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**WHEN HUMAN LIFE BEGINS**

by  
**Susan K.P. Das**

**A Thesis**

**Submitted in partial fulfillment of the requirements  
of the Master of Arts Degree  
of  
The Graduate School  
at  
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**Approved by**

**Professor**

**Date Approved** May 3, 2002

## ABSTRACT

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2002

Dr. Richard Meagher

Master of Arts in Higher Education – Biology Instructional Track

The moment attributed to the beginning of human life is debated not only in religious and political communities, but within the scientific community as well. Particular attention is given to this issue as advances in science make it possible to manipulate the embryo and fetus at early stages of development. This study explores these issues as they are revealed in the literature. In particular, examination of the stages of human development associated with this issue and the correlation between these stages and their influence on ethical concerns in current scientific technologies such as abortion, cloning, and embryonic stem cell experimentation.

## MINI-ABSTRACT

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# When Human Life Begins

## CHAPTER I

### INTRODUCTION

When does human life begin? Scientific advancements make this question vital as the possibilities of interventions in embryo development increase. Due to recent and developing scientific advancements, the question of when human life begins has become increasingly significant as individuals in society strive to protect the sanctity of human life. Recent issues that have spurred its discussion within the scientific community and in society as a whole include abortion, genetic engineering, stem cell research and cloning.

While the importance in maintaining the sanctity of human life is not in question, the moment at which that life begins and therefore gains the rights attributed to a person in our society is cause for debate. We recognize that a debate of the beginning of life issue exists within political and religious communities, as evidenced by the recent governmental decision allowing limited embryonic stem cell research (National Bioethics Advisory Commission, 1999). Boundaries to maintain the sanctity of human life are vital and have a great impact on our daily lives by impacting law, religious doctrine, and medicine. These boundaries continue to be challenged as scientific advancements and medical technologies involving the use and manipulation of human embryos progress.

Discussions debating the time corresponding to the beginning of human life is not limited to politics, philosophy, or religion. The topic is also a source of debate found

within the scientific community. Scientists differ on the definition of when human life begins. The ambiguity surrounding this issue has ramifications in areas of research and medicine as is particularly evident with the recent advances in science of stem cell research and cloning.

This study explores the controversy surrounding the beginning of life issue by examining critical stages in human development beginning with the gametes and continuing through the birth of a newborn taking a first breath. The differing opinions within the scientific community will be presented. An exploration of relevant issues such as laws and government positions will be included. The relationship between each stage and the positions corresponding to these stages on topics such as abortion, stem cell research, cloning and the fate of extra embryos from in vitro fertilization procedures is also discussed.

The importance of this issue is particularly evident in regard to the ethical treatment of the embryo and fetus. The utilization and manipulation of embryos or cells derived from human embryonic tissue are required for in vitro fertilization procedures (including the fates of remaining embryos), abortion, genetic engineering, embryonic stem cell research, and cloning. The extent to which the embryos are considered human beings affects how the embryos are handled and the experimentation allowed during the procedure or research.

Continued discussion and examination of the issue of when human life begins and the stage of human development at which the embryo or fetus gains the rights attributed by our society to personhood and protection under the law. Even prior to the attainment of the entity as consideration as human life, the embryo or fetus maintains a

level of moral and legal status due to its potential to become a human life. Recognition of the importance of this status in preserving the sanctity of life through the stages of human development will assure continued discussion and concern for the embryo and fetus.



## CHAPTER II

### METHOD

A review of the literature was performed to discover the scientific viewpoint on the subject of the beginning of human life. These positions were stated and explored as to their legitimacy and their relevance to current issues, particularly in the area of medical ethics. It includes a look at literature debating the idea of a human being versus attainment of personhood.

A brief discussion of embryology highlights moments in human development that begin with the gametes and continue through the birth of the newborn. Stages of development highlighted in this study are those at which there is some discussion and debate in determining that that stage be considered the beginning of human life and therefore having the rights attributed to human beings.

