free will, which includes the ability to create technologies. Thus, genetic engineering can be considered as an expression of the creator’s will.

There are those who would claim that genetic engineering constitutes a misuse of our free will. Defying God’s will” very often can mean defying some person’s interpretation of God’s will. Determining misuse of free will depends entirely on a human interpretation of the divine directives. “Furthermore, if genetic engineering violates God’s will, is selective breeding of agricultural products, both plants and animals also contrary to God’s will. How is selective breeding qualitatively different from genetic engineering or is it only a methodologically distinct process. If selective breeding does not violate life’s sacredness, then does it mean that modifying nature is acceptable, but only provided we proceed slowly and haphazardly?

## b) Non-religious objections

Clothing, agriculture, and weaponry have altered our relationship with nature enabling us to live in a variety of climates, defending ourselves from inclement environments and dangerous predators. Without these technologies, it is likely that humans would have been very different, with different strengths and weaknesses from those we see now. We would have remained in relatively restricted environments, instead of populating six out of the seven continents (and the seventh to a limited extent). These technologies express a rejection of the “natural” order of things and result from human endeavor. The history of our tinkering with the nature is long, with its results generally lauded. Technologies such as antibiotics and contraceptives have interfered with the natural order of evolution. These technologies have affected not only human populations, but also numerous other species where humans have interfered through medicines, contraception, and selective breeding.

Those who oppose the alteration of genomes of humans and other species based upon a notion of the inviolability of natural processes must provide an ethical justification of the use of medicines, contraception, and selective breeding and how the former is set apart from conscious, more targeted alterations at the genetic level.

Selective breeding will over time, express desired genetic traits and suppress undesired genes (and thus their phenotypes). Selective breeding manipulates the genome of a species, or subclasses of that species. However, breeding for certain traits can also result in new and unanticipated infirmities. Genetic engineering merely allows for more selectivity in determining traits and in weeding out harmful traits or infirmities. It is arguably just a matter of degree rather than a qualitative difference that separates selective breeding and genetic engineering. Those who oppose genetic engineering on moral grounds must make a coherent case how it is qualitatively different from selective breeding, or they must similarly oppose the selective breeding which has resulted in almost every aspect of our modern agriculture.

Technology in any form is an outgrowth of our intellectual abilities: at its best, it allows us to overcome natural shortcomings. Few would argue that overcoming natural disadvantages violates our inherent dignity. The dignity of an individual member of a species, or of the species itself, is tied to its untampered status -from evolution to its present state. In fact, it dignifies us to use the talents we must improve our lives by altering our environment and our biology.

In evaluating these concerns, we need to bear in mind that genetic engineering is still young. Many social divides exist simply because some of us are genetically better endowed than others and are doing jobs with better compensation. Some children are born with better athletic prowess, quicker mathematical minds, and more acute visual senses than others. As a result, those lacking the genes will be at a disadvantage. But if enhancement technologies are readily available to anyone who desires them, it is difficult to see where enhancement will end. If everyone is enhanced with HGH to become six feet tall, then, inevitably, someone will want to be taller than six feet, and enhancement to a new height will begin.

### **Conclusion**

Genetic Engineering has the potential to transform our lives in many positive ways. More thought and reflection is needed on these questions in particular:

- Does the need to edit out certain diseases and disabilities express the concept that existing people with those diseases or disabilities are less than able-bodied persons?
- How, if at all, does gene editing differ from other ways in which we intervene in or exert power over future humans' lives?
- How much control should parents have over their child's traits? Does a "good" parent use gene editing?

*What level of risk should parents be allowed to assume on behalf of their future children?*

The enormous amount of progress in science has often resulted in scientific advances outpacing moral understanding. Very often, our moral understanding of the newer technology is still limited and scientists and ethicists struggle to articulate their concerns. Anxieties, fears, and moral objections to the promise of genetic engineering abound. Some are well-grounded and suggest caution, while others are the product of misinformation, prejudice, or hysteria. We must sort out objections based on sound science and reason from those that are unfounded.

