

DR MEGAN BEST

Fearfully and  
Wonderfully  
*Made*

Ethics and the beginning of human life

At last—a single volume examining beginning-of-life issues that is equally competent in biology, theology, philosophy and pastoral care. This is now the ‘must read’ book in the field, a necessary resource not only for pastors, ethicists, and laypersons who share her Christian convictions, but also for anyone who wants to participate knowledgeably in current bioethical debates.

**DA Carson**

Trinity Evangelical Divinity School, Chicago

Megan Best has committed a large part of her life to understanding the medical and ethical issues we face in relation to conception, birth, abortion, miscarriage, pregnancy, and reproductive technologies of all kinds. She weaves together the best secular knowledge, ethical, moral and historical writings, medical research, public policy, law, personal experience and biblical wisdom. This incredible synthesis is done with humility and grace, with great compassion and without judgement.

**Trevor Cairney OAM**

Master of New College, UNSW, Sydney

This is an outstanding resource for concerned Christian laypeople, health professionals, church leaders and students. It is authoritative, up to date, meticulously researched and pastorally sensitive. I strongly recommend this remarkable book. Megan writes honestly and compassionately from her personal experience as an ethicist, palliative-care doctor, Christian speaker and parent.

**John Wyatt**

Emeritus Professor of Ethics and Perinatology, University College London



Megan Best is a medical doctor and a bioethicist. She is passionate about the value of human life and has been involved at both state and federal government levels in the development of Australian legislation regulating the treatment of unborn humans. Megan is married to John and they have two wonderful daughters.



At last—a single volume examining beginning-of-life issues that is equally competent in biology, theology, philosophy and pastoral care. Scarcely less important, Dr Best's book is admirably clear, simple without being simplistic, comprehensive without being overly complicated. This is now the 'must read' book in the field, a necessary resource not only for pastors, ethicists, and laypersons who share her Christian convictions, but also for anyone who wants to participate knowledgeably in current bioethical debates.

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**John Wyatt**

Emeritus Professor of Ethics and Perinatology, University College London

Dr Megan Best's ambitious work covers every aspect of the science and ethics of the beginning of human life. She has made accessible the best research and much helpful theology to offer a robust Christian account. The book is a welcome reply to much of what passes as 'bioethics', and will become a point of first reference for anyone seriously wrestling with this bewildering area.

**Andrew Cameron**

Lecturer in Ethics, Social Ethics and Philosophy, Moore College, Sydney

In clear and theologically informed language, Dr Best discusses a wide range of issues and problems in contemporary bioethics. Her training in medicine and bioethics is evident on every page. Of particular interest to Christian health professionals and clergy will be her discussion of the basis for ethical decision making, and the way she continually draws readers back to the biblical teaching in seeking to explain and critique various arguments. Her final chapter, exploring whether we are playing God when we try to control when and how we have children, confronts head-on several of the instrumental and utilitarian temptations many of us face today. This will be a valuable resource for anyone engaged in teaching, pastoral care or clinical practice.

**Rev. Rod Benson**

Ethicist and public theologian, Tinsley Institute (Morling College), Sydney

In *Fearfully and Wonderfully Made* Dr Megan Best offers an intelligent and deeply felt defence of the Christian vision of the beauty and goodness of the human person, sexuality and marriage. Although we clearly part company on certain fundamental issues such as contraception and IVF, I commend Dr Best's much-needed work in bringing the tradition of Anglican Reformed theology and her love of Scripture to the crucial field of contemporary bioethics in an engaging and practical way.

**Cardinal George Pell**

Catholic Archbishop of Sydney

Finally, a bioethics book written by someone who is both a specialist doctor and an ethicist. Dr Megan Best helps us to navigate through the medicine and theology that we need to know for complex issues such as contraception, reproductive technology and antenatal screening. I especially like how Dr Best covers everything so thoroughly, yet also explains it clearly and sensitively.

*Fearfully and Wonderfully Made* is for everyone who wants to know what a biblically informed viewpoint should be on these current issues. I will be using Dr Best's book as a reference in the preparation of my own lectures on ethics, and as the basis for any bioethical advice I give as a Christian doctor.

**Dr Sam Chan MB BS BTh ThM PhD**

Theology, Ethics, Preaching and Evangelism Lecturer, Sydney  
Missionary and Bible College, Sydney

*Fearfully and Wonderfully Made* addresses the crucial matters pertaining to the beginning of life. In our world in which technology and choice are often promoted over truth and compassion, Megan Best has applied a biblical framework to reproductive and early-life issues. The book is informative and instructive for both those who seek guidance about early-life questions and those health professionals who are consulted to provide answers.

The book is also more. It represents a journey of exploration by Megan Best through the prevailing attitudes to human life over the centuries. Her conclusion as to the point that modern medicine and society have reached challenges readers to question how they are advocates for some of life's most vulnerable.

**Professor Jonathan Morris**

Associate Dean and Head, Sydney Medical School—Northern  
Director, Kolling Institute of Medical Research, University of Sydney

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Ethics and the beginning of human life

DR MEGAN BEST



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*For you formed my inward parts;  
You knitted me together in my mother's womb.  
I praise you, for I am fearfully and wonderfully made.*

Ps 139:13-14a

*Fearfully and Wonderfully Made*

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I have been humbled by the graciousness I have been shown during the five years I have worked to put this book together. I have spoken to countless people who have lived through the challenges discussed within these pages, and I am deeply indebted to them all for sharing part of their lives with me. Many experts have kindly answered my questions as I have studied the current practice of medicine at the beginning of life, and the associated theology. I appreciate the assistance given by Andrew Cameron, Don Carson and my research assistant Elizabeth Hegedus. Thank you Andrew and Penny Wilkinson for your hospitality. A particularly big thank you to those who gave the time to read through chapters at draft stage and make suggestions: Kirsten Birkett, Peter Bland, Patrina Caldwell, Anne and Geoff Campbell, Patricia Chan, Sam Chan, Sarah Condie, Angela Ferguson, Andrew Ford, Peter Jensen, David Kardachi, Jonathon Morris, Kirk and Lisa Patson, Jeff Persson, Karin Sowada, Rob Smith, Joseph Thomas Thenalil and Ron Vaughan. Some of those chapters were really long. All remaining errors are my own.

