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Agent that can Disturb the Development of An Embryo or Fetus

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Description

Teratology is the study of abnormalities of physiological development in all organisms including plants during the entire life span. A sub discipline in Medical Genetics which focuses on the classification of congenital abnormalities is dysmorphology. The related term developmental toxicity includes all manifestations of abnormal development that are caused by environmental insult. These may include growth retardation, delayed mental development or other congenital disorders without any structural malformations.

As early as the 17th century, teratology referred to a discourse on prodigies and marvels of anything so extraordinary as to seem abnormal. In the 19th century, it acquired a meaning more closely related to biological deformities, mostly in the field of botany. Currently, its most instrumental meaning is that of the medical study of teratogenesis, congenital malformations or individuals with significant malformations. Historically, people have used many pejorative terms to describe/label cases of significant physical malformations. In the 1960s David W. Smith of the University of Washington Medical School (one of the researchers who became known in 1973 for the discovery of fetal alcohol syndrome), popularized the term teratology.

Studies designed to test the teratogenic potential of environmental agents use animal model systems (e.g., rat, mouse, rabbit, dog, and monkey). Early teratologists exposed pregnant animals to environmental agents and observed the fetuses for gross visceral and skeletal abnormalities. While this is still part of the teratological evaluation procedures today, the field of Teratology is moving to a more molecular level, seeking the mechanism(s) of action by which these agents act. One example of this is the use of mammalian animal models to evaluate the molecular role of Teratogens in the development of embryonic populations, such as the Neural Crest, which can lead to the development of Neurocristopathies. Genetically modified mice are commonly used for this purpose.

In humans, vaccination has become readily available, and is important to the prevention of some diseases like polio, rubella, and smallpox, among others. There has been no association between congenital malformations and vaccination, as shown in Finland in which expecting mothers received the oral polio vaccine and saw no difference in infant outcomes than mothers who had not received the vaccine. However, it is still not recommended to vaccinate for polio while pregnant unless there is risk of infection.

Evidence for congenital deformities found in the fossil record is studied by paleopathologists, specialists in ancient disease and injury. Fossils bearing evidence of congenital deformity are scientifically significant because they can help scientists infer the evolutionary history of life's developmental processes. For instance, because a Tyrannosaurus rex specimen has been discovered with a block vertebra, it means that vertebrae have been developing the same basic way since at least the most recent common ancestor of dinosaurs and mammals. Other notable fossil deformities include a hatchling specimen of the bird-like dinosaur.

These results helped to conclude that these three pathways significantly impacted by thalidomide for chick limb development and that the teratogenic outcomes of the limb development deficiencies thalidomide creates can be reversed if these three pathways are inhibited.