Depending on one's position on the stage of human development at which life begins impacts one's stance on important issues has been examined. The relationship between the developmental stage and the relevant issues is discussed. The way an embryo or fetus is utilized by these issues is also included. In particular, abortion, stem cell technology, and cloning of human embryos are considered.

The position of the government and laws regarding the treatment and rights of human embryos are also explored. Consideration of the impact of these decisions on current and developing research are examined.

A precise moment at which life begins that would be agreed upon within the scientific community or outside of the scientific community will not be established through this exploration. However, this study aims to continue discussion regarding the ethical treatment of human life by assessing the stages in the development of a human life and examining when that life begins. It also will correlate these stages with relevant scientific research, medical treatment and legal issues. Preservation of the sanctity of human life is vitally important, particularly as advancements in science bring to light the possibilities of genetic engineering and human cloning.

## CHAPTER III

### RESULTS

A review of the literature reveals several theories on when human life begins and personhood is attained and indicates the extent to which scientists and society disagree about when human life begins. In addition to these theories, there are several vital stages of human development that have been associated with the beginning of human life.

Some of the moments at which life is considered to have begun include: prior to fertilization (gametes), the fertilized ovum, development of the primitive line, the appearance of brain activity, the acquisition of capability of life outside of the womb, and when the child emerges from the womb and takes a first breath. While it is accepted that the newborn child is a human life of moral standing, the stages prior to birth remain a source of controversy.

Debate within the scientific community on this issue is often revealed in reaction to an article dealing with the treatment of the embryo in the context of recent advancements in technology. Ethical consideration of current issues such as stem cell research, cloning, and abortion begin with consideration of the status of the embryo (Harris, 1997; Kahn, 1997).

Ethical standards continue to be reconsidered, as advancements in science require the use of embryos. The rights of an embryo and how it should be treated are founded in whether or not the embryo at a particular stage of development is considered to be a human being.

The status of an embryo also has relevance to laws in our society. Issues pertaining to the regulation of research and medical uses are regulated by laws, but also the laws must consider whether the embryos are property or whether they have rights attributed to people in our society (Andrews, 1999).

Discussion of the beginning of life demands a look at the characteristics attributed to living things. Life is characterized by the processes that take place, such as metabolism and reproduction (Purves, Orians, & Heller, 1992). Webster's II New Riverside University Dictionary defines life as "the property or quality distinguishing living organisms from dead organisms and inanimate matter, manifested in functions such as growth, metabolism, response to stimuli, and reproduction".

### Stages in progression of human development

Human reproduction and embryonic development begins with the formation of the gametes and continues through the birth of a child. These are the stages relevant to the issue at hand and are therefore explored here.

#### Gametes

The gametes, or reproductive cells involved in human development, are formed during gametogenesis (the development and maturation of the gametes), which results in the eventual formation of an ovum and a sperm.

Prior to fertilization, the independent sperm and ovum are metabolically alive and have the attributes of living things (Grobstein, 1981; Sadler, 1995). The question, therefore, is not are they alive, but whether they are human life that should be granted the rights and moral standing associated with personhood. There are those who suggest the beginning of human life cannot be determined without considering these components (Kiessling, 2001). In these cases, the formation of a human life is viewed as a continuation of life in a new form (McLaren, 2001). However, opposition to this theory exists because a single entity has not yet been established until the gametes meet and fertilization occurs (Markl, 2001; Doran, 1989).

Granting the sperm and ovum the moral status of personhood would not allow any manipulation of the gametes, embryo, or fetus for research purposes or actions to intentionally terminate or endanger the potential for the gametes to develop into a human being.

### Fertilized egg

Embryonic development begins when the sperm unites with the ovum, which results in the formation of the fertilized egg. The sperm gains entry to the egg, where the genetic material from each gamete fuses and forms the fertilized egg. The fertilized egg is then activated to begin cleavage (Carlson, 1996). The fertilized egg contains all of the genetic material required in the formation of an adult individual. Mitotic cleavage divisions follow the initial fertilization of the egg by the sperm as a continuation of embryonic development (Carlson, 1994).