To the staff at Matthias Media, a big thank you for all your work in putting the book together, especially my editors Tony Payne, Lee Carter and Emma Thornett, and to Hayley Boag who had to bear with my late additions. The book would not have been what it is without your long hours of labour.

Finally, a big thank you to my family, who have put up with me being distracted by all things embryonic for such a long time—to Amoni and Susannah, who bring me so much joy, and finally to my husband, John, without whose care, support and cups of tea this book would never have been written. In acknowledgement of his invaluable contribution I dedicate this book to him.

# Preface

**I** READ A NEWSPAPER article the other day, with this headline:  
**‘Are these babies really a crime?’**

Underneath were photographs of two adorable children lovingly clasped in their parents’ arms. It was a story about gestational surrogacy, prompted by the birth of children to high-profile parents through the use of a surrogate mother.

Are they a crime? Of course not. All babies are beautiful, and these children are loved by their families and no doubt bring much joy. But it highlights the difficulty in evaluating the morality of issues in reproduction, because reproductive technologies are aiming to provide things that are in themselves good—things that are normal for humans to desire; things that we all desire. Because these technologies aim to satisfy these good desires, we hesitate to brand them as wrong. Nonetheless, evaluating them objectively is a necessary task if we are to put all areas of our lives under the lordship of Jesus Christ.

I have written this book in response to many requests from Christians who are struggling to find the information they need to think clearly about the morality of reproductive technology. I write from the perspective of believing that human life begins at fertilization and deserves protection from that time. I will give my reasons for this position, but I accept that some will not agree with me. This book may not be for them (although I hope and trust that it will provide clear and useful information on the current state of play in medicine and technology for all readers). The book will be particularly relevant to those who hold the Christian Bible as authoritative, and want to see how it can be applied to modern

reproductive dilemmas.

These matters involve personal decisions for which we will answer to God alone. No blame is intended for those whose past choices are now regretted. We make the best decisions we can with the information we have at the time. I now know from experience how difficult it is to get accurate information on some of these topics. This information is intended to help us look forward, not back, and make the best choices we can in the future. We live in a fallen world and none of us is free from the ravages of sin. Thank God that he knows our hearts and forgives our sins when we confess them to him (as 1 John 1:9 promises). Finally, I realize that some of the subject matter in this book refers to unspeakable personal suffering. May the God of all comfort hold you in the palm of his hand.

Megan Best

July 2012

# 1

## The dilemma

**I**S IT EVER RIGHT to have an abortion? What about the case of a young girl who has been raped? Or what if the baby has something seriously wrong with it and we know it can't survive?

What about the right to have a child? When we 'create' test-tube babies, are we saying we know better than God who should be a parent? Is IVF ever okay for Christians?

These are all very good questions. However, they are also difficult questions that affect the whole of our lives. Children are a blessing from the Lord, and it is right and good to desire them. Yet the technology that can make fertility control possible does not always operate within a framework where human beings are valued from the time they are created. Not only that, but as more and more extreme manipulations of unborn humans become available, the less extreme ones seem more reasonable by comparison. Before we know it, as a community we find ourselves regarding unborn human life as a resource to use rather than a gift to cherish. We contemplate our ethical dilemmas and say to ourselves, 'How did we end up here?'

Due to the development of reliable contraception and assisted reproductive technologies (ART) we are told that we can now have sex without children, and children without sex. The question is: should we? The urge to have a baby can be powerful, and the fear of an unplanned pregnancy can be overwhelming. Faced with unmet desires in a world where anything seems technologically possible, in a climate where we are used to being in control, the pull between what is possible and what is ethical can create an unbearable tension.

People in church circles often feel this tension strongly, but discussions

about practical issues arising from our sexuality can be awkward and embarrassing, involving as they do images of “glistening eyes and soft dark orifices, moisture and menses, muscle and bones and blood”.<sup>1</sup> However, God made us as embodied creatures, and our physicality is an important part of what it means to be human. As the way society views our bodies moves further and further from the biblical understanding, we need to think through a truly Christian understanding of human procreation.

Reformed Christianity has not always been strong in this area. In fact, it is difficult to find a comprehensive theology of the issues surrounding human procreation. Whatever the reasons in the past, as the science involved gets more complex, it is imperative that we get a clear theologically driven handle on the questions it raises. Recent controversies about the morality of research on human embryos have made many people think more carefully about other ways we treat humans in this early stage of development. I am regularly asked, “If it’s not okay to kill a human embryo for research, why aren’t we more careful to check which contraceptives do the same thing?”

This book, then, is an attempt to examine the different aspects of the quest for married couples to plan their families. It is not intended to replace a medical consultation at any level, but to give information that allows the reader to prepare ahead, and to think through the issues from a biblical point of view.

As we do so, there will be some inevitable clashes with the prevailing views of our society. Sometimes we will need to go against the flow, and not fall in with accepted modern practices. We will examine things carefully, and if necessary, do things differently, in order to be faithful to God. This can be hard. You might be seen as a nuisance or a crackpot. But Jesus Christ has called us to be salt and light in the corruption of our generation. We are the people of God. We *should* look different, and when we live out the kingdom’s values we bring glory to God.

