



# Protecting Human Life and Caring for Creation



## **Protecting Human Life and Caring for Creation: Why Protecting Unborn Children in Their First Environment Matters**

### **A Discussion and Study Guide**

On April 30, 2007, the United States Conference of Catholic Bishops (USCCB) sponsored a conference called “Protecting Human Life and Caring for Creation: Why Protecting Unborn Children in Their First Environment Matters.” The conference brought together leading scientists and heads of Catholic organizations to examine the latest science on the impact of environmental toxins on unborn children. The ethical and moral implications of environmental hazards on children were examined through the lens of Catholic social teaching. The primary focus was on respect for the human person, care for God’s creation, and the need to work for the common good, with an overarching concern for the needs of the poor and vulnerable. Participants also discussed regulatory and legislative opportunities to safeguard human life and the environment. The conference was jointly organized by the USCCB Department of Justice, Peace, and Human Development and the USCCB Secretariat of Pro-Life Activities, in collaboration with the Catholic Coalition for Children and a Safe Environment (CASE) and with financial support from the National Religious Partnership for the Environment.

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# Protecting Human Life and Caring for Creation



## STUDY GUIDE OVERVIEW

This study guide, prepared by the National Catholic Rural Life Conference, is for use with the accompanying DVD of the conference. Each chapter of the study guide corresponds to a presentation included in the DVD. The glossary for each chapter lists definitions of words and phrases used in the presentation that are undefined therein but critical to understanding the presentation. This guide also includes questions for small-group discussion, which are designed to clarify possible misunderstandings of the presentations and to spark additional study. It also includes questions that are intended to lead participants to faith-inspired action.

## HOW TO USE THIS RESOURCE

The DVD and study guide are formatted to allow flexibility of use in a variety of settings. Viewing the full DVD requires approximately two hours. The duration of each individual presentation is indicated in each chapter description in this study guide. Each discussion question in the study guide can stand on its own, so group leaders can reduce the number of questions if time is limited. A list of resources for further group or individual study is included at the end of the study guide. Presenters use many terms that may be unfamiliar to viewers, so it may be helpful to review the “Useful Terms to Know” section for each DVD presentation before viewing.

Here is one suggested format that a group leader might use for each section:

1. Begin by reading one of the quotations from Catholic social teaching, or a prayer that touches on the connection between respect for human life and dignity and care for creation, as an opening reflection.
2. Use Archbishop Kurtz’s and Dr. Landrigan’s presentations (chapters 1 and 3, respectively) as a way of introducing the topic. Archbishop Kurtz sets the theological framework for this discussion, and Dr. Landrigan provides an overview of the issue from a public health perspective.
3. Depending on the chapter(s) to be viewed, consider reviewing the “Useful Terms to Know” with the group for clarification, particularly of scientific terms that viewers may not be familiar with.
4. Watch the presentation.
5. Use the corresponding discussion questions in small groups.
6. Invite small groups to share briefly with the large group. (See “For Discussion and Further Thought.”)
7. Direct individuals to reflect on future action. (See “Faith in Action.”)



# Protecting Human Life and Caring for Creation



## For Reflection: Quotations from Catholic Social Teaching

**T**HE CHURCH HAS A RESPONSIBILITY towards creation and she must assert this responsibility in the public sphere. In so doing, she must defend not only earth, water and air as gifts of creation that belong to everyone. She must above all protect mankind from self-destruction. There is need for what might be called a human ecology, correctly understood. The deterioration of nature is in fact closely connected to the culture that shapes human coexistence: when “human ecology” is respected within society, environmental ecology also benefits. Just as human virtues are interrelated, such that the weakening of one places others at risk, so the ecological system is based on respect for a plan that affects both the health of society and its good relationship with nature.

—Pope Benedict XVI, Encyclical *Charity in Truth (Caritas in Veritate)*  
(Washington, DC: USCCB, 2009), no. 51

**I**T IS LIKEWISE INCUMBENT upon the competent authorities to make every effort to ensure that the economic and social costs of using up shared environmental resources are recognized with transparency and fully borne by those who incur them, not by other peoples or future generations: the protection of the environment, of resources and of the climate obliges all international leaders to act jointly and to show a readiness to work in good faith, respecting the law and promoting solidarity with the weakest regions of the planet.

—Pope Benedict XVI, Encyclical *Charity in Truth (Caritas in Veritate)*  
(Washington, DC: USCCB, 2009), no. 50

**T**ECHNOLOGY ENABLES US TO EXERCISE dominion over matter, to reduce risks, to save labor, to improve our conditions of life. It touches the heart of the vocation of human labor: in technology, seen as the product of his genius, man recognizes himself and forges his own humanity. Technology is the objective side of human action whose origin and *raison d’être* is found in the subjective element: the worker himself. For this reason, technology is never merely technology. It reveals man and his aspirations towards development, it expresses the inner tension that impels him gradually to overcome material limitations. Technology, in this sense, is a response to God’s

command to till and to keep the land (cf. Gn 2:15) that he has entrusted to humanity, and it must serve to reinforce the covenant between human beings and the environment, a covenant that should mirror God's creative love.

—Pope Benedict XVI, Encyclical *Charity in Truth (Caritas in Veritate)* (Washington, DC: USCCB, 2009), no. 69

**T**ECHNOLOGY IS HIGHLY ATTRACTIVE because it draws us out of our physical limitations and broadens our horizon. But human freedom is authentic only when it responds to the fascination of technology with decisions that are the fruit of moral responsibility. Hence the pressing need for formation in an ethically responsible use of technology. Moving beyond the fascination that technology exerts, we must reappropriate the true meaning of freedom, which is not an intoxication with total autonomy, but a response to the call of being, beginning with our own personal being.

—Pope Benedict XVI, Encyclical *Charity in Truth (Caritas in Veritate)* (Washington, DC: USCCB, 2009), no. 70

**T**HE LITURGY ITSELF TEACHES US this, when, during the presentation of the gifts, the priest raises to God a prayer of blessing and petition over the bread and wine, 'fruit of the earth,' 'fruit of the vine' and 'work of human hands.' With these words, the rite not only includes in our offering to God all human efforts and activity, but also leads us to see the world as God's creation, which brings forth everything we need for our sustenance. The world is not something indifferent, raw material to be utilized simply as we see fit. Rather, it is part of God's good plan, in which all of us are called to be sons and daughters in the one Son of God, Jesus Christ (cf. Eph 1:4-12). The justified concern about threats to the environment present in so many parts of the world is reinforced by Christian hope, which commits us to working responsibly for the protection of creation. The relationship between the Eucharist and the cosmos helps us to see the unity of God's plan and to grasp the profound relationship between creation and the 'new creation' inaugurated in the resurrection of Christ, the new Adam.

—Pope Benedict XVI, Apostolic Exhortation *The Sacrament of Charity (Sacramentum Caritatis)* (Washington, DC: USCCB, 2007), no. 92

**W**E CANNOT INTERFERE IN ONE area of the ecosystem without paying due attention both to the consequences of such interference in other areas and to the well-being of future generations.

—Pope John Paul II, 1990 World Day for Peace Message, no. 6,  
*www.vatican.va*

**T**HE MOST PROFOUND AND SERIOUS indication of the moral implications underlying the ecological problem is the lack of respect for life evident in many of the patterns of environmental pollution.

—Pope John Paul II, 1990 World Day for Peace Message, no. 7,  
*www.vatican.va*

**T**ODAY, WE ALL SEE THAT MAN can destroy the foundations of his existence, his earth, hence, that we can no longer simply do what we like or what seems useful and promising at the time with this earth of ours, with the reality entrusted to us.