Fear of new technology and a belief that human genetic modification enhancement is the next eugenic experimentation may lead to demands for stricter oversight through legislation and regulation to ensure that ethical violations do not happen. However, responsible decision-makers must also ensure that the regulations do not hamper fruitful implementation of genetic engineering. Too much regulation will stifle scientific innovation and prevent significant breakthroughs to enhance the quality of human life. Given the relative youth of the technology and the possibilities it offers for improvement of the humans, careful consideration of ethical implications can help inform and ensure the future of the genetics era.

*The robot revolution is coming...But are Christians ready?  
Advances in technology mean intelligent machines are likely to play an increasingly important role in our future*

Proff. John Wyatt

*This was first published by Premier Christianity and then on the website of Proff John Wyatt in Jan 2023. <https://www.johnwyatt.com>*

It was a spectacular event orchestrated by Elon Musk, the world's richest man. Optimus, a humanoid robot, walked gingerly onto the stage, waved to the crowd and performed a few primitive dance moves, accompanied by a light show and techno music.

Musk claimed that within a few years Optimus would adopt many of the tasks currently undertaken by human hands and minds. "This means a future of abundance, a future where there is no poverty, where you can have whatever you want. It really is a fundamental transformation of civilisation."

## STRANGER THAN (SCIENCE) FICTION

As Optimus illustrates, robots are increasingly leaving the realm of science fiction and entering our lives. They are constructing cars, ferrying parcels in warehouses, assisting in precision surgery and animating cute toys. Robotic devices that draw on Artificial Intelligence (AI), such as Amazon's Alexa and Google Home, amuse our children and operate the heating and lighting systems in our houses.

There are even robotic dogs working in hazardous environments such as offshore drilling platforms. There's little doubt that this trend will continue through the next decade, with robots becoming increasingly commonplace in many spheres of life.

Science fiction writers since Isaac Asimov have been dreaming of a time when robots will take over the boring, repetitive drudgery of our working lives so that we can enjoy leisurely pursuits. Popular media is saturated with images of droids, bots and replicants – think of films and TV shows such as Star Wars, Blade Runner, Humans, Westworld and so on.

The robots of sci-fi pop culture range from cute and friendly through to devious, creepy and scary. But they are all conscious, sentient and purposive – they all have an inner world and self-awareness. But, as the dystopic side of science fiction has taught us, what the robots are secretly planning might not be in humanity's best interests.

It was not surprising, therefore, that at the Optimus launch event in September, Musk cautioned his audience about the dangers of robots turning against humanity. Every Optimus would be fitted with a stop button that cannot be tampered with, he said. "We always want to be careful we don't go down The Terminator path."

## CHILDLIKE BOTS

From 2004's *I, Robot* to *Avengers: Age of Ultron*, science fiction has been obsessed by the possibility that the sophisticated and powerful machines we create to be our docile servants might turn the tables. And whether we like it or not, all our interactions with real-world robots – now and into the future – will be influenced by sci-fi culture.

This can be deeply problematic because of our inbuilt tendency to anthropomorphism – projecting human characteristics onto inanimate objects. Even though people know that current robot technology is not as advanced as in the films, there is a tendency to suspend disbelief when the machine looks and behaves like us. We can't help seeing our own humanity reflected back at us.

Some years ago, I attended a conference to discuss the ethical and spiritual implications of advancing AI and robotic technology. As I toured the university computer science department with a group of senior church leaders and theologians, we entered a laboratory in which a group of small childlike robots were operating.

Their eyes were flashing, arms were moving, speech processors generating sound – and instantly the atmosphere in the room changed. People were laughing, smiling and interacting. A senior bishop (no less) got down on his hands and knees to engage with the robots face to face.

However much we tell ourselves that these are just mechanical devices, we find ourselves drawn into emotional attachment. Unsurprisingly, robot developers and manufacturers expend considerable efforts on increasing emotional engagement with their creations.

They focus on creating cute and friendly animal or childlike beings that generate a powerful response. As tech ethicist David Polgar put it: “Human compassion can be gamed. It is the ultimate psychological hack; a glitch in human response that can be exploited in an attempt to make a sticky product. That's why designers give AIs human characteristics in the first place: they want us to like them.”

## ROBOT RIGHTS

Kate Darling, a researcher at the Massachusetts Institute of Technology Media Lab, has performed studies in which groups of volunteers were given small robotic dinosaurs to interact with. The volunteers were then asked to tie up, strike and ‘kill’ their robots. Darling reported that many of the participants refused to ‘hurt’ the robots, and expressed a sense of discomfort when they ‘whimpered’ while being smashed.