Modern reproductive technology is very complex, and it is difficult to make ethical judgements about reproductive therapies if we don’t understand what is actually being done. This book is therefore organized to help you understand those areas with which you may be unfamiliar. As you read, please remember that this is an international publication, and so the availability of some practices will vary in different countries.

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1. J Budziszewski, in ‘Contraception: a symposium’, *First Things*, December 1998, pp. 17-29.

Many of the key topics in medical ethics revolve around the question of when human life begins, so it is important we clarify that issue at the outset. We start by considering the biology of how human life develops in the womb, before looking in chapter 3 at the philosophical and theological questions of when life begins. Human beings are made for relationships, and we cannot make important life decisions in any other context, so chapter 4 looks at the background of biblical teaching on human relationships. A model for ethical Christian decision-making is offered in chapter 5 so that we can determine a biblical way to decide right from wrong, and see how this will differ from others in our community.

Following that we will consider separately the areas that can hold ethical problems for those who believe life begins at fertilization. This book assumes that the place for sexual relationships for Christians is within marriage. At the beginning of our married lives, there is usually more interest in contraception than child-bearing, so we begin with that topic in chapter 6. The easily available option of reversible contraceptives has, however, reduced the tolerance for unplanned pregnancy, so the corollary of legal abortion was almost inevitable. We deal with it next in chapter 7.

We look at normal pregnancy and find out the new and sinister agendas underlying many modern practices in chapter 8. In chapter 9 we go on to consider what can be done when you discover there is something wrong with your longed-for child.

Of course, not all couples will be able to have the baby they wish for, so in chapter 10 we examine infertility, before touching on the silent sorrow of miscarriage and stillbirth in chapter 11. One ‘solution’ to infertility is assisted reproduction and we look at that in chapter 12, before considering why you may decide against it in chapter 13. A common problem for Christians pursuing assisted reproduction is deciding what to do with leftover embryos. Options are discussed in chapter 14. Chapter 15 on human embryo research, stem cells and cloning helps clarify some of the options available to parents in this situation.

In the midst of all the discussion about assisted childbirth, we need to take time to consider whether it is ethical for Christians to embrace modern technology in the quest for a child. After all, if God had wanted us to be parents he could have made it happen naturally, couldn’t he? When is it permissible to take things into our own hands? We look at this in chapter 16.

We end by considering how the Christian view of the value of unborn



human life has changed over the ages, and whether pastors need to rethink the guidance they offer their members in the new millennium.

The appendices allow us to consider in more depth a few issues raised in the text: whether the oral contraceptive pill causes abortions, what are the commercial markets created by abortion, advances in the study of human genetics, and what is meant when someone asks you if you want your baby's cord blood cells collected at birth.

Many of the papers and journal articles I refer to in the footnotes—and even some of the books—are available online and can be freely read or downloaded. Internet search engines are great tools for this purpose, and I encourage you to follow up on those references that interest you.

I think it is important that in all our discussion of these topics, we remember that we will touch on painful issues for real people who have had to come to terms with terrible sadness in their lives. My prayer is that this information will help those who are making decisions, and those who are supporting them, to bring glory to God.

# 2

## Biology

**O**NE OF THE DIFFICULTIES in discussing the morality of medical technology is that in order to understand the ethics, we first need to understand the technology and the science that underlies it. In this chapter, I am providing a biology lesson to remind us how life begins at fertilization. I will also examine arguments that suggest human life begins *after* fertilization.

### Human development

Human conception begins with fertilization of an egg<sup>1</sup> by a sperm. Cells in the human body have 46 chromosomes, made up of 23 pairs. Chromosomes carry the genetic material, or DNA (deoxyribonucleic acid), that guides our individual growth and development. Both the egg and sperm carry half the usual number of chromosomes, so their union creates a single cell with the full complement of chromosomes. This single cell is called a *zygote* and has its own unique genetic code.<sup>2</sup> Both the sperm and the egg cease to exist individually at this point. It is not a ‘fertilized egg’ so much as the first cell of the new human, physically representing the ‘one flesh’ (Gen 2:24) of the father and mother. All the genetic material required for full maturity of the human being is present in this single cell, and from this point on it will direct its own growth. From this point, development of the individual will be a continuum

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1. The correct term for the human female gamete is ‘oocyte’. However, even though it is a more culinary term, ‘egg’ is used here for familiarity.

2. For a more detailed explanation of human genetics, see appendix III.

through pregnancy and childhood to adulthood. We therefore have in the human zygote a member of the species *homo sapiens*.

A human being is conceived when a sperm penetrates the wall of a human egg, which normally happens in a woman's fallopian tube.