—Pope Benedict XVI, Meeting with the Clergy of the Dioceses of Belluno-Feltre and Treviso, July 24, 2007, *www.vatican.va*

**T**HE EXPERIENCE OF MOTHERHOOD makes you acutely aware of the other person and, at the same time, confers on you a particular task: ‘Motherhood involves a special communion with the mystery of life, as it develops in the woman’s womb. . . . This unique contact with the new human being developing within her gives rise to an attitude towards human beings not only towards her own child, but every human being, which profoundly marks the woman’s personality’ [John Paul II, Apostolic Letter On The Dignity of Women (*Mulieris Dignitatem*)]. A mother welcomes and carries in herself another human being, enabling it to grow inside her, giving it room, respecting it in its otherness. Women first learn and then teach others that human relations are authentic if they are open to accepting the other person: a person who is recognized and loved because of the dignity which comes from being a person and not from other considerations, such as usefulness, strength, intelligence, beauty or health. This is the fundamental contribution which the Church and humanity expect from women. And it is the indispensable prerequisite for an authentic cultural change.

—Pope John Paul II, Encyclical *The Gospel of Life* (*Evangelium Vitae*) (Washington, DC: USCCB, 1995), no. 99

**T**HE FAMILY NEEDS A HOME, a fit environment in which to develop its proper relationships. For the human family, this home is the earth, the environment that God the Creator has given us to inhabit with creativity and responsibility. We need to care for the environment: it has been entrusted to men and women to be protected and cultivated with responsible freedom, with the good of all as a constant guiding criterion.

—Pope Benedict XVI, 2008 World Day for Peace Message, no. 7,  
*www.vatican.va*

**G**OD'S CREATION IS ONE and it is good. The concerns for non-violence, sustainable development, justice and peace, and care for our environment are of vital importance for humanity. They cannot, however, be understood apart from a profound reflection upon the innate dignity of every human life from conception to natural death: a dignity conferred by God himself and thus inviolable.

—Pope Benedict XVI, 2008 World Youth Day Message, Welcoming celebration by the young people at Barangaroo, East Darling Harbour of Sydney, July 17, 2008, [www.vatican.va](http://www.vatican.va)

**I**N HIS ENCYCLICAL LETTER *Centesimus Annus*, Pope John Paul II wrote: 'Not only has God given the earth to man, who must use it with respect for the original good purpose for which it was given to him, but man too is God's gift to man. He must therefore respect the natural and moral structure with which he has been endowed.' By responding to this charge, entrusted to them by the Creator, men and women can join in bringing about a world of peace. Alongside the ecology of nature, there exists what can be called a 'human' ecology, which in turn demands a 'social' ecology. All this means that humanity, if it truly desires peace, must be increasingly conscious of the links between natural ecology, or respect for nature, and human ecology. Experience shows that disregard for the environment always harms human coexistence, and vice versa. It becomes more and more evident that there is an inseparable link between peace with creation and peace among men. Both of these presuppose peace with God.

—Pope Benedict XVI, 2007 World Day for Peace Message, no. 8, [www.vatican.va](http://www.vatican.va)

**T**HE MAGISTERIUM UNDERSCORES HUMAN RESPONSIBILITY for the preservation of a sound and healthy environment for all. 'If humanity today succeeds in combining the new scientific capacities with a strong ethical dimension, it will certainly be able to promote the environment as a home and a resource for man and for all men, and will be able to eliminate the causes of pollution and to guarantee adequate conditions of hygiene and health for small groups as well as for vast human settlements. Technology that pollutes can also cleanse, production that amasses can also distribute justly, on condition that the ethic of respect for life and human dignity, for the rights of today's generations and those to come, prevails' [John Paul II, Address, March 24, 1997].

—*Compendium of the Social Doctrine of the Church* (Washington, DC: USCCB, 2004), no. 465



**T**HE DEVELOPMENT OF SCIENCE AND technology, this splendid testimony of the human capacity for understanding and for perseverance, does not free humanity from the obligation to ask the ultimate religious questions. Rather, it spurs us on to face the most painful and decisive of struggles, those of the heart and of the moral conscience.

—Pope John Paul II, Encyclical *The Splendor of Truth (Veritatis Splendor)* (Washington, DC: USCCB, 1993), no. 1

**W**E FACE A FUNDAMENTAL QUESTION which can be described as both ethical and ecological. How can accelerated development be prevented from turning against man? How can one prevent disasters that destroy the environment and threaten all forms of life, and how can the negative consequences that have already occurred be remedied?

—Pope John Paul II, “International Solidarity Needed to Safeguard Environment,” Address by the Holy Father to the European Bureau for the Environment, L’Osservatore Romano, June 26, 1996

**R**ESPECT FOR LIFE REQUIRES THAT science and technology should always be at the service of man and his integral development. Society as a whole must respect, defend and promote the dignity of every human person, at every moment and in every condition of that person’s life.

—Pope John Paul II, Encyclical *The Gospel of Life (Evangelium Vitae)* (Washington, DC: USCCB, 1995), no. 81

**A**S DISCIPLES OF JESUS, WE ARE called to become neighbors to everyone (cf. Lk 10:29-37), and to show special favor to those who are poorest, most alone and most in need. In helping the hungry, the thirsty, the foreigner, the naked, the sick, the imprisoned—as well as the child in the womb and the old person who is suffering or near death—we have the opportunity to serve Jesus. He himself said: ‘As you did it to one of the least of these my brethren, you did it to me’ (Mt 25:40).

—Pope John Paul II, Encyclical *The Gospel of Life (Evangelium Vitae)* (Washington, DC: USCCB, 1995), no. 87

**T**HE DOMINION GRANTED TO MAN by the Creator is not an absolute power, nor can one speak of a freedom to ‘use and misuse,’ or to dispose of things as one pleases. The limitation imposed from the beginning by the Creator himself . . . shows clearly enough that, when it comes to the natural world, we are subject not only to biological laws but also to moral ones, which cannot be violated with impunity.

—Pope John Paul II, Encyclical *On Social Concern (Sollicitudo Rei Socialis)* (Washington, DC: USCCB, 1987), no. 34

**M**AN'S DOMINION OVER INANIMATE AND other living beings granted by the Creator is not absolute; it is limited by concern for the quality of life of his neighbor, including generations to come; it requires a religious respect for the integrity of creation.

—*Catechism of the Catholic Church* (2nd ed.) (Washington, DC: Libreria Editrice Vaticana–USCCB, 2000), no. 2415

**T**HE WHOLE HUMAN RACE SUFFERS as a result of environmental blight, and generations yet unborn will bear the cost for our failure to act today.

—United States Conference of Catholic Bishops, *Renewing the Earth* (Washington, DC: USCCB, 1991), 2

**O**UR MISTREATMENT OF THE NATURAL WORLD diminishes our own dignity and sacredness, not only because we are destroying resources that future generations of humans need, but because we are engaging in actions that contradict what it means to be human. Our tradition calls us to protect the life and dignity of the human person, and it is increasingly clear that this task cannot be separated from the care and defense of all of creation.

—United States Conference of Catholic Bishops, *Renewing the Earth* (Washington, DC: USCCB, 1991), 2

**A**S INDIVIDUALS, AS INSTITUTIONS, AS A PEOPLE, we need a change of heart to preserve and protect the planet for our children and for generations yet unborn.

—United States Conference of Catholic Bishops, *Renewing the Earth* (Washington, DC: USCCB, 1991), 3

**F**INALLY, WE ARE CHARGED WITH RESTORING the integrity of all creation. We must care for all God's creatures, especially the most vulnerable. How, then, can we protect endangered species and at the same time be callous to the unborn, the elderly, or disabled persons? Is not abortion also a sin against creation? If we turn our backs on our own unborn children, can we truly expect that nature will receive respectful treatment at our hands? The care of the earth will not be advanced by the destruction of human life at any stage of development. As Pope John Paul II has said, 'protecting the environment is first of all the right to live and the protection of life' (October 16, 1991, homily at Quiaba, Mato Grosso, Brazil).