The fertilized egg is another developmental stage that may be considered to be the beginning of human life (Diamond, 2000; Flamigni, 2001). During this process, the one-celled embryo gains all of the genetic material necessary to develop into an individual unique from its parents (Sadler, 1995; Carlson, 1994). It is also the initial stage of development at which there is a single entity that can grow to develop into a child.

There are several issues about this stage that lead to debate regarding the status of the fertilized egg by the scientific community. These issues include basing the definition of life on the acquisition of the unique DNA required to develop fully, the lack of distinguishingly human features, and the inability to develop fully without the maternal environment.

One example of the opposition to this stage of human development being the beginning of human life exists because DNA unique to an individual can also be found in the individuals skin cells or hair follicles, which are not considered to be human life (Flamigni, 2001). The fertilized egg also has no features that would distinguish it as a human embryo. Since cellular differentiation and organ and limb development have not yet occurred, the fertilized egg does not have a head, brain or limbs (Sadler, 1995; Carlson, 1996). Another argument against attributing the status of a person to this early embryo is the inability of it to develop without the support system provided by the mother, that being the uterus (Friedrich, M.J., 2000).

Some cells of the fertilized egg will not become fetal cells which are part of the developing embryo, but rather form extraembryonic tissues (Lanza, et al., 2000). These extraembryonic structures are necessary to the healthy development of the embryo, but

are not part of the embryo itself. These structures include the yolk sac, chorion, allantois, and amnion (Carlson, 1996).

From this viewpoint, which maintains that human life begins with the fertilized egg, the manipulation of gametes prior to fertilization of the ovum would be acceptable. Such issues as abortion, therapeutic or reproductive cloning, and the destruction of frozen embryos remaining from in vitro fertilization procedures would, however, not be tolerated due to the threat of harm to a human life.

#### Development of primitive streak

It takes approximately three days for the first three mitotic cleavage divisions of the fertilized egg to be completed (Carlson, 1996). The next major stage of embryonic development is the beginning of gastrulation, during which cells of the epiblast develop into three germ layers of the embryo, and subsequent development and appearance of the primitive streak, an elongated thickening in the early embryo (Sadler, 1995). The separation of the cells into germ layers determines the structural and functional differentiation of the cells. The cells at this stage of human development have lost their ability to differentiate into any cell in the body. This stage of human development roughly corresponds to the appearance and development of the primitive streak (Carlson, 1996). Following this stage of development, the cells will continue to divide and differentiate to form the fetus.

The development of the primitive streak in the embryo is an important step in the development of the embryo. The primitive streak forms at the beginning of gastrulation,

during which the germ layers are established (Sadler, 1995). After development of the primitive streak, twinning of the embryo can no longer occur (Jones & Crockin, 2000). Therefore, the embryo can no longer develop into more than one complete person. Prior to the development of this streak, which occurs at approximately two weeks after conception, the embryo can split to become identical twins (Sadler, 1995). The individuality of the embryo is therefore established at the primitive streak stage of human development.

This early embryo lacks organs, including the brain, and therefore has no brain function. Consideration for personhood at this stage of development relies solely on the potential of the developing embryo to become an independent and functioning human being (Lanza, et al., 2000).

### Brain function

The separation of the cells into germ layers results in the determination of the location and function the embryonic cells will have. Some of these cells will differentiate to form neural tissue and develop into the fetal brain. This vital stage of human development is characterized by the beginning of the ability of the fetal brain to function.

Some evidence of reflex activity in the fetus can be detected approximately 6 weeks after fertilization if the fetus is stimulated (Carlson, 1994). These reflexes give indications of brain activity that increase with gestational age. With the acquisition of brain function, the processes of thought and reason associated with being human are



possible. Some discount the idea of a fetus being a person prior to the acquisition of the mental processes and awareness characteristic of a person (Holmes, 1992; Sumner, 1981/1987). By the third month after conception, the fetal brain has certainly developed enough to support spontaneous movement (Brody, 1975/1987).