Diagram 1: Female reproductive organs

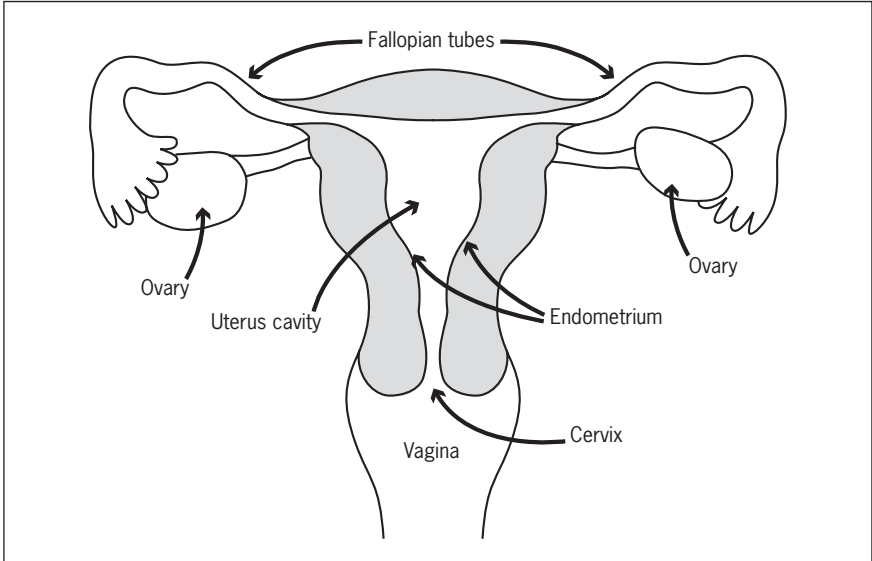
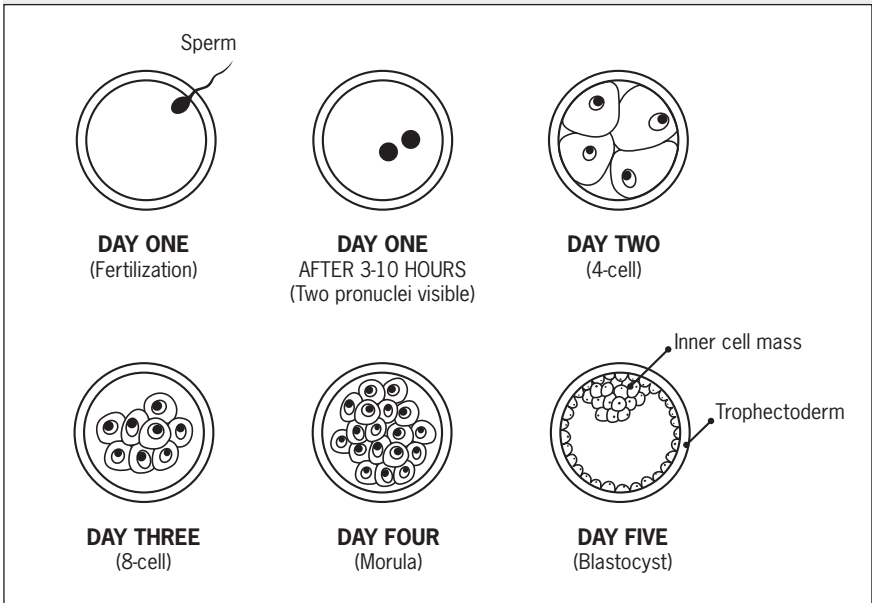


Diagram 2: Early embryo development



The first cell division occurs within 24 hours of conception, and cellular division continues while the embryo travels down the fallopian tube towards the uterus.<sup>3</sup> At day 5 a *blastocyst* is formed, at which point the cells have divided into those which will become the baby and those which will become the placenta; an inner cell mass surrounded by a hollow ball of cells. The blastocyst will normally be floating in the uterus at the end of the first week, when implantation begins. The blastocyst attaches to the uterine wall and the mother's blood supply starts to nourish it. Sadly this doesn't always happen successfully and instead an early miscarriage occurs.

At around 14 days, the mother will notice that she has missed her menstrual period—the first outward sign of the pregnancy. Embryonic development from this point is quite rapid. Note that babies can vary in their development and the information below is a rough guide only, counting weeks from fertilization.<sup>4</sup>

Table 1: Human embryological development

Age (weeks)	Length (mm) <sup>5</sup>	Development
3	1	Future spinal cord begins to develop and heart tubes begin to fuse. Blood cell production begins.
4	3	The embryo's own heart begins to beat regularly. Early development of the brain, thyroid, eyes and ears, arms and legs. Embryo begins to curve into typical C shape.
5	8	Continued development of eyes and mouth, arms and legs. Nose, sinuses, lungs, and hands begin to grow.
6	16	Beginning of formation of feet, ears, nipples and bones. Continued development of face and brain. Fingers are growing on hands and toes on feet.

3. The first week of embryo development is covered in more detail in chapter 12.

4. Working out the duration of pregnancy can be confusing, as some people date it from the first day of the last menstrual period (this is known as *gestational age*, which actually starts counting before fertilization takes place). This was traditionally used because most women know this date. Embryologists describe development in *ovulation age* (time from ovulation) or *postconceptional age*, which is used here. You can translate this number into gestational age by adding two weeks to the postconceptional age. For greater detail of embryology see R O'Rahilly and F Müller, *Human Embryology and Teratology*, 3rd edn, Wiley-Liss, New York, 2001; for fetal development see F Cunningham, K Leveno, S Bloom, J Hauth, D Rouse and C Spong, *Williams Obstetrics*, 23rd edn, McGraw-Hill, New York, 2010, chapter 4.

5. From 3-5 weeks greatest length is given; from 6 weeks crown-heel length is given.

7	22	Trunk lengthens and straightens. Upper limbs are longer and bent at elbow. Hands approach each other, feet likewise. Kidneys and tastebuds start to develop. Hormones are beginning to be produced by the embryo.
8	43	Eyelids and external ear more developed. Limbs longer and more developed. Beginnings of all essential external and internal structures are present.

You can see that even while still at the *embryonic* stage (that is, from 0-8 weeks), an enormous amount of development has taken place. After 8 weeks, the *fetal* period begins. At 3 months, the fetus is fully formed and all organs are beginning to function. The remainder of the pregnancy is the time during which the fetus will mature.

