

Request to Continue Flying While Pregnant

Pregnancy is a normal female condition resulting in various important physiologic changes. These dynamic changes accommodate the developing fetus and prepare for delivery. The overall impact of these changes is unpredictable and varies between different patients and pregnancies. Many of the normal physiologic changes of pregnancy create potential risks in the context of naval aviation. In addition to the risks of normal pregnancy physiology, pregnancy-specific disorders can present with sudden incapacitation or life-threatening emergencies. Furthermore, pregnancy can exacerbate other chronic medical problems. These issues present unique risks to the pregnant aviator who continues to fly.

As in aviation, risk management strategies can mitigate threats during pregnancy. Aviators with complicated pregnancies, or certain pre-existing medical conditions (other medical waivers), should not fly while pregnant. Pregnant aviators should not fly during high risk times in the pregnancy, such as the first and third trimester. Solo flights, flights in ejection seat aircraft, and flights with risk for hypoxia or excessive G-force exposures should be avoided during pregnancy.

It is essential for the pregnant aviator to discuss potential adverse consequences of the aviation environment with her flight surgeon and obstetrical care provider. Only after careful consideration should she request a waiver to continue flying during her pregnancy. Some of the common physiologic changes in pregnancy and potential hazards are described below.

Changes in Blood Volume:

Blood volume in a pregnant patient increases in order to adequately perfuse the growing uterus and fetal tissues. These changes are dynamic and progress throughout the pregnancy. Increased blood volume primarily results from an increase in plasma, the watery portion of the blood. This dilutes the oxygen carrying red cells, causing a physiologic anemia. Increased iron requirements in pregnancy may further complicate anemia. Maternal iron stores are transferred to the fetus, requiring iron replacement during pregnancy. Physiologic and/or iron deficiency anemia can impair an aviator's performance and adversely impact flight safety. Therefore, prior to returning to flight status, a blood test is required to assess blood levels and rule out anemia.

Dehydration:

It is important for aviators to remain well hydrated. Pregnancy produces an increase in urine production, commonly contributes to dehydration that may be challenging to correct. Dehydration results in lower blood pressure, which may cause reduced G-tolerance, lightheadedness, dizziness, visual disturbances, loss of consciousness, or adverse consequences for the fetus. Lower blood pressure compromises blood flow to maternal and fetal tissue. This is a dynamic process requiring an aviator's constant vigilance to maintain a well hydrated status.

Blood Sugar:

Pregnancy hormones affect a pregnant woman's blood sugar control, resulting in higher blood sugar levels than in non-pregnant women. Elevated blood sugar can be harmful to both the pregnant woman and her fetus, and can increase flight-related risks for dehydration, spatial disorientation, and G-force intolerance. The changes and impacts of blood sugar metabolism in pregnancy vary considerably. Therefore, blood sugar evaluation is part of routine pregnancy care. Because of the unique risks of the flight environment, it should be evaluated closely in aviators who continue to fly while pregnant.

Hypotension (low blood pressure) & Syncope (loss of consciousness):

Pregnant women generally experience lower blood pressures. This is due in part to dehydration, but mainly as a result of hormonal effects on blood vessel relaxation. The general relaxation of smooth muscles in blood vessel walls lowers the baseline blood pressure and reduces the vascular system's ability to compensate for G-forces that "pull" blood from the brain. In addition, about 25% of blood flow is directed to the uterus and placenta, which is a very low pressure system assuring constant blood flow to the fetus. The diversion of blood into the low pressure system further decreases systemic blood pressure, decreases G-tolerance, and increases the risk of grey-out, black-out, and syncope. Syncope is a transient loss of consciousness due to decreased blood flow to the brain, and usually resolves without lasting effects once blood flow is restored. Hypotension is especially important to aviators exposed to G-forces as it increases the risk for G-LOC. Tolerances may differ significantly from the non-pregnant tolerances to which the aviator has been accustomed. It is important for the pregnant aviator to understand these changes may vary throughout pregnancy and modify her ability to anticipate, recognize, and counter G-induced grey-out, black-out, or syncope. Pregnant aviators are generally restricted to low-G exposure aircraft for this reason.

Lungs:

Changes occurring in the lungs during pregnancy are aeromedically relevant. More fluid collects in the lungs of a pregnant woman resulting in functional changes. The most significant change results in a dramatic reduction in the residual lung volume, which functions as the lung's emergency oxygen reserve. This can result in an impaired tolerance to any exposure to hypoxia. Pregnancy also increases a woman's susceptibility to lung infections and their complications, which should be considered.

Hypoxia:

As mentioned above, a pregnant aviator will have an impaired tolerance to hypoxia. Hypoxia may potentially cause fetal malformation, spontaneous abortion or developmental disorders. The hemoglobin in the fetal blood, however, has a much higher affinity for oxygen than the mother's hemoglobin. This preferentially oxygenates the fetal blood providing some level of protection. It is unclear how susceptible the fetus may be during transient hypoxia exposures, and this must be considered in the aviation environment. It is widely believed adequate fetal oxygenation occurs at altitudes under 10,000 feet. For this reason, pregnant aviators are restricted to flights with cabin pressures less than 10,000 feet.

Vision Changes:

Good vision is critical to safe flight. Studies have shown variable and temporary changes in visual acuity during pregnancy. To mitigate any risk related to vision changes during pregnancy, an aviator should have a visual acuity examination prior to returning to flight status, and her vision should be rechecked regularly during the pregnancy. A common eye change in pregnancy is corneal edema, which causes a thickening of the cornea by about 3%. This may result in visual changes and intolerance to contact lens use. Pregnant aviators who wear contact lenses may need to switch to glasses.