—United States Conference of Catholic Bishops, *Renewing the Earth* (Washington, DC: USCCB, 1991), 9-10

**I**N A WORD, THE WORLD NEEDS an ecological conversion so as to examine critically current models of thought, as well as those of production and consumption.

—Archbishop Celestino Migliore, Statement Before the United Nations General Assembly, October 25, 2006, [www.holyseemission.org/25Oct2006.html](http://www.holyseemission.org/25Oct2006.html)



# Protecting Human Life and Caring for Creation



## Chapter 1: Introduction—Protecting Human Life and Caring for Creation

Viewing time: 4:19 minutes

Most Reverend Joseph E. Kurtz, DD, now Archbishop of Louisville

### Overview

Archbishop Kurtz opens the conference by setting the context and expressing the commitment of the Church to protect human life at all stages. He describes the intention of this series of presentations as an exploration and an examination of the impact of environmental exposures on children in the womb. Presenters look at the latest in the science of chemical hazards in the environment as well as opportunities, both regulatory and legislative, to safeguard human life and the environment. The Catholic perspective emphasizes respect for the human person, care for God's creation, and the need to work for the common good, with a special option for those who are poor and vulnerable as the overarching theme that connects these concerns. Our children, born and unborn, are the weakest and most vulnerable among us.

To learn about church teaching on the protection of human life and care for God's creation, visit [www.usccb.org/sdwp/ejp/case/cst.shtml](http://www.usccb.org/sdwp/ejp/case/cst.shtml).

### For Discussion and Further Thought

Based on your understanding of this presentation and on your personal experience, discuss one or more of the following questions with others around you. Help each other to

understand these concepts better. For more background, see the **References** section at the end of this discussion guide.

1. Express your understanding of possible relationships between the quality of a child's first environment (his or her mother's womb) and our obligation to respect human dignity for all.
2. The principle of the option for the poor extends to those who are most vulnerable in society. Why does Archbishop Kurtz suggest that children, born and unborn, are the most vulnerable among us?
3. Why do you think the Catholic Church is concerned about the quality of the environment of an unborn child?

### Faith in Action

1. From your perspective, what actions make someone a good steward of God's creation?
2. Often we refer to stewards of creation as caretakers of the environment, usually the environment of the born. How do you think one can be a caretaker of the environment of children in the womb and in our communities?



# Protecting Human Life and Caring for Creation



## Chapter 1: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Common good:** The sum of those conditions of social life that allow social groups and their individual members to reach their fulfillment more fully and more easily.
- **Conception:** “The process of becoming pregnant involving fertilization or implantation or both.”<sup>1</sup>
- **Embryo:** “The developing human individual from the time of implantation to the end of the eighth week after conception.”<sup>2</sup>
- **Embryology:** “A branch of biology dealing with embryos and their development.”<sup>3</sup>
- **Environmental exposure:** Any human encounter with chemicals (some toxic or harmful, others benign) in the environment: in food, through the air, in water and other beverages, and in the womb. Hundreds of chemicals not tested for safety are found in human blood, urine, breast milk, and amniotic fluid.
- **Fertilization:** “The process of union of two gametes whereby the somatic chromosome number is restored and the development of a new individual is initiated.”<sup>4</sup>
- **Steward:** One who receives the gifts of God, including creation, with gratitude, cultivates them responsibly, shares them lovingly in justice with others, and stands before the Lord in a spirit of accountability.

To learn more about the key themes at the heart of the Church’s social tradition, visit [www.usccb.org/sdwp/projects/socialteaching/excerpt.shtml](http://www.usccb.org/sdwp/projects/socialteaching/excerpt.shtml).

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1 Merriam-Webster, *MedlinePlus Medical Dictionary* (2005), [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=conception](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=conception).

2 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=embryo](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=embryo).

3 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=embryology](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=embryology).

4 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=fertilization](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=fertilization).



# Protecting Human Life and Caring for Creation



## Chapter 2: The Human Embryo: Early Development and External Influences

Viewing time: 13:45 minutes

**Stuart A. Newman, PhD**, Professor of Cell Biology and Anatomy, New York Medical College

### Overview

Dr. Newman presents the scientific basis for concern about environmental threats to the unborn, describing the early stages of human development and highlighting the particular vulnerability of humans to toxic environmental exposure during early stages of development. Dr. Newman pays particular attention to the vulnerability of the brain and nervous system from conception to birth.

### For Discussion and Further Thought

Based on your understanding of this presentation and your personal experience, discuss one or more of the following questions. For more background, see the **References** section at the end of this discussion guide.

1. What do you think can happen to unborn children if they encounter substances in their environment that are not naturally present during the very early stages of human development?
2. Describe experiences in your own life with physical or mental disabilities, or discuss what you have seen and heard of the experiences of others. How does the disability or condition (be it physi-

cal, mental, or emotional) seem to affect a person's quality of life? How does it seem to affect the quality of life of others around the person?

3. Are you aware of any toxins that are present in your home? Church? School or childcare facility? What would be your reaction if you found out that children in your midst (born and unborn) were being exposed to potentially harmful toxins?

### Faith in Action

1. If you are aware of toxins in your own home, church, school, or childcare facility, how should you respond to those situations as a steward of God's creation? What difficulties might you encounter?
2. What if you are aware of contaminants in your wider community? How can you act to protect the community, just as you would act to protect your own family or neighborhood? What difficulties might you encounter?



# Protecting Human Life and Caring for Creation



## Chapter 2: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Diploid stage/number:** When the basic chromosome number is doubled through the union of a gamete (i.e., sperm or egg) from each parent;<sup>1</sup> in humans, the diploid stage or number is 46, with 23 chromosomes from each parent joined together in pairs.
- **Dysmorphology:** A branch of clinical medicine concerned with the study of malformations or serious deviations from the normal type in an organism.<sup>2</sup>
- **Gastrulation:** An early stage in an embryo's development when it forms three layers<sup>3</sup> which develop into the various systems of the human body: the outermost *ectoderm*, which develops the brain and nervous system;<sup>4</sup> the middle *mesoderm*, which is the source of bone, muscle, connective tissue and skin;<sup>5</sup> and the innermost *endoderm*, which develops the digestive and respiratory organs.<sup>6</sup>
- **Genes and genetics:** "Genes (units of heredity) carry the instructions for making proteins, which direct the activities of cells and functions of the body. Genes influence traits such as hair and eye color as well as health and disease development." Genetics (study of genes and their role in inheritance) determines much (but not all) of a person's appearance and health status, but environmental differences also play a part.<sup>7</sup>

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1 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=diploid](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=diploid).

2 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=dysmorphology](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=dysmorphology); see also [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=teratology](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=teratology).

3 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=gastrula](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=gastrula).

4 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=ectoderm](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=ectoderm).

5 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=mesoderm](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=mesoderm).

6 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=endoderm](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=endoderm).