Table 2: Human fetal development

Age (weeks)	Crown-rump length (mm) <sup>6</sup>	Development
9	50	Eyes closing or closed. Head more rounded. Intestines are in the umbilical cord.
10	61	Intestines in abdomen. Early fingernail and bone development. The fetus can move spontaneously when seen on ultrasound. Fetus begins to swallow amniotic fluid.
12	87	External genitalia distinguishable as male or female. Well-defined neck. Tastebuds mature. Kidneys start to make urine. Fetal chest wall movements are starting.
14	120	Head erect and lower limbs well developed.
16	140	Ears stand out from head.
18	160	Early toenail development.
20	190	Head and body ( <i>lanugo</i> ) hair visible.
22	210	Skin wrinkled and red. Eyebrows and eyelashes usually recognizable.
24	230	Fingernails present. Lean body. May be able to suck and hear.
26	250	Eyes partially open. Eyelashes present.
28	270	Eyes open and sensitive to light. Good head of hair. Skin slightly wrinkled.

6. Average measurements are given, variation increases with age.

30	280	Toenails present. Body filling out. Testes descending.
32	300	Fingernails reach fingertips. Skin pink and smooth.
36	340	Body usually plump. Lanugo hair is disappearing. Toenails reach tips of toes.
38	360	Prominent chest; breasts protrude. Fingernails extend beyond fingertips.

## Language

I have noticed in my research that language is often used to confuse the debate regarding when life begins. Depending on your purpose, early embryos can be called many things, including ‘pre-embryos’, ‘fertilized eggs’, ‘pre-syngamy eggs’, ‘little clusters of cells’, and ‘genetic material (which is going to be thrown away)’. And the problem isn’t just euphemisms for early embryos; I have also seen the term ‘conception’ used to describe the beginning of fertilization (fusion of sperm and egg), the end of fertilization (syngamy), full genetic expression (around the 8-cell stage) and implantation (around 7-10 days). Then there are various options for the term ‘cloning’: we have ‘therapeutic cloning’ (which sounds downright good for you), ‘cloning for research’ (which also sounds fairly harmless), and ‘somatic cell nuclear transfer’ (which for most people means nothing at all). Although the technical terms can be difficult for those not used to them, there is a lot to be said for clarity. Any terms that obscure the truth instead of increasing transparency should be avoided.

## Common objections to the argument that human life begins at fertilization

In public debate, no educated person questions the humanity of the human embryo any more. The argument now focuses on *when* the embryonic human deserves protection. Nonetheless, despite the straightforward embryology, you may still hear arguments that suggest the embryo is not human.<sup>7</sup> I have listed the most common of these below, along with a response to each one.<sup>8</sup>

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7. Some of these arguments are also used to deny the moral significance of the unborn human.

8. I have heard these arguments from many sources and have not listed them all. This topic is treated in great detail in RP George and C Tollefsen, *Embryo: A Defense of Human Life*, Doubleday, New York, 2008.

## 1. Twinning and the problem of individuality

This objection states that, because it is possible for an embryo to divide into two identical twins, or indeed (rarely) for two embryos to meld into one, and because the early embryo is totipotent (each individual cell retains the capacity to develop into a separate embryo), it is not possible to say that a single human individual exists from zygote stage (because you could end up with two). It is argued that it is only at around 14 days, when totipotency and the possibility of twinning no longer exist, that the human individual exists.

**Response:** This argument confuses individuality with indivisibility. While most individual humans are indivisible, it is not *necessary* for them to be indivisible in order to be human individuals. Consider conjoined (Siamese) twins. Despite the fact that they are permanently joined, we talk about them as two persons rather than one. In any case of fertilization, an individual embryo exists from day one. It may or may not divide during the next two weeks. At present we don't know enough about the twinning process to be able to know from day one whether or not the embryo will divide. However, the possibility of division does not remove the fact that the individual embryo exists. Should it divide, then two individuals exist. The existence of one has begun in a way that is unusual for a human being (i.e. twinning), but this does not alter the fact that it has begun to exist as an individual. The other embryo continues to exist, as it has since day one, maintaining its identity (ontological continuity) for the rest of its life. The unusual process of generation does not change these facts, and our inability to identify which is the 'new' embryo and which is the 'continuing' embryo also does not change these facts. The objection that two embryos can become one (mosaicism) can be responded to in the same way.<sup>9</sup>

## 2. The problem of destiny

This objection notes that most of the substance of the early embryo does not contribute to the future fetus. The developing cells of the embryo do not separate into those that will become the embryo and those that will become the extraembryonic membranes (such as the placenta) until the

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9. Further discussion is found in JJ Davis, 'Human embryos, "twinning", and public policy', *Ethics and Medicine*, vol. 20, no. 2, Summer 2004, pp. 35-46; and J Finnis, 'Abortion and Health Care Ethics', in R Gillon (ed.), *Principles of Health Care Ethics*, Wiley, Chichester, 1994, pp. 547-57.

blastocyst stage, and all tissues supporting the development of the fetus are discarded at birth. How can we call the early embryo a human being when this excess tissue makes up more than half of it?

**Response:** Our inability to distinguish those cells that will become the body from those cells that will become the placenta after the first week does not change the fact that a human individual is represented in an early embryo. It is just a human individual with extra tissue. The lack of clarity should make us more careful in our handling of it—not less.

### 3. The problem of wastage

It is estimated that roughly up to 75% of all embryos created naturally will fail to implant after fertilization, often without the woman ever being aware that she was pregnant. It has therefore been suggested that the destruction of human embryos which is sometimes part of the reproductive technology process is the equivalent of this normal ‘wastage’, and therefore of no moral concern. This argument suggests that the sheer number of lost embryos in either process reduces the significance of each individual one.