The end of human life is characterized by the loss of the detection brain function (Capron, 2001; Lazar, et al., 2001). This loss of brain function is associated with the loss of human life and personhood due to the lack of cardiac and respiratory control required for sustaining life without artificial life support (Capron, 2001). Conversely, therefore, the beginning of human life may be considered to coincide with the stage of human development when brain function can be detected. Brody also examines the issue of brain function in determining personhood because brain function is a requirement of human life and accompanies the consciousness associated with being human (Brody, 1975/1987).

### Viability

As the development of the fetus progresses, the controversy becomes less evident in the literature. This is particularly true once the fetus is considered viable and has gained the ability to continue its development independently of the maternal environment. The attainment of the status of viability is attributed to this stage of development. Viability is considered to be the likelihood of long-term survival and development, not just temporary survival.

The time of fetal viability has a gray area between the 20<sup>th</sup> and 27<sup>th</sup> weeks, but viability is not considered to be possible prior to the 20<sup>th</sup> week (Epner, et al., 1998). Research has indicated viability rates for a gestation period of 23 weeks to be 15%, a gestation period of 24 weeks to be 56% and a gestation period of 25 weeks to be 79%, although abnormalities are likely, particularly in the shorter gestation periods (Allen, Donohue, and Dusman, 1993). At 27 weeks, the fetus is considered viable (Epner, et al., 1998). At this point, the fetus is determined to have a good probability of surviving and developing separately from the mother. This period, of course, extends through until the birth of the fetus during which time, the fetus continues to develop in preparation for the separation from the maternal environment.

#### Theories on attainment of personhood

The idea of the attainment of personhood, and therefore all rights granted an individual person, as a difference from defining an organism as alive is explored by questioning whether classifying the stage as being a living organism equates to exemplifying human life deserving the rights that are associated with being a person. It is suggested that being a person is not exclusively a biological distinction (Engelhardt, 1983/1987). Therefore, the determination that a cell is metabolically alive would not automatically determine that a person exists.

The Species Theory suggests that being human can be determined solely by the genetic structure of the organism. This would suggest that level of function or human

features is irrelevant and would therefore include the early human embryo (Devine, 1978/1987).

The potentiality theory also discussed by Devine recognized the humanness of not only the early embryo and the potential it has to become an adult human, but may also include the sperm and ovum in its considerations because of the potential of these gametes to develop into an adult human under specific circumstances (Devine 1978/1987). This stance is disputed by Engelhardt in that the idea of being a potential person in and of itself disputes that it is, in fact, a person because it has not yet achieved that potential (Engelhardt, 1983/1987).

A pluralistic framework supports the embryo at the primitive-streak stage as warranting the moral standing granted to personhood. This recognizes that the combined characteristics of the embryo, such as genetic uniqueness and the potential for development into an adult human, changes the embryo at the primitive-streak stage from being an object that deserves respect to an increased moral standing associated with having the rights of a person (Annas, Caplan, and Elias, 1996).

Sumner suggests sentience, or consciousness and capability of feeling, as criteria for having human life (Sumner, 1981/1987). This recognizes sentience as the capacity for feeling and therefore requires a consciousness. This criteria suggests then that the early embryo, which lacks brain function, has a lack of sentience and therefore is not a human life (Lockwood, 1995).

The developmental view allows for varying degrees of humanness attributable to the fetus depending on the stage of human development. Those with this view do not recognize conception as the initiation of a morally human life. Under this framework,

the fetus with brain function has more rights than an embryo or fertilized egg (Lanza, et al., 2000).

### Issues relevant to beginning of life

Current issues involving the dignity and rights due the embryo and developing fetus include abortion, use of embryonic stem cells and cloning, and the fates of extra embryos created for in vitro fertilization.