7 See National Human Genome Research Institute, [www.genome.gov/19016904](http://www.genome.gov/19016904).



- **Genotype:** The genetic identity of an individual that does not show as outward characteristics.<sup>8</sup>
- **Interdigitate/communicate:** When cells or parts of cells become “interlocked like the fingers of folded hands.”<sup>9</sup>
- **Neural tube groove:** A hollow tube which develops from folds in the ectoderm and forms the brain and spinal cord.<sup>10</sup>
- **Organogenesis:** “Origin and development of bodily organs”<sup>11</sup> in the embryo, after gastrulation (see *gastrulation*).
- **Period of somite formation:** Phase of embryonic development when the body produces “a block of tissue, present as a series of pairs, arrayed along the central axis of vertebrate embryos. The somites give rise to the vertebral bones, associated connective tissues, intervertebral discs, and body wall and limb muscles.”<sup>12</sup>
- **Primordium/primordial:** The earliest stage of development of a specific part or organ.<sup>13</sup>
- **Toxin:** A “poisonous substance that is a specific product of the metabolic activities of a living organism and is usually very unstable, notably toxic when introduced into the tissues, and typically capable of inducing antibody formation.”<sup>14</sup> Capable of causing harm or death when introduced into the body (such as by ingesting, breathing, or absorption through the skin) in sufficient quantity.
- **Trilaminar embryo:** An embryo at the stage of developing three layers (see *gastrulation*).<sup>15</sup>

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8 See National Human Genome Research Institute, [www.genome.gov/glossary.cfm?key=genotype](http://www.genome.gov/glossary.cfm?key=genotype).

9 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=interdigitate](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=interdigitate).

10 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=neural%20tube](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=neural%20tube).

11 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=organogenesis](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=organogenesis).

12 See Gabor Forgacs and Stuart A. Newman, *Biological Physics of the Developing Embryo* (Cambridge, UK: Cambridge University Press, 2005).

13 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=primordial](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=primordial).

14 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin).

15 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=trilaminar](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=trilaminar).



# Protecting Human Life and Caring for Creation



## Chapter 3: An Overview of the Most Harmful Toxins with a Focus on Mercury—Our Unborn Children, Our Most Vulnerable

Viewing time: 12:53 minutes

**Philip Landrigan, MD**, Executive Director, Center for Children’s Health and the Environment, Department of Community and Preventive Medicine, The Mount Sinai School of Medicine, Queens, New York

### Overview

Dr. Landrigan presents some of the growing evidence that widely available chemicals are contributing to major diseases in children, including asthma, pediatric cancer, and birth defects. He explains how extremely sensitive the human brain is to toxic chemicals, particularly during its early development. Dr. Landrigan explains the particular vulnerability of poor children to exposure to toxins because they are more likely to live in contaminated areas and near tainted food sources. This exposure results in increased learning disabilities and lower IQs.

### For Discussion and Further Thought

Based on your understanding of this presentation and your personal experience, discuss one or more of the following questions. Help each other to understand these concepts better. For more background, see the **References** section at the end of this discussion guide.

1. What are some medical abnormalities or conditions that can result from toxins in the environment of unborn children?
2. What substances do you think might be accumulating in your own body? What

do you think might be sources of these substances?

3. Describe experiences in your own life, or that of another person, with a mental impairment, disability, or learning disorder (not previously discussed in Chapter 2). How does the disability or disorder seem to affect one’s quality of life? How does it seem to affect the quality of life of others?
4. Why are children, especially unborn children, more susceptible than adults to neurodevelopmental disabilities from environmental toxins?

### Faith in Action

1. Statistics indicate that people who are poor are more apt to suffer from developmental, learning, and behavioral disabilities from environmental toxins. Why do you think that is? What do you think could be done to eliminate potential multiple exposures to contaminants in low-income communities?
2. Dr. Landrigan suggests that because most human-made substances are not tested for toxicity before they are used in the United States, we may be using our children and grandchildren as “test rodents” to determine the toxicity of those substances. What is your response to that notion in terms of respect for human life and dignity?





# Protecting Human Life and Caring for Creation



## Chapter 3: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Bioaccumulation:** “The accumulation of a substance (as a pesticide) in a living organism.”<sup>1</sup>
- **Chemical exposure:** Any human encounter with chemicals (some toxic or harmful, others benign) in the environment: in food, through the air, in water and other beverages, and in the womb. Hundreds of chemicals not tested for safety are found in human blood, urine, breast milk, and amniotic fluid.
- **Congenital malformations:** Abnormalities “acquired during development in the uterus and not through heredity.”<sup>2</sup>
- **Familial genetic disorder:** A condition that is passed from parent to child through genetic material; the condition “runs in the family” and occurs more frequently in family members than in the population as a whole.<sup>3</sup>
- **Impermeable barrier:** An obstruction that does not allow unwanted substances to pass through. It was once believed that the human placenta protected the unborn child from toxins.
- **Neurodevelopmental disabilities/disorders:** Medical conditions due to abnormalities related to the development of the human central nervous system (e.g. autism, autism spectrum disorder-ASD, attention deficit hyperactivity disorder-ADHD).<sup>4</sup>
- **Organophosphate pesticides:** These kill insects and other animals by attacking the nervous system. In overdoses, organophosphates can also kill people and pets. “Studies in animals show that even a single, low-level exposure to certain organophosphates, during particular times of early brain development, can cause permanent changes in brain chemistry as well as changes in behavior, like hyperactivity. Research suggests that early childhood exposures, which can

1 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=bioaccumulation](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=bioaccumulation).*

2 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=congenital](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=congenital).*

3 Adapted from U.S. National Library of Medicine, National Institutes of Health (NIH), [www.nlm.nih.gov/medlineplus/geneticdisorders.html](http://www.nlm.nih.gov/medlineplus/geneticdisorders.html) and [ghr.nlm.nih.gov/handbook/inheritance/runsinfamily](http://ghr.nlm.nih.gov/handbook/inheritance/runsinfamily).

4 See United States Environmental Protection Agency (EPA), Office of Research and Development, National Center for Environmental Research, *A Decade of Children’s Environmental Health Research: Highlights from EPA’s Science to Achieve Results Program* (December 2007), 17, [es.epa.gov/ncer/publications/research\\_results\\_synthesis/ceh\\_report\\_508.pdf](http://es.epa.gov/ncer/publications/research_results_synthesis/ceh_report_508.pdf).

go undetected because of the lack of overt symptoms, to certain organophosphates can lead to lasting effects on learning, attention, and behavior.”<sup>5</sup>

- **Polychlorinated biphenyls (PCBs):** A family of 209 chemical compounds for which there are no natural sources. Because of their stability, resistance to fire, and electrical insulating properties, PCBs were widely used in a variety of industrial applications. These same characteristics make PCBs problematic for the environment, as they are persistent and generally unalterable by microorganisms or by chemical reactions. PCBs have been demonstrated to cause cancer and a variety of adverse health effects on the immune, reproductive, nervous, and endocrine systems.<sup>6</sup> Their use and wide release into the environment peaked in the 1950s-1960s, before PCBs were banned in the United States in 1977.<sup>7</sup> PCBs tend to accumulate in animal and human fatty tissues,<sup>8</sup> most often through contaminated food, but also through breathing or absorption through the skin.<sup>9</sup>
- **Synapse:** “The place at which a nervous impulse passes from one neuron to another,” allowing communication.<sup>10</sup>
- **Thalidomide:** “A sedative, hypnotic, and antiemetic drug . . . that was used chiefly in Europe during the late 1950s and early 1960s especially to treat morning sickness but was soon withdrawn after being shown to cause serious malformations (as missing or severely shortened arms and legs) in infants born to mothers using it during the first trimester of pregnancy.”<sup>11</sup>
- **Toxicity:** “The quality, state, or relative degree of being toxic or poisonous.”<sup>12</sup>
- **Toxin:** A “poisonous substance that is a specific product of the metabolic activities of a living organism and is usually very unstable, notably toxic when introduced into the tissues, and typically capable of inducing antibody formation.”<sup>13</sup> Capable of causing harm or death when introduced into the body (such as by ingesting, breathing, or absorption through the skin) in sufficient quantity.