**Response:** It is true that there is a high rate of loss of human embryos before natural implantation (the range is 30%-70%). This is frequently due to a genetic abnormality, such as the wrong number of chromosomes or missing/extra bits of chromosomes, which can be fatal for embryos. Other reasons that some embryos don’t make it include local endometrial (womb lining) factors affecting receptivity to the blastocyst; or a lack of energy in the embryo due to mitochondria problems, especially if they were made from an older woman’s eggs (the mitochondria is the ‘power house’ of the cell). However, this is not an expression of the unimportance of early embryos so much as a problem of living in a fallen world. In countries where many children die before 12 months of age, you would not consider each child less important, but as a casualty of disease in a fallen world. You certainly would not say they weren’t human. Furthermore, how can a statistical argument (which speaks in percentages) give us a sufficient indication of discontinuity in the individual embryo to justify destruction?<sup>10</sup> As we do not know in advance which embryos will live and which will die, we need to treat them all carefully.

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10. See O’Donovan, *Begotten or Made?*, OUP, Oxford, 1984, p. 57.



#### 4. The problem of environment

This is really an extension of the ‘wastage’ argument. It is suggested that until implantation, the embryo is not in a secure environment where nurture is ensured. In the 10 days or so before implantation, the embryo could still be flushed out of the uterus with the next menstrual flow and there is no guarantee that it will remain in an environment where it will be able to flourish.

**Response:** Location is not a biologically significant factor when deciding what an embryo is. It is either a human being or not, regardless of where it is. None of us would survive long if we were not in an environment conducive to our survival.

#### 5. The problem of syngamy

The continuity of the human being from fertilization is linked to its unique genetic code (DNA), which results from the fusion of egg and sperm. However, as we have discovered more about the embryo we have realized that fertilization is not so much an event as a process. We now know that there is a gap of about 20 hours between the penetration of the egg by the sperm and the total fusion of male and female DNA (*syngamy*). It is suggested that if personhood is linked to the genetic continuity of the individual from embryo to live birth, then the human embryo should be protected only once syngamy (and therefore fertilization) is complete.

This may seem petty—arguing over a few hours time difference—but it is significant because some scientists want to conduct research into aspects of fertilization that occur before syngamy (for example, the microinjection of a single sperm into the egg). This has led to a change in the definition of an embryo in some jurisdictions so that it is said to exist only after syngamy has occurred.

Also, a few hours before syngamy, the genetic material from the sperm and the egg are visible as separate *vacuoles* (storage bubbles) called *pronuclei*. Some ART<sup>11</sup> clinics offer the service of freezing embryos at this stage (they may call the embryos ‘fertilized eggs that have not yet become embryos’) to avoid producing more ‘embryos’ than will be used, yet still have the benefits of freezing.

Those who believe that legislation should protect the human embryo only after syngamy is complete are not necessarily arguing against the

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11. Assisted reproductive technology.

view that a new human life begins at fertilization. Rather, they may be attempting to explain the traditional view more precisely.

**Response:** There are many points at which the embryonic human life is said to have begun: on penetration of the egg by the sperm; at syngamy; on implantation; at viability; and at birth. Certainly there are significant milestones reached at each of these points, and each milestone is necessary for the ongoing development of the human being involved. However, the first ‘significant moment’ is when a particular sperm penetrates the egg so that the sperm and the egg individually no longer exist. At this time the structure of the egg wall changes so that no other sperm can enter. This is the moment when the unique combination of genetic material of the new individual is first together within one cell, and all other genetic combinations (had a different sperm won the race) are no longer possible. The gender of the embryo is decided. To choose any later ‘significant’ point is arbitrary.

Although it is possible for the normal sequence of events in fertilization to fail in some way—for example, more than one sperm may enter the egg—this is unusual and leads to significant abnormalities in the embryo. I would not change my definition of the embryo on this basis. We create definitions based on the common manifestation rather than the exception. So while it is possible for a man to have one leg, he usually has two. We would not say he was not a man because of this difference, nor would we refrain from defining ‘man’ as a two-legged creature because an exception is possible.<sup>12</sup>

We also know that the beginning of fertilization (prior to syngamy) is significant in other ways. The organization (orientation) of the embryo’s development seems to be present from the start, and may be related to the sperm’s point of penetration.<sup>13</sup> In addition, the embryo is a separate organism that will direct its own growth and development from that point on.

Furthermore, the argument from syngamy seems to me to be trying consciously to follow the letter of the law while avoiding the spirit of the law.

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12. This point is challenged in S Buckle, K Dawson and P Singer, ‘The syngamy debate: When precisely does a human life begin?’, *Law, Medicine and Health Care*, vol. 17, 1989, pp. 174-81.

13. The very early development of the embryo is still not fully understood. See T Hiiragi, VB Alarcon, T Fujimori, S Louvet-Vallée, M Maleszewski, Y Marikawa, B Maro and D Solter, ‘Where do we stand now? Mouse early embryo patterning meeting in Freiburg, Germany (2005)’, *International Journal of Developmental Biology*, vol. 50, no. 7, 2006, pp. 581-88.

We all know that a human being comes from the joining of the sperm and the egg. If it is not a nascent human being prior to syngamy then what is it?

## 6. The problem of potential

This argument concedes that the early human embryo has the potential to develop into a fully conscious human being, but denies that this potential means it deserves to be given moral significance. This argument does not grant moral significance on merely biological grounds.<sup>14</sup>

**Response:** The words used in ethical debates can make a difference to how the community thinks. One problem of discussing embryos in terms of ‘potential’ is that it gives us the impression that the embryo is not fully human, when what is meant is that it is not fully developed. It would be more helpful to describe an embryo as a ‘human with potential’ than as a ‘potential human’.