Darling uses this kind of evidence to argue that it may be necessary in the future to develop some form of ‘robot rights’ or legal protections: “Violent behaviour toward robotic objects feels wrong to many of us, even if we know that the abused object does not experience anything,” she says.

Studies of children who grow up interacting and playing with robotic pets have shown that while they are well aware that the robots are not alive, they understand them as being ‘alive enough’ to be a companion or a friend.

Like the adults in Darling's study, it seems many children develop a new category – or new way of thinking – about their robotic toys. On the one hand, the pets are not fully alive, but on the other, they are not dead. As one group of researchers wrote: “It may well be that a generational shift occurs wherein those children who grow up knowing and interacting with life-like robots will understand them in fundamentally different ways from previous generations.”

It is hard to know what effect this will have on emotional development. As psychologist Sherry Turkle put it: “Ultimately, the question is not whether children will love their robotic pets more than their animal pets, but rather, what loving will come to mean?” In other words, how might human relationships become distorted in the future if children increasingly learn about the meaning of love and intimacy from their interactions with machines?

## MANMADE MACHINES

For many of us, there is a special fascination with humanoid robots; replicants that seem indistinguishable from living, breathing humans. Professor Hiroshi Ishiguro, a roboticist at Osaka University, Japan, has created a robot that is an identical human-sized copy of himself. It replicates his appearance, movements and speech with uncanny precision. He has even used the robot to give lectures to students in his place. When questioned about his intentions, he said: “I have created this robot in order to understand what it means to be human.”

When we interact with a machine constructed out of wires, joints and motors, but which mirrors our own humanity, it can be a disorientating experience. There is often a sense of something creepy or uncanny about a robot that is nearly human but not quite. And I wonder whether that uneasy feeling is telling us something rather disturbing about ourselves. Is there a sense in which we, too, are simply biological machines made of flesh, nerves and muscles, rather than wires and motors?

Is there really so much difference between ‘a machine made out of meat’ and one made out of silicon? Physicist Sean Carroll expressed a view that many modern technologists would concur with: “When asked for my thoughts about machines that think, I can’t help but reply: ‘Hey, those are my friends you’re talking about.’ We are all machines that think, and the distinction between different types of machines is eroding.”

Of course, there is a certain truth behind all this. There are indeed aspects of the way that we function as humans that are similar to the robots and computers we have designed and created. The functioning of the human brain does have some similarities with the way a computer works, and academic research in psychology and neuroscience has provided fruitful insights. But to say that a human is a machine is nonsense.

## IMAGO DEI

The Christian faith teaches that each one of us is a person created as a unique reflection and physical representation of the invisible God. We are known, loved and even named from before the foundation of the world.

We are called into existence and formed in our mother’s womb; woven into a network of human relationships – friends and lovers – and called into intimate communion with our creator. We are given the dignity of freedom and are accountable for our choices and actions.

We are also offered the opportunity to be a temple of the Holy Spirit, destined ultimately to participate in the consummation of all things in the new creation. To be created as a human person is, in some mysterious and wonderful way, to be written into the great story of history, each one of us a bit-player in the great drama of the ages.

From this perspective, to compare a human person to a robot designed by human engineers seems a rather pathetic and forlorn exercise. I can’t help thinking of the words of the Old Testament prophet Isaiah, who lampooned the stupidity of the idol-makers of his day:

“He burns part of the tree to roast his meat and to keep himself warm.