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5 Adapted from National Institute of Environmental Health Sciences (NIEHS), [tools.niehs.nih.gov/sbrp/research/research4\\_s3\\_s5.cfm](http://tools.niehs.nih.gov/sbrp/research/research4_s3_s5.cfm).

6 Adapted from NIEHS, [tools.niehs.nih.gov/sbrp/research/research4\\_s4\\_s2.cfm](http://tools.niehs.nih.gov/sbrp/research/research4_s4_s2.cfm).

7 See EPA, *A Decade of Children’s Environmental Health Research*, iii, [es.epa.gov/ncer/publications/research\\_results\\_synthesis/ceh\\_report\\_508.pdf](http://es.epa.gov/ncer/publications/research_results_synthesis/ceh_report_508.pdf).

8 See MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=polychlorinated+biphenyl](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=polychlorinated+biphenyl).

9 Adapted from World Health Organization (WHO) Working Group, “Polychlorinated biphenyls and terphenyls,” *Environmental Health Criteria* Vol. 140 (1993), 682.

10 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=synapse](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=synapse).

11 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=thalidomide](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=thalidomide).

12 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxicity](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxicity).

13 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin).



# Protecting Human Life and Caring for Creation



## Chapter 4: Pesticides and PCBs—Prenatal Exposure to Persistent Organic Pollutants and Effects on Physical and Mental Health

Viewing time: 16:22 minutes

**David O. Carpenter, MD**, Professor, Environmental Health and Toxicology, Institute for Health and the Environment, University at Albany, SUNY

### Overview

Dr. Carpenter describes the toxic effects of persistent organic pollutants. For example, PCBs have been linked to birth defects, infections, cancer, deviant social behavior, and altered gender-specific behaviors. They have been banned for decades but are still pervasive in the environment. Dr. Carpenter describes the need to protect the unborn child from exposure to PCBs and other dangerous environmental chemicals.

### For Discussion and Further Thought

Based on your understanding of this presentation and your personal experience, discuss one or more of the following questions. Help each other to understand these concepts better. For more background, see the **References** section at the end of this discussion guide.

1. What was your reaction to Dr. Carpenter's story about his breastfed child, Zachary, and his colleague's non-breastfed child, Patrick, in which the urine of both children was found to be "loaded" with contaminants, although Zachary's had significantly lower amounts?
2. How do you react to the knowledge of how easily environmental contaminants

can enter the human body and be passed along by pregnant women to their unborn children?

3. What are some of the effects of exposure to environmental contaminants on humans, particularly unborn and newborn children?
4. What are some of the ways in which you could be exposed to environmental contaminants? What are some of the sources of environmental contaminants in your community?

### Faith in Action

1. The families of immigrant and migrant farmworkers, both in the United States and around the world, often live adjacent to the fields where they work and often drink from water sources nearby. What are their possible risks? What can you and others do to help minimize their exposure to toxic pesticides?
2. Dr. Carpenter indicates that one effect of exposure to environmental contaminants before birth is reduced IQ. Discuss how it makes you feel that exposed children may live their entire lives with lower IQs than they were genetically capable of having. How do you think Catholic social teaching could apply to this situation, particularly the need to respect human life and dignity? What might be some ways you can personally help reduce harmful exposures to contaminants in your own community?



# Protecting Human Life and Caring for Creation



## Chapter 4: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Chromatogram:** A time-based graphic record used to identify the presence and concentration of a substance by separating two or more chemical compounds in a sample of bodily fluid.<sup>1</sup>
- **Cognitive function:** Conscious processing of information in the brain.<sup>2</sup>
- **Dioxin:** “Any of several persistent toxic heterocyclic hydrocarbons that occur especially as by-products of various industrial processes (as pesticide manufacture and paper milling) and waste incineration.”<sup>3</sup>
- **Dysfunction:** “Impaired or abnormal functioning (as of an organ of the body).”<sup>4</sup>
- **Environmental contaminants:** Substances introduced into the natural environment of air, water and soil which can harm human health, the health of other living organisms, or the environment.<sup>5</sup>
- **Habituation:** Decreased response or sensitivity to a stimulus due to repeated exposure.<sup>6</sup>
- **Half-life:** “The time required for half of something to undergo a process: as . . . the time required for half the amount of a substance . . . in or introduced into a living system or ecosystem to be eliminated or disintegrated by natural processes.”<sup>7</sup>

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1 See *MedlinePlus Medical Encyclopedia*, [www.nlm.nih.gov/medlineplus/ency/article/002325.htm](http://www.nlm.nih.gov/medlineplus/ency/article/002325.htm). See also *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=chromatogram](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=chromatogram).

2 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=cognitive](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=cognitive).

3 Merriam-Webster Online Dictionary, [www.merriam-webster.com/dictionary/dioxin](http://www.merriam-webster.com/dictionary/dioxin).

4 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=dysfunction](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=dysfunction).

5 Adapted from NIEHS, *New Technology for Detecting Biological Responses to Environmental Factors* (February 2006), [www.niehs.nih.gov/news/releases/2006/docs/gei.pdf](http://www.niehs.nih.gov/news/releases/2006/docs/gei.pdf).

6 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=habituation](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=habituation).

7 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=half-life](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=half-life).

- **Hormonal imbalance:** Hormones carry messages from one cell of the body to another for a desired effect. Sometimes one type of hormone affects the operation of another; examples include the male sex hormone testosterone and the female sex hormone estrogen, both of which appear in both men and women. When one hormone dominates the other (imbalance), the sexual characteristics controlled by that hormone will overshadow the other.
- **Immune system:** “The bodily system that protects the body from foreign substances.”<sup>8</sup>
- **Immunological effects:** The reaction of the body’s immune system to foreign substances (i.e., virus, bacteria, etc.).
- **Metabolite:** A substance that is part of or produced by metabolism or a metabolic process.<sup>9</sup> See *metabolism*.
- **Metabolism:** “The chemical changes in living cells by which energy is provided for vital processes and activities and new material is assimilated.”<sup>10</sup>
- **Neurobehavioral toxins:** Harmful substances whose damage to the nervous system results in observable changes in behavior, such as lowered IQ, attention problems, deficient social behavior, or blurring of gender-specific behavior.
- **Persistent organic pollutants:** Chemicals that “are major public health concerns because they are omnipresent in the ecosystem and may cause adverse health effects at background levels of exposure via diet. Examples are DDE, the major metabolite of the insecticide DDT, polychlorinated biphenyls (PCBs), and dioxin, also known as tetrachlorodibenzo-*p*-dioxin or TCDD.”<sup>11</sup>
- **Polychlorinated biphenyls (PCBs):** A family of 209 chemical compounds for which there are no natural sources. Because of their stability, resistance to fire and electrical insulating properties, PCBs were widely used in a variety of industrial applications. These same characteristics make PCBs problematic for the environment, as they are persistent and generally unalterable by microorganisms or by chemical reactions. PCBs have been demonstrated to cause cancer and a variety of adverse health effects on the immune, reproductive, nervous, and endocrine systems.<sup>12</sup>

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8 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=immune%20system](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=immune%20system).

9 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=metabolite](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=metabolite).

10 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=metabolism](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=metabolism).

11 “Biomarker-based Epidemiology Group: Exposure to Environmental Contaminants,” [www.niehs.nih.gov/research/atniehs/labs/epi/biomarker](http://www.niehs.nih.gov/research/atniehs/labs/epi/biomarker).

12 Adapted from NIEHS, [tools.niehs.nih.gov/sbrp/research/research4\\_s4\\_s2.cfm](http://tools.niehs.nih.gov/sbrp/research/research4_s4_s2.cfm).

