



Teratogens and their affect on a forming embryo

Teratogen: *An agent, which can cause a birth defect.*

Exposure to certain substances or agents in pregnancy can have an effect on the developing embryo or fetus and lead to a birth defect. Certain factors such as the type of teratogen, how much of it, when the pregnancy was exposed, and for how long need to be considered when determining risk or possibilities for birth defect. The research I've discovered on these factors can be found in this report.

Avoiding Teratogens in Pregnancy

Pregnant clients and their families should be counseled on avoiding teratogens in pregnancy. One complication presented in educating pregnant women on teratogenic effects is the fact that the most crucial time of exposure is early in pregnancy, sometimes even before the woman knows she's pregnant and often before she's made the discovery and has sought prenatal care. Many national and local organizations have made campaigns targeting educating the general public so that birth defects can be avoided. Regardless, at the first prenatal appointment, it would be good practice to inform pregnant women and their families of teratogens to avoid.

Types of Teratogens

There are various types of teratogens. Some well known and others not so well know. Certain medications, including prescription and over the counter drugs can produce birth defects. Infections, environmental exposures, chemical exposures, recreational or habitual alcohol and drug use, mechanical factors and maternal medical conditions are other teratogens. Lets look at a few of these and their impact on the developing baby. This is a general list, and is not complete.

Lifestyle and Recreational Teratogens

ALCOHOL: *Consuming even moderate amounts of alcohol in pregnancy has been linked to fetal alcohol syndrome. Babies born with this syndrome can suffer from prenatal and postnatal growth restriction, joint and ocular abnormalities, mental retardation, and congenital heart disease.*

AMPHETEMINES (SPEED): *Found to be associated with intracranial bleeding and low birth weight.*

COCAINE: *Intrauterine Growth Restriction, microcephaly, urogenital abnormalities, neurobehavioral disturbances and cerebral infarction.*

MARIJUANA: *Limited studies, but some suggest use in pregnancy may result in low birth weight, intracranial bleeding, jitteriness, low blood sugar, and rapid breathing.*



NICOTINE: Has an effect on fetal growth due to constriction of uterine blood vessels. This constriction decreases the supply of oxygen and nutrients to the embryo and can lead to compromised cell growth and mental development.

OPIOID DRUGS (HEROIN, METHADONE): Babies whose mothers use these drugs in pregnancy have been found to have central nervous system dysfunction, low birth weights, and smaller head circumferences.

Environmental Teratogens

Pinning down environmental agents as teratogens is a difficult task. There are so many factors involved. This area of teratogens is constantly being studied and updated. There are many, many theories linking agents that need more studying.

DIOXINS: Known carcinogens, or known to cause cancer these are common ingredients found in laundry detergents, liquid soaps, and window cleaners. Exposure to large amounts can increase risk of birth defects, immune system damage, and cancer.

HYPERTHERMIA: When a pregnant woman's body reaches 102 degrees F or higher for an extended period of time, there have been defects associated. These defects include neural tube defects, miscarriage, central nervous system and cardiovascular defects.

LEAD: Crosses placenta and builds up in fetal tissues. Associated with increased risk of miscarriage, fetal anomalies, intrauterine growth restriction, and neurobehavioral and psychomotor disturbances. Lead was commonly used in paints before 1960 and in plumbing pipes before 1986.

MERCURY: Can lead to cerebral atrophy, seizures, mental retardation and behavioral disturbances. Mercury is found in various levels of certain fish.

POLYCHLORINATED BIPHENYLS (PCB): These chemicals produce intrauterine growth restriction and skin discoloration in babies born that were exposed. PCB's are found in plastics, copy paper, floor finish, oil-based paint, adhesives and tapes, motor oil and hydraulic systems and other electrical equipment.

Teratogenic Medications

ANTIBIOTICS: Tetracyclines cross the placenta and can impact the growth of bones and teeth.