The issue of elective abortion as a voluntary termination of a pregnancy has been debated for many years. Medical abortion prior to the 9<sup>th</sup> week does not require surgery, but it is still considered to be abortion as it is a method of voluntarily and intentionally ending the pregnancy (Borgmann & Jones, 2000). Presuming the beginning of human life to be at the stage of the gametes, fertilized ovum or early embryo prior to the development of the primitive streak would not accept abortion of a fetus following these stages.

Debate regarding research on embryonic stem cells is due to the human origins of stem cells (Juengst & Fossil, 2000). Current research into embryonic stem cell lines utilizes tissues from embryos that are of two types – those that are left over following their creation by in vitro fertilization procedures that are to be destroyed and those tissues that result from terminated pregnancies (Marwick, 1999; Juengst & Fossil, 2000; and Edwards, Gearhart, & Wallach, 2000). Researchers are interested in stem cells because they are pluripotent, that is, they can develop into many of the types of cells found in the adult human body.

Therapeutic uses of embryonic stem cells may include the transplantation of human fetal tissue for treatment of disease. An example of this would be the transplantation of human fetal neural tissue into patients affected by Parkinson's disease (Edwards, Gearhart, & Wallach, 2000).

Cloning techniques utilize the pluripotent stem cells of the embryo that exist prior to the formation of the primitive streak to create embryonic stem cell lines for use in therapeutic cloning purposes (Solter and Gearhart, 1999).

Solter and Gearhart differentiate between embryonic stem cell therapy, which they also refer to as therapeutic cloning, and reproductive cloning utilizing somatic cell nuclear transfer, which would result in the development of a newborn infant. Both cloning methods currently utilize the creation of a human embryo to get started (Juengst & Fossil, 2000). Embryonic stem cells cannot develop into the adult organism without insertion into an artificial environment because they are pluripotent, not totipotent, that is they can develop into many of the types of cells, but not all of the types of cells (Solter and Gearhart, 1999).

Research utilizing cells of human embryonic origin as in embryonic stem cells and cloning would not be permissible if the beginning of a morally human life began prior to or concurrently with the harvesting and manipulation of these cells. Utilization of the criteria of primitive streak formation, brain functioning, viability or birth would allow such research to occur.

The fate of embryos that remain following in vitro fertilization procedures raises several issues. Two of these fates that are of relevance are the donation of the embryos for research purposes and the destruction of the embryos (Annas, 2000). The donation

of the embryos for research would then raise the issues relating to embryonic stem cell research and cloning since these are fates for embryonic tissues in research. The destruction of the embryos would constitute the termination of the life of the embryo (Lanza, et al., 2000).

The fate of embryos, which are frozen and remain from in vitro fertilization procedures, would not provide an ethical dilemma if the beginning of human life and personhood were to be attributed to a stage following the formation of the primitive streak, including brain function, viability or birth. However, if the embryos, or any stage prior to the embryo, are considered to have human life and are morally equivalent to a newborn infant, then the destruction or manipulation of these embryos would be unacceptable (Lanza, et al., 2000).

### Laws and Government Decisions

Laws, decisions and recommendations exist indicating the position of the government on issues relating to when human life and personhood begins. The law addresses the issue of whether the interests of the embryo or fetus deserve protection and to what degree it deserves protection. The right to electively terminate a pregnancy and custody battles over frozen embryos remaining following infertility procedures have been addressed in the courts. The federal government has addressed issues surrounding cloning and the use of embryonic stem cells for research recently.

The stance of the courts on the legal status of the embryo or fetus is demonstrated by their rulings. The courts look not to when life begins, but whether the

embryo or fetus as an entity has rights under the law (Seymour, 2000). Although there is a distinction, the courts must consider the status of the embryo or fetus to determine whether the embryo or fetus is an entity that the laws encompass.