However, this helps us clarify some of the confusion. If we mean that the embryo *will become* a fully conscious human, it would be fair to say we imply that the embryo is not fully a human being *yet*. But that is not what I mean when I say an embryo deserves protection because of its potential. I am indicating that there is continuity between the embryonic human and the fetal human and the child human and the adult human. This is referred to as *ontological continuity*. We were all embryos once. And when we were, we looked exactly like an embryonic human is supposed to look.

We should also remember that in biblical terms, no-one reaches their potential in this life. Philippians 1:6 tells us that God is still working in each one of us. In this sense, we are all ‘humans with potential’ until we are face to face with God.

## 7. The problem of appearance

According to this argument, early embryos are not human because they do not look human. For one thing, they are very small (smaller than a full stop). They are also a different shape, and they can’t do anything.

**Response:** It is obviously true that embryos in the first month of development look different from the way we do now. But you also look different now from the way you did one month after birth. You may not like it, but that’s what you looked like at that stage of development. It does not help us determine what your moral value is. Appearance is not morally relevant.

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14. This argument is expanded in S Buckle, ‘Arguing from potential’, *Bioethics*, vol. 2, no. 3, July 1988, pp. 227-53.

## 8. The problem of detection

This argument notes that there is no test for the mother to identify that an embryo has been created until after implantation when her *human chorionic gonadotropin (hCG)* level is checked. Therefore, it is claimed, the pregnancy (and by implication, human life) cannot start until then. This argument is sometimes expanded to include the idea that ‘conception’ is a process that begins with fertilization and ends with implantation, and cannot be said to have definitely occurred until the embryo is implanted in the mother’s womb.

**Response:** This argument seems to be saying that something cannot exist if you can’t confirm it with a test. Indwelling Holy Spirit aside, years of scientific research should have taught us by now that just because you can’t detect something, it doesn’t mean it’s not there. It would make sense that there are no biochemical markers detectable in maternal blood before the embryo physically attaches to the wall of the mother’s uterus and makes contact with her blood supply. (In much the same way, there is no evidence I have taken medication until it is absorbed into my system, but that doesn’t mean the tablet is not in my tummy.)

Perhaps this argument supports the idea that *pregnancy* begins with implantation, but our inability to test for the embryo’s existence prior to this does not mean that *human life* begins at implantation. There was a time when English law did not confidently extend protection to an unborn child until the mother felt it move (known as ‘quickenings’) because that was how they knew it was definitely there. Times change. Perhaps we should simply say that we cannot routinely detect the presence of an embryo in the womb prior to implantation *yet*.

However, it so happens that studies have demonstrated that hCG in the mother’s blood is not the earliest signal of pregnancy. Although the test has only been done in research laboratories, Early Pregnancy Factor (EPF) has been detected in maternal blood within 24 hours of fertilization. It is thought that the embryo releases EPF to prepare the nearby endometrium for implantation.<sup>15</sup> This may yet provide us with an earlier test for pregnancy, but technically it is quite difficult to do.

It is also important to realize that the existence of embryos fertilized

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15. H Morton, AC Cavanagh, S Athanasas-Platsis, KA Quinn and BE Rolfe, ‘Early pregnancy factor has immunosuppressive and growth factor properties’, *Reproduction, Fertility and Development*, vol. 4, no. 4, 1992, pp. 411-22.

outside of the body (as in the case of IVF) is not questioned just because implantation has not occurred. Their importance may be questioned, but not their existence as embryological human beings. If confirmation of existence is the requirement for humanity, on these grounds embryos are human beings before implantation.

## 9. Difference in kind

This is more of a moral significance issue, discussed by philosopher Michael Sandel in the prestigious *New England Journal of Medicine*.<sup>16</sup> Using the analogy of an acorn and an oak tree, he argues that just as we do not value an acorn as much as an oak tree, so we do not need to value embryos as we would adult human beings. He dismisses the developmental continuity, saying that embryos and adult humans (like acorns and oak trees) are different kinds of things and so do not have the equivalent moral value.

**Response:** It is important to note that human beings and oak trees are not moral equivalents. Indeed, it is because of the *kind* of thing it is that we value an adult human more than an oak tree. In the same way, it is because of the kind of thing it is that we value a human being at all stages of development. Made in the image of God, our value lies in what we are rather than in what we can do. It is our essential nature that gives us moral value. In contrast, the reason we value an oak tree over an acorn is because of what RP George and C Tollefsen call its “accidental characteristics”—the shade it provides, its magnificence and perhaps its sentimental value.<sup>17</sup> These ‘accidental characteristics’, and not its essential nature, explain why an oak tree might be valuable to us—indeed, why a large, beautiful, oak tree would be highly valued while a small, ugly one would not.

The oak tree analogy does not work, although it does help us understand that when we grieve the loss of an adult more than an embryo, it is because of the ‘accidental characteristics’ of the human adult with which we have become familiar as we have been in relationship with them. Just because the embryo and adult human have equivalent *moral value* does not mean they are *identical*. I would suggest it is not true that loss of a human embryo is never mourned,<sup>18</sup> but it is certainly mourned less, on the whole, than loss of a more mature human.

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16. MJ Sandel, ‘Embryo ethics: The moral logic of stem-cell research’, *New England Journal of Medicine*, vol. 351, no. 3, 15 July 2004, pp. 207-9.

17. Full discussion of this argument can be found in George and Tollefsen, *op. cit.*, pp. 176-84.

18. See ‘Moving on’ at the end of chapter 12.

## 10. Confusion with gametes

I have heard many arguments where embryos are confused with gametes (sex cells; sperm and eggs). It is argued that if sperm and eggs are alive but are not treated as if they are human, why should embryos be treated as if they are human? The reverse is also argued: that if we treat an embryo as if it is morally significant, why would we not have to treat sperm and eggs just as carefully?