*He says, ‘Ah, that fire feels good.’*

*Then he takes what’s left*

*and makes his god: a carved idol!*

*He falls down in front of it,*

*worshipping and praying to it.*

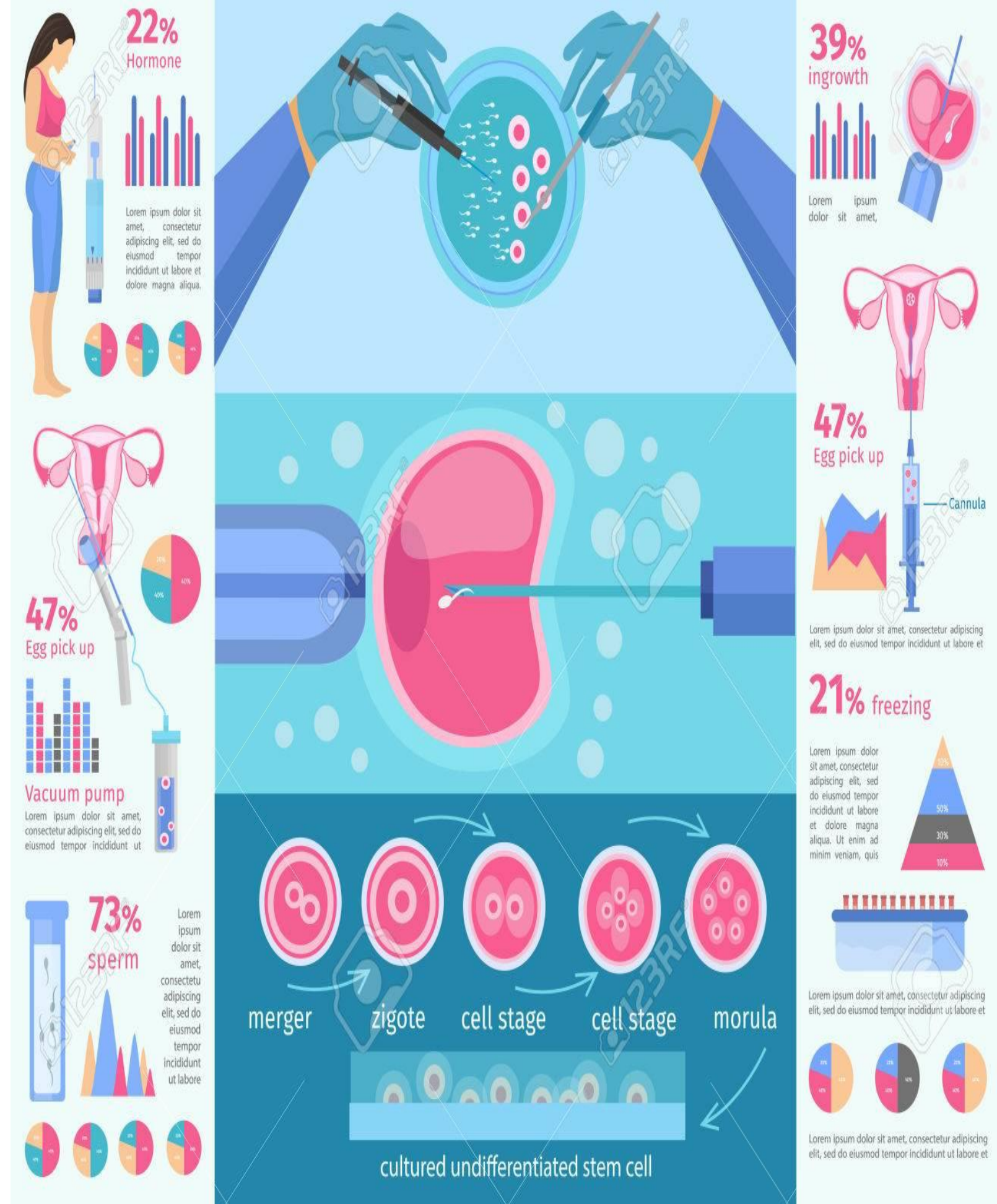
*‘Rescue me!’ he says.*

Isaiah 44:16-17 (NLT)

It's clear that human-machine relationships raise complex ethical, social and philosophical issues, and there are no easy answers as we look towards a future in which intelligent machines will play an increasingly important role. As we find the distinction between science fiction and our reality starting to erode, there is a fresh opportunity to reflect more deeply on our own humanity.

Although Musk's dreams of an age of abundance seem overplayed, there's little doubt that there will be definite economic and practical benefits from advancing robotic technology. But it seems to me that as Christian believers, we have a special calling to safeguard and celebrate the uniqueness and wonder of what it means to be human. In particular, to celebrate and uphold the importance of embodied face-to-face, human-to-human relationships.