For many years, the issue of abortion has been explored in the courts. From the turn of the century until 1973, abortion in the United States was illegal except when there was a threat to the life of the mother (Nossiff, 2001). The Supreme Court decision in 1973 in the case of *Roe v. Wade* found that prohibiting elective abortion in the first trimester of a pregnancy violated a woman's right to privacy (*Roe v. Wade*, 1973). In *Roe v. Wade*, the Court recognized the rights of the mother were not the sole interest as the pregnancy progressed. The Court also acknowledged that there is an obligation to protect a fetus once it has reached the stage of development where it may be considered to be viable (*Roe v. Wade*, 1973). Laws have been passed and have been upheld in individual states that limit access to abortion by regulation of issues such as the requirement of parental consent and/or notification and the limit of public funds (Rosenblatt, 1992).

The issue of abortion and the decisions of the courts have sparked controversy between those who believe human life begins at conception and are therefore against abortion and those who believe the rights of the mother has a greater interest at that stage of pregnancy in the country. Disputes over the issue have escalated to threats and cases of violence (Nossiff, 2001).

The legal status of the fetus has also been explored in the context of lawsuits involving harm that has been done to the fetus. In these cases, the findings have

required live birth resulting in life independent of the mother as evidenced by breathing on its own (Seymour, 2000).

There have also been cases recently that involved the custody of frozen embryos that have remained following the use of assisted reproduction procedures by couples whose relationship ended after freezing the remaining embryos. The policies regarding this issue have favored the donor of the gametes who did not wish to have the embryos utilized for reproductive purposes following the breakdown of the relationship under which the embryos were created (Daar, 2001; Levy, 2001).

The issue of the ethical treatment of embryos has also been addressed by the National Bioethics Advisory Commission to provide recommendations to the government on the funding of research utilizing embryonic stem cells. The findings of the commission were presented to the White House for consideration (National Bioethics Advisory Commission, 1999).

Recently, the National Bioethics Advisory Commission made recommendations on federal funding of embryonic stem cell research and cloning via somatic cell nuclear transfer. Recommendations by the commission include approval for support for federal funding of research involving embryonic stem cells derived from embryos that remain following infertility procedures and cadaveric fetal tissue, which is obtained from elective abortions (National Bioethics Advisory Commission, 1999). The derivation of the tissue was specified in respect to the moral consideration attributed to the embryo (Lauritzen, 2001).

The Commission did not recommend funding for research creating human embryos solely for research of either embryonic stem cells or cloning techniques that



utilize somatic cell nuclear transfer of the nucleus of an adult somatic cell into a human egg (National Bioethics Advisory Commission, 1999). The findings support that while the embryo has a moral status deserving of consideration and respect, there are potential benefits to human life to be gained by embryonic stem cell research without violating human life (Lauritzen, 2001).

## CHAPTER IV

### DISCUSSION

The discussion of when human life begins is one that cannot focus wholly on a biological basis. Even the earliest stages are genetically human. The beginning of a human life is then only relevant in deciding when an individual human begins to exist and when this individual human ceases to be nonexistent and transitions into a person. Biological examination has revealed that the developing embryo and fetus are human, that they are metabolically alive, and identify significant stages in their development, but whether those stages represent an organism that has gained the rights of personhood is an issue beyond current experimental ability.

The promise of the therapeutic value of techniques developed using embryonic or fetal tissue is being weighed in our society with the respect due the embryo and fetus. The potential for the use of embryonic stem cells offers hope for therapy in diseases such as Parkinson's disease and Alzheimer's disease.

Depending on which stage of human development is considered to be the beginning of human life and personhood, current scientific and medical techniques would be either permissible or unacceptable.

Establishment of the gametes as deserving of personhood would restrict manipulation of the sperm and ovum. This would include contraception, elective abortion, in vitro fertilization, or any experimental techniques manipulating the gametes or that involves any stage of development that follows.