- **Vigilance task:** A task that requires paying close and continuous attention without being distracted.
- **Water-soluble compounds:** Substances that will dissolve in water and be transported by it.





# Protecting Human Life and Caring for Creation



## Chapter 5: Lead and Other Neurotoxins—Protecting Children from Environmental Toxins

Viewing time: 20:38 minutes

**Bruce Lanphear, MD**, Sloan Professor of Children's Environmental Health and Director of the Cincinnati Children's Environmental Health Center at Cincinnati Children's Hospital Medical Center and the University of Cincinnati

### Overview

Dr. Lanphear looks at the relationship between exposure of the unborn to neurotoxins and their potential impacts on behavior after birth. He reports that a third of diagnosed cases of attention deficit/hyperactivity disorder (ADHD) are thought to result from the exposure of the unborn to tobacco and lead. He questions safety standards under current regulations.

### For Discussion and Further Thought

Based on your understanding of this presentation and your personal experience, discuss one or more of the following questions. Help each other to understand these concepts better. For more background, see the **References** section at the end of this discussion guide.

1. How does it make you feel to hear Dr. Lanphear state that we did not become aware of the toxicity of most currently recognized toxins until after widespread environmental contamination had already occurred?
2. Discuss why you think the European Union requires the toxicity of chemicals to be determined before they are approved

for use and why the United States does not require such testing.

3. Do you think there is sufficient evidence that chemicals that are widely used are toxic to humans?
4. Recall Dr. Lanphear's story about the woman spraying DDT (a persistent pesticide banned in the United States) over a child in a crib, thinking she was doing the best thing she could to protect her child from malaria-carrying mosquitoes. Discuss some things we are doing today in our culture that we might think are best for the common good, but may prove otherwise.

### Faith in Action

1. Dr. Lanphear states that 80 percent of all pregnant women have environmental toxins in their bloodstream that can be readily transferred to their unborn children. What action might Catholic teaching on the protection of human life and the common good lead us to consider in response to this reality?
2. Discuss possible actions to better protect children in the womb from potentially harmful exposure to toxins. Does it make more sense for the government to require toxicity testing of all new, suspected environmental toxins *before* widespread use is allowed, or to require toxicity testing of man-made substances only *after* it becomes evident that a substance is a suspected toxin?



# Protecting Human Life and Caring for Creation



## Chapter 5: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Biologic (genetic) marker:** “A readily recognizable genetic trait, gene, DNA segment, or gene product used for identification purposes”<sup>1</sup> and for tracing inheritance.
- **Cardiovascular diseases:** Diseases “of, relating to, or involving the heart and blood vessels.”<sup>2</sup>
- **Chlorpyrifos exposure:** Contact with chlorpyrifos, one of the most common agricultural pesticides before an EPA ban on household use in 2001, due primarily to health risks to children.<sup>3</sup>
- **DDE:** A persistent chemical produced by the body’s breakdown of the pesticide DDT; DDE accumulates in human fat.<sup>4</sup>
- **Epidemiology:** “A branch of medical science that deals with the incidence, distribution, and control of disease in a population.”<sup>5</sup>
- **FDA (Food and Drug Administration) and CDC (Centers for Disease Control and Prevention):** The FDA is a U.S. government agency responsible for protecting the public health by ensuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, our nation’s food supply, cosmetics, and products that emit radiation. The FDA is also responsible for advancing the public health by helping to speed innovations that make medicines and foods more effective, safer, and more affordable, and for helping the public get the accurate, science-based information they need to use medicines and foods to improve their health.<sup>6</sup> The CDC serves as the national focus for developing and

1 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=genetic%20marker](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=genetic%20marker).*

2 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=cardiovascular](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=cardiovascular).*

3 *EPA, A Decade of Children’s Environmental Health Research, [es.epa.gov/ncer/publications/research\\_results\\_synthesis/ceh\\_report\\_508.pdf](http://es.epa.gov/ncer/publications/research_results_synthesis/ceh_report_508.pdf).*

4 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=DDE](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=DDE).*

5 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=epidemiology](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=epidemiology).*

6 *Food and Drug Administration (FDA), Mission Statement, [www.fda.gov/opacom/morechoices/mission.html](http://www.fda.gov/opacom/morechoices/mission.html).*



applying disease prevention and control, environmental health, and health promotion and health education activities designed to improve the health of the people of the United States.<sup>7</sup>

- **Maternal serum screen:** A blood test for pregnant women to test for fetal disorders.
- **Meconium:** A baby’s first bowel movement, consisting of “a dark greenish mass of desquamated cells, mucus, and bile that accumulates in the bowel of a fetus and is typically discharged shortly after birth.”<sup>8</sup>
- **Metabolism:** “The sum of the processes by which a particular substance is handled (as by assimilation and incorporation or by detoxification and excretion) in the living body.”<sup>9</sup>
- **Morbidity:** “The incidence of disease: the rate of sickness (as in a specified community or group).”<sup>10</sup>
- **Neurodevelopmental disabilities/disorders:** Medical conditions due to abnormalities in brain development resulting from genetic causes and/or toxins in the womb. Such conditions include attention deficit disorders (ADD), developmental language disorders (DLD), learning disabilities (LD), epilepsy, and pervasive developmental disorders/autistic spectrum disorders.
- **Neurotoxin:** “A poisonous protein complex that acts on the nervous system.”<sup>11</sup> See **toxin**.
- **Passive exposure:** Involuntary contact with toxins.
- **Prefrontal cortex:** That part of the brain (front/top) involved in planning complex cognitive behaviors, expressing personality, and moderating social behavior.
- **Prenatal exposure:** Coming in contact with toxins before birth.
- **Toxicants:** “A toxic agent, especially: one for insect control that kills rather than repels [insects].”<sup>12</sup>
- **Toxin:** A “poisonous substance that is a specific product of the metabolic activities of a living organism and is usually very unstable, notably toxic when introduced into the tissues,

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7 Centers for Disease Control and Prevention, Mission Statement, [www.cdc.gov/maso/pdf/cdcmiss.pdf](http://www.cdc.gov/maso/pdf/cdcmiss.pdf).

8 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=meconium](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=meconium).

9 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=metabolism](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=metabolism).

10 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=morbidity](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=morbidity).

11 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=neurotoxin](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=neurotoxin).

12 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxicant](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxicant).

and typically capable of inducing antibody formation.”<sup>13</sup> Capable of causing harm or death when introduced into the body (such as by ingesting, breathing, or absorption through the skin) in sufficient quantity.

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13 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin).*



# Protecting Human Life and Caring for Creation



## Chapter 6: Impact of Fetal Exposure to Endocrine-Disrupting Chemicals in Plastic

Viewing time: 18:32 minutes

Frederick vom Saal, PhD, Professor, Division of Biological Sciences, College of Arts and Sciences, University of Missouri-Columbia

### Overview

Dr. vom Saal focuses on the effects of two synthetic chemicals found in plastics (bisphenol A [BPA] and phthalates). BPA mimics the female sex hormone estrogen, and phthalates block the male sex hormone testosterone; both can result in increased abnormalities of sexual characteristics in the developing unborn child and later in life. Dr. vom Saal explores other human health effects and discusses the plastic industry's response to growing research that supports his findings.

### For Discussion and Further Thought

Based on your understanding of this presentation and your personal experience, discuss one or more of the following questions. Help each other to understand these concepts better. For more background, see the **References** section at the end of this discussion guide.

1. What was your reaction when you learned that bisphenol A and phthalates are both present in 100 percent of the U.S. human population? Why do you think you responded this way?
2. What do scientists report may be the effects of bisphenol A and phthalates on humans? How did you react when Dr. vom Saal revealed that some industries that produce and use bisphenol A and phthalates deny that the chemicals pose risks to human development?
3. In what products can bisphenol A and/or phthalates be found?

