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Common Summertime Exposures During Pregnancy

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Sunscreen

Heightened attention to health risks from sun overexposure has increased the use of sunscreens, both in the general population as well as in pregnancy (Benson, 2000). Sunscreens can come in various formulations (creams, lotions, sprays, etc.) and are also present in many cosmetic products. A few common sunscreen ingredients include oxybenzone, avobenzone (Parsol 1789), p-Aminobenzoic acid (PABA), octyl methoxycinnamate, and octocrylene (Benson, 2000).

Although there is a lack of specific human pregnancy teratology studies, reassurance can be gathered from their common use during pregnancy and the absence of adverse pregnancy reports.

Additionally, some high dose experimental animal studies are available. For example, Stroeve, et al. (1998) noted that when pregnant rats were directly injected with PABA, there was no increase in congenital malformations. Octocrylene has also been studied in pregnant rats and rabbits. When orally administered to rats and topically applied to rabbits, no teratogenic effects were seen (Odio et al, 1994).

The route of administration is also an important principle in teratology. Since sunscreen is topically applied to the skin, systemic absorption (and therefore fetal exposure) is expected to be low. Depending on the particular ingredient, it is estimated that only 1-10% of topically applied sunscreen is absorbed into the blood system (Benson, 2000).

There is a medical benefit of sunscreen use in protecting individuals from the damaging effects of the sun. For this reason, sunscreen has been used for many years as a method of preventative health care (Benson, 2000). It is important that a pregnant woman, like all women, protect herself from overexposure to the sun. Although specific pregnancy studies are limited, conservative, but appropriate use of sunscreens on exposed areas of skin should not be a concern for the developing fetus.

Self-tanners

Self-tanning creams, lotions, and sprays typically contain an active ingredient called dihydroxyacetone (DHA) at concentrations of 3-5% (Levy, 1992). When applied topically, DHA temporarily enhances pigmentation of the skin. Due to the topical route of administration, systemic absorption is expected to be low. One in vitro study estimated that while 22% of the applied dose penetrated human skin, only 0.5% of this application would be systemically absorbed (Yourick et al, 2004).

As with sunscreen, while there are no adverse pregnancy reports, there are also no human pregnancy studies on DHA. However, there are no experimental animal studies on DHA either. Since self-tanners do not have the medical benefit that sunscreen has, a woman may feel more comfortable erring on the side of caution and deciding to avoid the use of self-tanners during pregnancy. If a woman does choose to use tanning creams during pregnancy, it is important to remember that they do not provide protection

from the sun and that the small amount of expected absorption can be further decreased with less frequent use and with application to smaller areas of the body.

West Nile Virus

In 1999, New York City was the site of an outbreak of encephalitis and meningitis caused by the West Nile Virus (WNV), originally described in 1937 in Uganda (Alpert et al, 2003; Chappa et al, 2003). The disease is transmitted to humans primarily through the bites of infected mosquitoes.

Symptoms of infection typically develop within 3-14 days after being bitten, and can vary from mild to severe. Many people infected with WNV do not develop any symptoms. The mild form of WNV typically presents as a sudden fever, often with nausea, vomiting, eye pain, skin rash, headache, or myalgia. Less than 1% of cases result in more serious neurological disease, with advanced age being a risk factor. Clinical information can be located online at http://www.cdc.gov/ncidod/dvbid/westnile/resources/fact_sheet_clinician.htm

In 2002, the Centers for Disease Control and Prevention (CDC) reported the first case of intrauterine transmission from a woman who had WNV encephalitis during the 27th week of pregnancy (Alpert et al, 2003). The child was born with both ocular and neurologic complications. Serum studies on the infant indicated the presence of WNV-specific antibodies. Although this case demonstrated intrauterine WNV infection, no causal relationship between WNV and the congenital anomalies was established.

However, after this case was reported, a registry was formed by the CDC and local state and health departments to follow birth outcomes among women with WNV illness during pregnancy (O'Leary, 2004). During 2002, three additional infants of mothers infected with WNV were born full term with normal appearance and negative laboratory studies. Since 2003, the registry has identified 74 women who acquired WNV illness while pregnant. Preliminary data for 49 known outcomes includes 42 livebirths, 5 first trimester miscarriages, and two elective terminations. Of the 42 livebirths, specimens were available from 29 to check for WNV antibodies. There was evidence of intrauterine infection in 1 infant who did not have clinical evidence of illness.