Vaginal Bleeding:

Vaginal bleeding can present in all stages of pregnancy, and occurs in up to 25% of all first trimester pregnancies. It can range from minimal and benign to excessive and life-threatening. It can be gradual and painless, or sudden and associated with incapacitating pain. In most cases, small amounts of vaginal bleeding are not associated with dangerous conditions. However, vaginal bleeding could indicate more serious conditions such as miscarriage, placenta previa, vasa previa, or placental abruption, and must always be immediately evaluated by an obstetrical care provider. Miscarriages are common events, occurring in approximately 15% of all recognized pregnancies. Nearly 80% of miscarriages occur in the first trimester. Many miscarriages occur unpredictably without identifiable cause. Placenta previa, vasa previa, and placental abruption occur later in pregnancy and can result in sudden life-threatening bleeding. The risk of placenta previa and vasa previa can be mitigated with an ultrasound exam, which is frequently performed in the second trimester. Because vaginal bleeding occurs frequently in the first trimester, and can lead to unpredictable sudden incapacitation, pregnant aviators are frequently restricted from flight in the first trimester.

Ectopic Pregnancy:

An ectopic pregnancy occurs when the pregnancy implants and grows in a location outside of its normal position in the uterine cavity. Most ectopic pregnancies occur in the fallopian tube (“tubal pregnancy”). Unlike the uterus, which can expand with the growing fetus, the fallopian tube will stretch, rupture, and result in life-threatening internal bleeding. An ectopic pregnancy occurs in about 2% of all first trimester pregnancies, and is the most common cause of maternal death in the first trimester. Ectopic pregnancies are difficult to predict and diagnose, frequently presenting with an abrupt onset of incapacitating pain and life-threatening bleeding. Because of the ectopic pregnancy risk, pregnant aviators should be grounded, and defer any consideration for returning to flight status until a formal ultrasound confirms the pregnancy is located within the uterus.

Blood Clots:

Pregnancy is considered a hypercoagulable state, a condition promoting blood clot formation. The normal chemicals that induce clot formation are hyperactive during pregnancy. As described above, normal physiologic changes in pregnancy include the relaxation of blood vessels, dehydration, and low blood pressure. These changes increase

the likelihood that blood will pool, particularly in the lower extremities. Blood pooling promotes blood clot formation. A growing uterus can compress the veins that drain the legs, further increasing the likelihood for blood clots in the lower extremities. Due to these circumstances, blood clots occur four times more frequently in pregnancy. Sitting for prolonged periods of time, as in the aviation environment, can also lead to blood clots in the legs. Clots within the legs can break off as emboli, traveling through the blood to the lungs (pulmonary embolism). These embolic clots become trapped in the vessels within the lungs, resulting in severe chest pain and shortness of breath. This is life-threatening and requires immediate treatment. Pulmonary embolism during pregnancy is the leading cause of maternal death in the developed world. Understanding these risks, the pregnant aviator must limit prolonged sitting in a fixed position, and seek immediate medical attention if experiencing chest pain or shortness of breath.

Preeclampsia, High Blood Pressure and Seizure:

Preeclampsia is an abnormal condition in pregnancy resulting in very high blood pressure, excessive swelling, abnormal kidney function, severe headaches, vision changes, neurological impairment, and occasionally seizures (eclampsia). Preeclampsia occurs in 3-5% of pregnancies. It generally occurs after the 20th week of pregnancy, and rarely occurs earlier. The evaluation for its presence is a common part of routine pregnancy care. Any signs or symptoms of this condition must result in immediate grounding and prompt evaluation by the obstetric care provider.

Hearing:

Dual hearing protection in the aviation environment provides the aviator with protection against permanent hearing loss. There are no similar protective devices for a developing fetus, however. While definitive research in humans is limited, there is some evidence suggesting exposure to high levels of noise and vibration may adversely impact the developing fetus. The organs responsible for hearing in humans develop by 24 weeks gestation, and research has shown noise and vibration may damage these developing organs. Furthermore, other studies have suggested noise exposure may contribute to growth restriction and preterm labor. The pregnant aviator must understand excessive noise in the aviation environment represents an uncertain risk to her developing fetus.

Chemical Exposure:

Although somewhat protected by the uterine environment, the fetus is susceptible to the harmful effects of toxic exposures. This risk is greatest in the first 12 weeks of the pregnancy. Animal studies suggest a number of chemicals can cause birth defects and miscarriage, but definitive studies in humans do not exist. Because a number of potentially toxic chemicals are present in the aviation environment, the pregnant aviator must consider and minimize this uncertain risk.

Physiology Training:

NATOPS required physiology training is not authorized during pregnancy. If any qualification expires during pregnancy, the member must be grounded until completion of the pregnancy, and may not participate in training until an aeromedical clearance notice is reissued.

Aviation Training:

Aviation training is not authorized during pregnancy. Only designated aviators are eligible for pregnancy waivers.

Many women have continued to fly during pregnancy without evidence of adverse effects. Because of this, it is believed most uncomplicated pregnancies will tolerate the aviation environment when appropriate restrictions and risk management strategies are employed. The pregnant aviator must educate herself with regard to potential hazards and prevention when flying while pregnant.

I request permission to continue flying during my pregnancy. I have read this handout and understand the risks and uncertainties relative to flying while pregnant. I have considered the impact flying may have on my health and the health of my unborn child. I understand I am not required to request a pregnancy waiver, and if granted, I may voluntarily terminate the waiver at any time. My questions have been answered to my satisfaction.

Signature / Date

Printed Name

*This form is designed for naval aviators, aircrew, and aviation personnel. This form considers risks related to aircrew flying in military environments. This form is not designed for use in passengers on commercial or military flights. Although the issues discussed are important in considerations for all flying, this form is specifically designed for aviators, aircrew and aviation personnel.

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