There is no substitute for the human empathy, solidarity, friendship and love expressed in the human eyes that gaze at us, the human arms that care for us and the compassionate, thoughtful, loving words spoken by the human mouths of those around us. For all the brilliance of the engineering, you can't help feeling that the Optimus robot is a long way off from the real thing.





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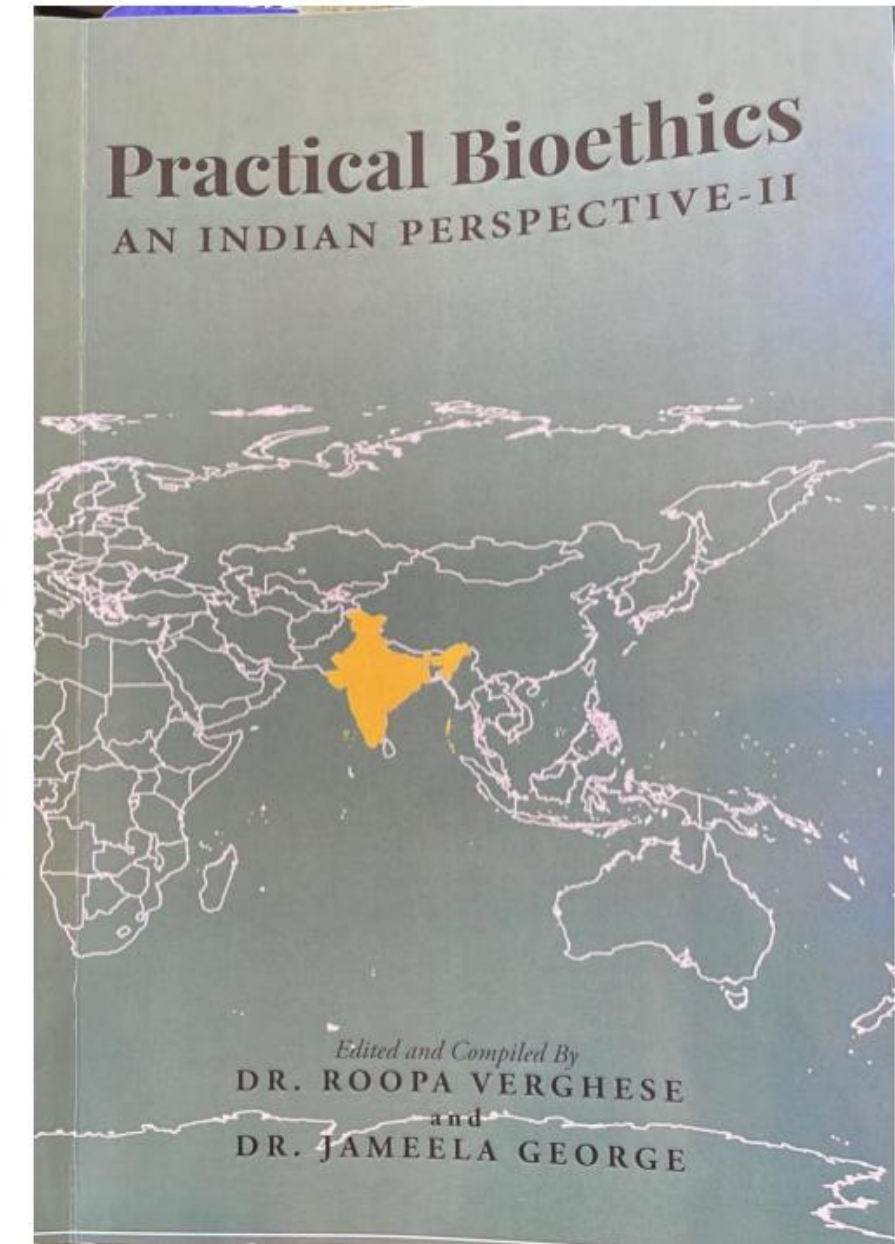
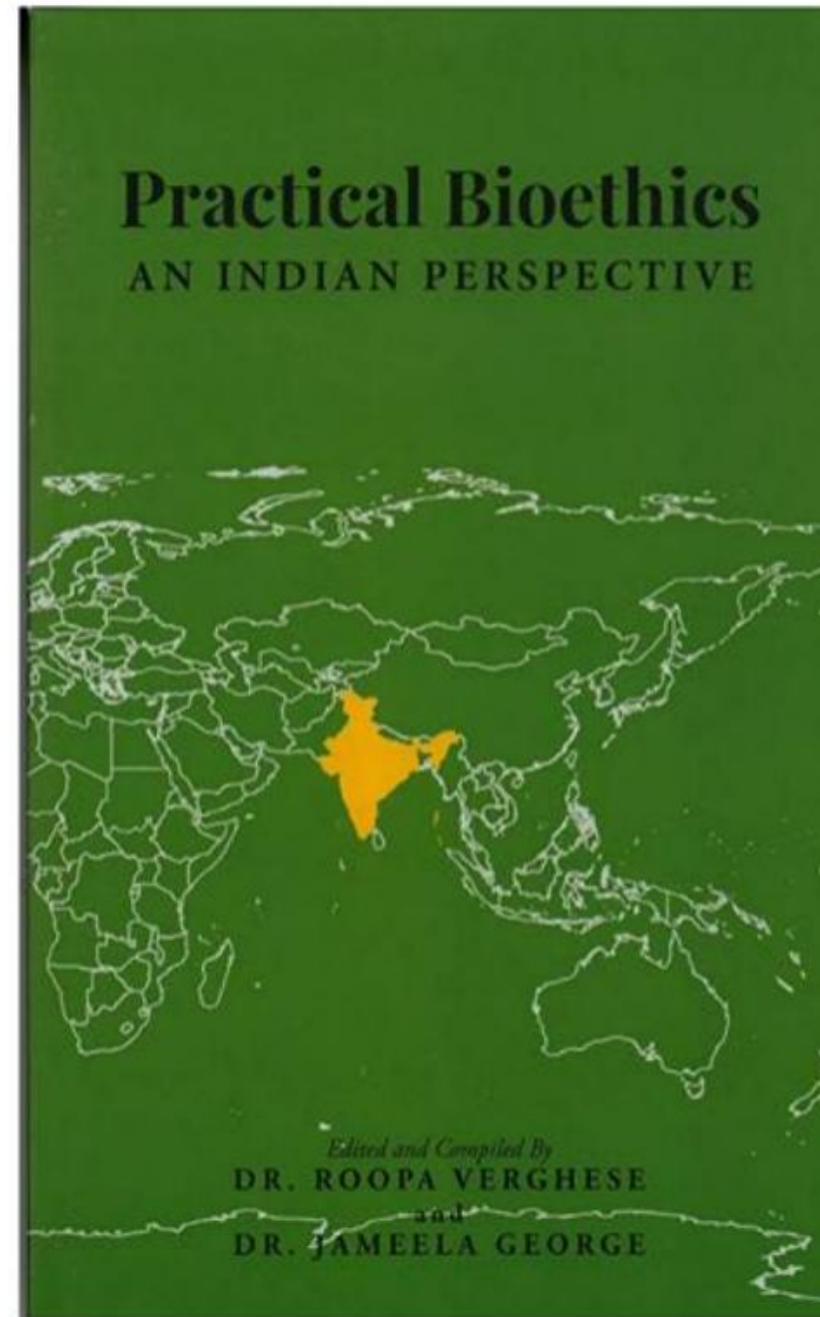
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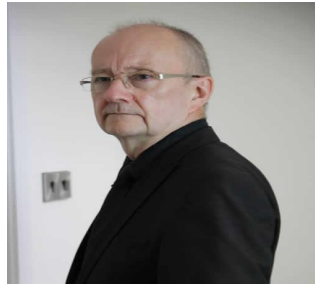
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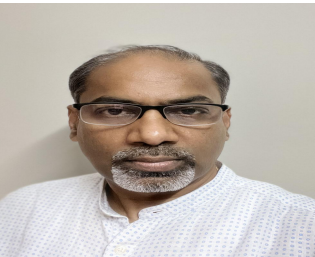
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Proff John Wyatt is as a consultant neonatologist and academic researcher focussing on the mechanisms, treatment and prevention of brain damage in newborn infants. I am now engaged in addressing new ethical, philosophical and theological challenges caused by advances in medical science and technology. I am also fascinated by the issues raised by rapid advances in AI and robotics, and the interface between cutting-edge science and Christian faith.

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