Additionally, in three other cases with suspected, but unconfirmed intrauterine infection, there was 1 infant fatality secondary to lissencephaly and superimposed WNV infection, one case of a neonatal rash that resolved, and one case of a neonatal rash with fever (O'Leary, 2004).

If WNV is diagnosed during pregnancy, ultrasound at 2-4 weeks post symptoms can evaluate the fetus for signs of viral infection (CDC, 2004). While amniotic fluid could be tested for evidence of WNV infection, the sensitivity, specificity, and predictive value are not known, nor is the clinical consequence of fetal infection (CDC, 2004). Physicians aware of instances of WNV in pregnancy are asked to contact their state health department or the CDC. A list of follow-up clinical newborn evaluations can be found online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5307a4.htm>

In an attempt to minimize the risk of contracting WNV during pregnancy, the CDC recommends that women who live in areas with WNV-infected mosquitoes use insect repellent over their clothes and on exposed skin, and when possible avoid outdoors during dawn and dusk, the peak hours of mosquito activity (CDC, 2004).

DEET

DEET is an acronym for Diethyltoluamide, which has been marketed in the United States since the late 1950s. According to the CDC, it is the most effective repellent for the prevention of mosquito bites. DEET is a common component of many insect repellents such as "Off". In a study investigating the absorption of DEET following dermal application in a group of male volunteers, it was found that on average, only 5.6% of DEET was systemically absorbed at undiluted concentrations (Selim et al, 1995).

DEET has been reported to produce dermatitis in sensitive adult individuals (Koren et al, 2003). Initial

concern about DEET in pregnancy stemmed from case reports of seizures following misuse of DEET in children (Zadikoff et al, 1979). However, causation related to DEET was not proven. Additionally, a more recent study did not find a higher incidence of severe adverse events in children compared to adults (Koren et al, 2003).

Very high dose animal studies in rats and rabbits (undiluted DEET administered via a stomach tube) found no increased incidence of congenital anomalies (Schoenig GP et al, 1994). At the highest doses, decreased fetal body weights were found. However, the latter may be related to the toxicity of the mother animal and reduced maternal food consumption.

There is an isolated case report of an adverse pregnancy outcome in association with the daily use of DEET throughout the pregnancy, but cause and effect were not established because there were additional medicine exposures (Schaefer et al, 1992).

Unfortunately, there is no specific controlled data available on human first trimester exposure to DEET to confirm the reassuring animal data. However, there is a controlled human pregnancy study that evaluated DEET exposure during the second and third trimesters of pregnancy.

A double-blinded, randomized, therapeutic trial of insect repellents for the prevention of malaria was conducted in Thailand (McGready et al, 2001). 897 women between three and seven months of pregnancy participated and were randomly allocated to either receive a 20% DEET solution and thanaka (a common local cosmetic paste used as a carrier for the repellent), or thanaka alone. 449 women were exposed to the DEET and thanaka combination, while 448 women were exposed to the thanaka alone. 741 live born singletons were available for follow-up studies. In 50 women randomly selected who received DEET, 4 (8%) showed evidence of DEET in the cord blood, indicating that placental transfer can occur. However, there were no differences in survival or growth parameters between the two groups, and for those infants followed for the first year of life (81%), no differences were noted in neurological development.

It should be noted that repellents containing a higher concentration of DEET provide longer-lasting protection but not more effective protection. A repellent therefore should be chosen with the lowest concentration needed for the amount of time spent outdoors. The CDC notes that a product containing 20% DEET provides almost 4 hours of protection while a product with 6.65% DEET provides almost 2 hours of protection and a products with 4.75% DEET provides roughly 1 and one half hour of protection.

Patient information on the use of DEET during pregnancy can be found at www.otispregnancy.org under the fact sheet listings.

In summary, both experimental animal studies and one controlled human study during the second and third trimesters regarding the use of DEET found no increase in congenital anomalies.

Limiting the number and amount of DEET applications should reduce systemic absorption and therefore reduce fetal exposure. Other recommendations listed earlier include wearing protective clothing (i.e. long sleeves, socks) when possible and then spraying DEET over clothing, rather than directly on skin, not spraying directly onto abraided skin, and avoiding outside activities during peak hours of mosquito exposure. After returning indoors, the CDC recommends washing any treated skin with soap and water. They also recommend removing any items outside and around the home that contain standing water where mosquitoes can lay their eggs.

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