To consider the fertilized egg as the moment at which human life and personhood begins would allow manipulation and experimentation of the sperm and ova prior to fertilization and include the prevention of fertilization from occurring. However, once the ovum is fertilized by the sperm, the fertilized egg would be considered to have the rights granted a person. No manipulation or experimentation would be allowed that would potentially harm the fertilized egg. Manipulation or experimentation of the stages of human development that follow the fertilized egg would also be regulated in consideration of the ethical treatment of the embryo or fetus as human life that has attained the rights our society attributes to personhood. Therefore, while contraception would be permissible, abortion, cloning, embryonic stem cell research, and disposal of remaining embryos from in vitro fertilization would not be allowed.

Use of the primitive-streak stage of the embryo as the guideline for personhood would allow for termination of a pregnancy up to the 14<sup>th</sup> day after fertilization. It would, for example, not exclude the use of contragestational “morning after pills” which can prevent the fertilized egg from implantation in the placenta. Under this criterion, manipulation of the embryo up until the formation of the primitive streak would be acceptable, even if that manipulation were to lead to a permanent disruption of the normal development of the embryo.

Brain functioning criteria for attainment of personhood would not permit an action that would endanger the development of the fetus beyond the first trimester, however, it would allow for the manipulation and termination of the embryo or fetus prior to detectable brain functioning.

If the criterion for personhood were the viability of the fetus, contraception, abortion, cloning, embryonic stem cell research and in vitro fertilization would all be acceptable prior to the accepted time of viability at approximately the 24<sup>th</sup> week of gestation.

Once the infant has been born, it is considered a human life and is granted the moral standing and intrinsic rights associated with personhood. It is a single entity that has genetic material unique to the infant. The infant is no longer dependent on the maternal environment of the womb for survival. This child who is genetically unique from its parents will continue to grow and develop through adulthood. Use of this criterion for determination of human life would allow any manipulation and experimentation of the gametes, embryo and fetus regardless of the possibility of harmful effects to the gametes, embryo or fetus.

The laws, decisions of the courts, and recommendations by government agencies recognize the embryo and fetus as having the status of being an entity that possesses the potential to become a human life. However, whether the embryo or fetus are actual persons or simply have the potential to become persons is not clear from the findings. The rulings and recommendations are based on this issue of being an actual person versus having the potential to become a person, which is why the ambiguity surrounding the issue becomes problematic.

The issue of when human life begins and personhood is attained is of great importance when confronted by the laws governing the ethical treatment of the embryo and fetus. The laws exist to protect the sanctity of human life and determination of when that protection should begin is being addressed by the government in the laws that

are passed stipulating ethical treatment and usage of the embryos and by the interpretation of these laws by the courts. Certainly, confusion exists within the current framework, but the issue continues to be examined.

## CHAPTER V

### CONCLUSION

Human life clearly begins prior to birth in a normal, full-term pregnancy. The gametes, the sperm and ova, individually do not contain the genetic material necessary to form a unique individual. The potential to develop into an individual human also certainly exists from the fertilization of the ovum at the moment of conception because the required genetic components are now available.

It is currently generally recognized that the end of life corresponds with the loss or absence of brain function despite the intact function of the other organs. Therefore, if the detection of brain waves is indicative of life and not necessarily the function of other organs, the beating of the fetal heart prior to detection of brain function may be excluded as an indicator as the beginning of life.

Certainly, once the fetus attains viability outside of the womb, the fetus deserves the dignity reserved for human life not merely because of its ability to survive independently but because has already become a human life.

The status of the gametes, embryo, or fetus is relevant primarily in the respect accorded them in the context of the manipulation, usage, and experimentation during various stages in human development.

This research of the literature has explored several moments during embryonic and fetal development that may be considered to be when human life begins. This issue will continue to be debated and reconsidered in regard to current ethical issues dealing

with the embryo and fetus and future advances in these areas. The potential of these stages to become a human life must also be included in these future considerations.

When does human life begin? This simple question currently has no simple answer. However, continued debate and consideration of the issue is a requirement for the protection of the sanctity of human life. Without a doubt, the potentiality of some of these stages of human development to become a person is deserving of respect and protection. How much protection is given to the early stages of development is and will continue to be regarded as an important issue to the preservation of the sanctity of human life.

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