### Faith in Action

1. Dr. vom Saal stated that a private research firm described its work for some industries that produce toxic chemicals this way: "We will harness, focus, and involve the scientific and intellectual capital of our company with one goal in mind—creating the outcome our client desires." Who might benefit from such research? Who might be impacted negatively by such a mindset? Discuss how this relates to Catholic teaching on the common good. Do you think anything should or could be done to minimize the effect such companies might have on the welfare of humans?
2. Will you continue to use products made with bisphenol A and/or phthalates? Why or why not? Do you think the production of food containers that contain bisphenol A and/or phthalates should be stopped? Why or why not?



# Protecting Human Life and Caring for Creation



## Chapter 6: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Bisphenol A (BPA):** “A high production volume chemical used primarily in the production of polycarbonate plastics and epoxy resins. Polycarbonate plastics have many applications, including use in some food and drink packaging, e.g. water and infant bottles, compact discs, impact-resistant safety equipment, and medical devices. Epoxy resins are used as lacquers to coat metal products such as food cans, bottle tops, and water supply pipes.”<sup>1</sup>
- **Cell differentiation:** The process by which the cells of the embryo change over time to form the specialized structures and functions they will have in the adult.<sup>2</sup>
- **Endocrine disruptors/endocrine active compounds:** Endocrine disruptors (also known as endocrine active compounds) are naturally occurring compounds or man-made chemicals that may interfere with the production or activity of hormones of the endocrine system, which is one of the body’s main communication networks and controls and coordinates numerous body functions. Many endocrine disruptors have been linked with developmental, reproductive, neural, immune, and other problems in wildlife and laboratory animals. Some scientists think these chemicals affect human health in similar ways, such as declined fertility and increased incidences of some endometriosis and cancers. Endocrine disruptors may pose the greatest risk during prenatal and early postnatal development when organ and neural systems are developing.<sup>3</sup>
- **Epidemiology:** “A branch of medical science that deals with the incidence, distribution, and control of disease in a population.”<sup>4</sup>
- **Estrogen (estradiol) and testosterone:** Sex hormones present in differing levels in both males and females. Estrogen is produced chiefly by the ovaries, placenta, adipose tissue, and testes. It “stimulate[s] the development of female secondary sex characteristics,” such as breasts, and

1 National Toxicology Program, “Bisphenol A,” [www.niehs.nih.gov/health/docs/bpa-factsheet.pdf](http://www.niehs.nih.gov/health/docs/bpa-factsheet.pdf).

2 See *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=differentiation](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=differentiation).

3 See NIEHS, *Endocrine Disruptors* (June 2006), [www.niehs.nih.gov/health/topics/agents/endocrine/docs/endocrine.pdf](http://www.niehs.nih.gov/health/topics/agents/endocrine/docs/endocrine.pdf).

4 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=epidemiology](http://www2.merriam-webster.com/cgi-bin/mumednlm?book=Medical&va=epidemiology).

“promote[s] the growth and maintenance of the female reproductive system.”<sup>5</sup> Testosterone is produced primarily by the testes and “is the main androgen responsible for inducing and maintaining male secondary sex characteristics” such as facial hair and muscle mass.<sup>6</sup>

- **Hypospadias:** “An abnormality of the penis in which the urethra opens on the underside.”<sup>7</sup>
- **Locus ceruleus:** The part of the brain related to depression, panic disorder, and anxiety.
- **Meiosis:** Formation of sperm and eggs with 23 chromosomes each, as opposed to the 46 chromosomes present in other human cells.
- **Phthalates:** A class of man-made chemicals that soften and increase the flexibility of certain plastics (primarily polyvinyl chloride, or PVC). Phthalates also contain endocrine disruptors (see *endocrine disruptor*). One phthalate, DEHP, is widely used in the manufacture of a variety of consumer products, such as building products, car products, clothing, food packaging, some children’s products, and some medical devices. In 2006, an independent panel of experts assembled by the National Toxicology Program (NTP) found that DEHP may pose a risk to human development, especially for critically ill male infants.<sup>8</sup>
- **Substantia nigra:** “A layer of deeply pigmented gray matter situated in the midbrain and containing the cell bodies of a tract of dopamine-producing nerve cells whose secretion tends to be deficient in Parkinson’s disease.”<sup>9</sup>
- **Syndrome:** “A group of signs and symptoms that occur together and characterize a particular abnormality.”<sup>10</sup>

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5 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=estrogen](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=estrogen).

6 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=testosterone](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=testosterone).

7 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=hypospadias](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=hypospadias).

8 See NIEHS, *Endocrine Disruptors*, [www.niehs.nih.gov/health/topics/agents/endocrine/docs/endocrine.pdf](http://www.niehs.nih.gov/health/topics/agents/endocrine/docs/endocrine.pdf).

9 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=substantia%20nigra](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=substantia%20nigra).

10 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=syndrome](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=syndrome).



# Protecting Human Life and Caring for Creation



## Chapter 7: The National Children's Study: Protecting Our Children

Viewing time: 13:13 minutes

Peter C. Scheidt, MD, MPH, Director, National Children's Study, National Institute of Child and Health Development, National Institutes of Health, Rockville, Maryland

### Overview

Dr. Scheidt describes the National Children's Study initiated in 1998, the largest long-term study of children's health and development ever conducted in the United States. It is studying and following about 100,000 children across the nation from their conception to adulthood, to determine (1) the relationship between environmental exposures during pregnancy and neurodevelopmental outcomes in children and (2) the effects of low-level exposure to non-persistent pesticides during pregnancy on the development and functioning of a child's brain.

### For Discussion and Further Thought

Based on your understanding of this presentation and your personal experience, discuss one or more of the following questions. Help each other to understand these concepts better. For more background, see the **References** section at the end of this discussion guide.

1. How would you describe the purpose of the National Children's Study? What do you particularly like about it?
2. Do you think the National Children's Study will answer important questions about the relationships between toxic substance exposures and human health? Why or why not?

### Faith in Action

1. Should the National Children's Study be funded and conducted by the federal government or private industry? Why?
2. Would you allow your children to be included in the National Children's Study? Why or why not?



# Protecting Human Life and Caring for Creation



## Chapter 7: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Autism:** “A developmental disorder that appears by age three and that is variable in expression but is recognized and diagnosed by impairment of the ability to form normal social relationships, by impairment of the ability to communicate with others, and by stereotyped behavior patterns especially as exhibited by a preoccupation with repetitive activities of restricted focus rather than with flexible and imaginative ones.”<sup>1</sup>
- **Bisphenol A (BPA):** “A high production volume chemical used primarily in the production of polycarbonate plastics and epoxy resins. Polycarbonate plastics have many applications, including use in some food and drink packaging, e.g. water and infant bottles, compact discs, impact-resistant safety equipment, and medical devices. Epoxy resins are used as lacquers to coat metal products such as food cans, bottle tops, and water supply pipes.”<sup>2</sup>
- **Chemical exposure:** Any human encounter with chemicals (some toxic or harmful, others benign) in the environment in food, through the air, in water and other beverages, and in the womb. Hundreds of chemicals not tested for safety are found in human blood, urine, breast milk, and amniotic fluid.
- **Context:** The circumstances or setting in which an event occurs.
- **Detoxification:** Bodily process of removing a poisonous or harmful substance or reducing its toxic qualities.<sup>3</sup>
- **Endocrine active compounds/endocrine disruptors:** Endocrine active compounds (also known as endocrine disruptors) are naturally occurring compounds or man-made chemicals that may interfere with the production or activity of hormones of the endocrine system, which is one of the body’s main communication networks and controls and coordinates numerous body functions. Many endocrine active compounds have been linked with developmental, reproductive, neural, immune, and other problems in wild-life and laboratory animals. Some scientists think these chemicals affect human health

1 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=autism](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=autism).*

2 See National Toxicology Program, “Bisphenol A,” [www.niehs.nih.gov/health/docs/bpa-factsheet.pdf](http://www.niehs.nih.gov/health/docs/bpa-factsheet.pdf).