**Response:** As mentioned above, sperm and eggs each consist of a single cell that is different from other types of cells in the body. Each has a half complement of DNA (genetic information)—that is, they have 23 chromosomes each rather than the usual 46. As such, they cannot grow individually as they do not contain all the required genetic material for maturation. Therefore, neither is a human being at an early stage of development, and so neither has moral significance. When the egg and sperm combine to make a zygote, however, a cell is created with a new set of the full 46 chromosomes—a unique individual with its own unique genetic code, combining the mother and father’s DNA in a new way. This cell also has the ability to continue to divide and direct its own development from that point until it is a fully grown human. As a genetically distinct human being even at this early embryonic stage, it has moral value.

## 11. Confusion with somatic cells

Following on from the previous argument, it has been suggested that if the other cells in the body apart from the sex cells (called *somatic* cells) each have 46 chromosomes just like an embryo, *and* we now know that they can each grow into an embryo through the cloning process, then it follows that every cell in the human body has as much potential for development as any human embryo. Therefore it is suggested that embryos have no greater significance than ordinary somatic cells. And since we obviously don’t treat every cell in our body as morally significant, it is argued, we shouldn’t give this status to an embryo.

**Response:** This is, once again, a mistake in biology. Although an embryo *can* be generated from a somatic cell through the cloning process, the somatic cell *of itself* is not a distinct organism, and is only able to change into an organism with the introduction of other factors.<sup>19</sup> In contrast, a human

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19. For further discussion of cloning, see chapter 15.

### The strange case of the clone

*How can a cloned embryo have the same moral status as a fertilized embryo? Isn't the definition of a human embryo based on sexual reproduction—the joining of a sperm and an egg? Now that we can make 'embryos' from single cells (with a bit of extra help— asexual production), what does that mean in terms of moral significance? Are they the same kind of thing?*

*Yes. Despite their different origins, once you have created an embryo that continues to promote and direct its own growth, the two types of embryo are indistinguishable. You could only identify the clone genetically by showing that its DNA was the same as another person's (this is the definition of a clone). Furthermore, the development of the two types of embryos will be a continuum through pregnancy to birth and further growth. Should any children come to birth through asexual production they will be fully human, made in the image of God, and morally valuable.*

embryo is *of itself* a “unified, unique, dynamic, self-directed whole”,<sup>20</sup> distinct from other organisms, as soon as it is created. A similar argument to this—that stem cells are equivalent to embryos because they can also be used to create an embryo—can be refuted on the grounds that, once again, a stem cell cannot *of itself* develop into an individual organism.

Having said that, if a human embryo were to be created through any of the cloning techniques, it would deserve to be treated with respect similar to that of a human embryo that was created by fertilization, just as we treat other human beings whose beginnings were atypical with similar respect. But by that stage it is no longer a somatic cell or a stem cell.

## 12. The problem of Christian apathy

According to this argument, human embryos should not be treated as morally significant human beings today because they have been routinely destroyed for years through the use of certain contraceptives and the development of assisted reproduction, and the church has not made any significant objection to this in the past.

**Response:** Ouch. It is true that we have failed to protect human embryos, those most vulnerable of human beings, in the past. This reflects not so much on the nature or

20. H Pearson, 'Developmental biology: Your destiny, from day one', *Nature*, vol. 418, no. 6893, 4 July 2002, pp. 14-15.

value of those embryos as on our own indifference. Maybe we should change. We will address this issue below—but for now, I will end this section by directing you to the *real* experts.

## The view of embryologists

Embryologists are the experts in this field. They are quite clear about what fertilization represents. There are many references I could quote to make the point; here are just some:

Almost all higher animals start their lives from a single cell, the fertilized ovum (zygote)... The time of fertilization represents the starting point in the life history, or ontogeny, of the individual.<sup>21</sup>

Embryologist Ronan O’Rahilly originated the international Carnegie Stages of human embryological development, used for many decades now by the international Terminologica Embryologica committee, which determines the scientifically correct terms to be used in human embryology around the world. This internationally pre-eminent human embryologist has no doubt that in biological terms we are dealing with a human being from the time of fertilization:

Although life is a continuous process, fertilization... is a critical landmark because, under ordinary circumstances, a new, genetically distinct human organism is formed when the chromosomes of the male and female pronuclei blend in the oocyte [egg]. This remains true even though the embryonic genome is not actually activated until 2-8 cells are present, at about 2-3 days...

During the embryonic period proper, milestones include fertilization, activation of the embryonic genome, segregation of embryonic from extra-embryonic cells, implantation, and the appearance of the primitive streak and bilateral symmetry.

Despite the various embryological milestones, however, development is a continuous rather than a saltatory process, and hence the selection of prenatal events would seem to be largely arbitrary.<sup>22</sup>

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21. BM Carlson, *Patten’s Foundations of Embryology*, 6th edn, McGraw-Hill, New York, 1996, p. 3.

22. O’Rahilly and Müller, *op. cit.*, p. 8.



Prenatal life is conveniently divided into two phases: the embryonic and the fetal...

...it is now accepted that the word embryo, as currently used in human embryology, means “an unborn human in the first 8 weeks” from fertilization. Embryonic life begins with the formation of a new embryonic genome (slightly prior to its activation).<sup>23</sup>

The embryo, from the time it is created, is a unified, unique, dynamic, self-directed whole, not just a collection of cells. There is evidence that organization exists from the first cell division.<sup>24</sup>

So if there is no doubt that, biologically, the human embryo is indeed a human being at an early stage of development, why is there confusion about how it should be treated? We shall consider this question in the next chapter.

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23. *ibid.*, p. 87.

24. Pearson, *loc. cit.*