ANTICONVULSANTS: These medications prevent seizures but can effect developing facial features, mental retardation, intrauterine growth retardation, skeletal anomalies and microcephaly.

ANTICOAGULANTS: Blood thinners that prevent blood clots. Known to cause eye and nasal anomalies as well as mental retardation.

CHEMOTHERAPEUTIC OR ANTI-NEOPLASTIC DRUGS: Used to treat serious diseases such as cancer, and rheumatoid arthritis these drugs are generally avoided in pregnancy when possible. Highly teratogenic, they inhibit rapid cell growth necessary for the growth and development of a baby.



METHOTREXATE: Used to treat severe psoriasis this drug has been linked to many anomalies including skeletal, facial, cranium, limbs and spinal.

PSYCHOTROPIC DRUGS: Used to treat bipolar disorder, some of these drugs can produce various anomalies, including of the heart and large vessels or crania-facial.

RETINOIC ACID: A vitamin A derivative used to treat acne; even low doses can produce birth defects. The most critical period for exposure is 2-5 weeks gestation. Malformations linked usually involve the head and face including craniofacial dysmorphisms, cleft palate, thymic aplasia, and neural tube defects.

TRANQUILIZERS: Associated with limb abnormalities (absence of or shortened length of), abnormalities of the ears, heart, and urinary tract. The most critical period of exposure is from 24-36 days after fertilization.

Teratogenic Infections

CYTOMEGALOVIRUS: A viral infection in which most pregnancies in the first trimester end in miscarriage, and those in later pregnancy are associated with neurologic and audiological anomalies as well as intrauterine growth restriction.

HERPES SIMPLEX: Congenital anomalies, spontaneous miscarriage, intrauterine growth restriction and continuing infection of the newborn.

RUBELLA (GERMAN MEASLES OR 3-DAY MEASLES): Crosses the placenta and can lead to cardiac defects, deafness, and cataracts.

SYPHILIS: Can cross the placenta as early as 9-10 weeks. Primary infections of syphilis cause serious fetal infection and congenital anomalies. Risk of stillbirth is 25% if mother is not treated.

TOXOPLASMOSIS: A parasitic organism that causes destructive changes in the brain and eyes resulting in mental deficiency as well as other anomalies.

Toxoplasmosis is usually passed from animals and found in cat feces. Pregnant women should avoid or take extra care if changing litter boxes, and while gardening or working in soil. Meat and eggs should be well cooked, and milk should be pasteurized to lessen risk.

VARICELLA (CHICKENPOX): If infected in the first four months of pregnancy, congenital anomalies often occur.

Maternal Medical Conditions

DIABETES MELLITUS: Uncontrolled or poorly controlled diabetes is associated with macrosomia, holoprosencephaly (forebrain does not divide into hemispheres), meroencephaly (partial absence of the brain), sacral agenesis, vertebral anomalies, congenital heart defects, and limb anomalies.



Critical Periods of Teratogen Exposure

The first two weeks of development are generally not susceptible to teratogens. The most critical time for exposure to teratogens in general is from 3-9 weeks. Most critical meaning they have potential for serious medical significance. As the third trimester approaches, minor defects may occur, but major ones can generally be avoided.

CENTRAL NERVOUS SYSTEM: throughout the pregnancy, with weeks 3-31 being most critical.

EARS: Weeks 4.5-33 with 3.5-12 being most critical.

EXTERNAL GENITALIA: Weeks 7.5-end of pregnancy, with 7.5-14 being most critical.

EYES: Weeks 4.5-end of pregnancy, with 4.5-8.5 being most critical.

HEART: Weeks 3.5-9, with weeks 3.5-7 being most critical.

LIMBS: Weeks 4-9, with 4-6 being most critical.

LIPS: Weeks 5-9, with 5-7 being most critical.

PALATE: Weeks 6.5-16, with 6.5-11 being most critical

TEETH: Weeks 6.5-end of pregnancy, with 6.5-9 being most critical.

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