3 See *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=detoxification](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=detoxification).*



in similar ways, such as declined fertility and increased incidences of some endometriosis and cancers. Endocrine active compounds may pose the greatest risk during prenatal and early postnatal development when organ and neural systems are developing.<sup>4</sup>

- **EPA (Environmental Protection Agency):** The U.S. government agency for environmental science, research, education and assessment efforts. The EPA's mission is to protect human health and the environment.<sup>5</sup>
- **Gene expression:** "Process by which proteins are made from the instructions encoded in DNA."<sup>6</sup>
- **HHS (Department of Health and Human Services):** The U.S. government's principal agency for protecting the health of all Americans and providing essential human services, especially for those who are least able to help themselves.<sup>7</sup>
- **Hypothesis-driven:** A process used to explain a cause-and-effect relationship in which one makes an educated guess (hypothesis), then conducts experiments to test this guess, and ultimately determines if the hypothesis is true or false.
- **Longitudinal study:** A research study that involves repeated observations of the same people over long periods of time, often through many decades, in order to uncover predictors of certain diseases or disorders.
- **Neurodevelopmental disabilities/disorders:** Medical conditions due to abnormalities in brain development.<sup>8</sup>
- **NICHD (National Institute of Child Health and Human Development):** A U.S. government agency established to investigate the broad aspects of human development as a means of understanding developmental disabilities, including mental retardation, and the events that occur during pregnancy. Today, the NICHD conducts and supports research on all stages of human development, from preconception to adulthood, to better understand the health of children, adults, families, and communities.<sup>9</sup>
- **Protocol:** "A detailed plan of a scientific or medical experiment, treatment, or procedure."<sup>10</sup>

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4 NIEHS, *Endocrine Disruptors*, [www.niehs.nih.gov/health/topics/agents/endocrine/docs/endocrine.pdf](http://www.niehs.nih.gov/health/topics/agents/endocrine/docs/endocrine.pdf).

5 EPA, [www.epa.gov/epahome/aboutepa.htm](http://www.epa.gov/epahome/aboutepa.htm).

6 National Human Genome Research Institute, [www.genome.gov/glossary.cfm?key=gene%20expression](http://www.genome.gov/glossary.cfm?key=gene%20expression).

7 U.S. Department of Health and Human Services (HHS), [www.hhs.gov/about/whatwedo.html](http://www.hhs.gov/about/whatwedo.html).

8 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=neurodevelopment](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=neurodevelopment).

9 National Institute of Child Health and Human Development (NICHD), [www.nichd.nih.gov/about/overview](http://www.nichd.nih.gov/about/overview).

10 *MedlinePlus Medical Dictionary*, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=protocol](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=protocol).



- **Psychosocial milieu:** The physical and social setting or environment in which a person's mind and emotions develop.
- **Representative sample:** A group that adequately reflects the characteristics of a larger group or entire population selected for study in order to gather knowledge about that group or population.
- **Toxin:** A “poisonous substance that is a specific product of the metabolic activities of a living organism and is usually very unstable, notably toxic when introduced into the tissues, and typically capable of inducing antibody formation.”<sup>11</sup> Capable of causing harm or death when introduced into the body (such as by ingesting, breathing, or absorption through the skin) in sufficient quantity.

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11 *MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=toxin).*



# Protecting Human Life and Caring for Creation



## Chapter 8: Protecting Environmental Health for Mothers and Children: A U.S. EPA Perspective

Viewing time: 16:35 minutes

Elizabeth Blackburn and Devon Payne-Sturges, DrPH, Office of Children's Health Protection and Environmental Education, U.S. Environmental Protection Agency (EPA), Washington, D.C.

### Overview

Ms. Blackburn and Dr. Payne-Sturges present an overview of the EPA's responsibilities regarding children and environmental health. They highlight a periodic report by the EPA, *America's Children and the Environment*, that examines trends over time and suggests research emphases for the future. Ms. Blackburn and Dr. Payne-Sturges describe the EPA Prenatal Partnership, composed of businesses, doctors, parents, and others who promote cooperative ways in which everyone can change behaviors ultimately to reduce exposure of pregnant women and of children to environmental health risks.

### For Discussion and Further Thought

Based on your understanding of this presentation and your personal experience, discuss one or more of the following questions. Help each other to understand these concepts better. For more background, see the **References** section at the end of this discussion guide.

1. What are some of the trends reported in the EPA report *America's Children and*

*the Environment*? What do you think of these trends?

2. How would you define the role of the U.S. Environmental Protection Agency as it relates to children and a safe environment? Do you think its role is (1) sufficient as is, (2) too small/permissive, or (3) too large/intrusive?
3. What do you think are some of the benefits of the EPA's Prenatal Partnership?

### Faith in Action

1. Would you encourage increased government funding for research and education about the effects of toxins on the development of children, born and unborn? Why or why not?
2. There are a number of laws and regulations intended to promote adequate safety from environmental hazards, including the Toxic Substances Control Act of 1976 and the Safe Drinking Water Act of 1996. Would you be willing to join others in seeking stronger protections from potentially harmful exposures by writing a letter or e-mail, making a phone call, attending public hearings, providing public comments, or contacting your senators or Congressperson? Why or why not?



# Protecting Human Life and Caring for Creation



## Chapter 8: Useful Terms to Know

The following words and phrases are used in the presentation, but are not defined therein. You can review this list in order to enhance your understanding.

- **Chlorpyrifos:** One of the most common agricultural pesticides before an EPA ban on household use in 2001, due primarily to health risks to children.<sup>1</sup>
- **Dysfunction:** “Impaired or abnormal functioning (as of an organ or part of the body).”<sup>2</sup>
- **Etiology:** “A branch of medical science dealing with the causes and origin of diseases” or abnormal conditions.<sup>3</sup>
- **Integrated pest management (IPM):** An approach to pest management that relies on a combination of practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment, in combination with available pest control methods, to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. IPM uses all pest management options, including the judicious use of pesticides.<sup>4</sup>
- **Metabolite:** A substance that is part of or produced by metabolism or a metabolic process.<sup>5</sup> See *metabolism*.
- **Metabolism:** “The sum of the processes by which a particular substance is handled (as by assimilation and incorporation or by detoxification and excretion) in the living body.”<sup>6</sup>
- **NIEHS (National Institute of Environmental Health Sciences):** A U.S. government agency whose mission is to reduce the burden of human illness and disability by understanding how the environment influences the development and progression of human disease.<sup>7</sup>

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1 EPA, *A Decade of Children’s Environmental Health Research*, es.epa.gov/ncer/publications/research\_results\_synthesis/ceh\_report\_508.pdf.

2 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=dysfunction](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=dysfunction).

3 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=etiology](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=etiology).

4 EPA, “Integrated Pest Management,” [www.epa.gov/agriculture/tpm.html](http://www.epa.gov/agriculture/tpm.html).

5 See MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=metabolite](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=metabolite).

6 MedlinePlus Medical Dictionary, [www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=metabolism](http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=metabolism).

7 NIEHS, [www.niehs.nih.gov](http://www.niehs.nih.gov).



# Protecting Human Life and Caring for Creation



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Msgr. David J. Malloy, STD  
General Secretary, USCCB

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