

Pregnancy and Flying

Note: This Briefing Leaflet supersedes 18HUPBL01 – Pregnancy and Flying.

INTRODUCTION

Pregnancy is a normal physiological condition and not an illness; however, associated physiological changes may affect a pilot's performance. Flying whilst pregnant may present a risk to the fetus, particularly during the first trimester. Risk factors may vary from one individual to another and with regard to type of flying in question. Some women are more at risk than others. Each pregnancy should be reviewed on an individual basis by both an Obstetrician and an Aeromedical Examiner /AME familiar with flight crew duties. The decision whether a pregnant pilot chooses to stop flying immediately or to continue flying during her pregnancy, should be taken in conjunction with her AME, Obstetrician and/or family doctor. The following information is meant to educate, not to dictate.

Once a pregnancy is confirmed, the pilot should report to her own doctor, Obstetrician and to her AME. It is advisable, not only to minimize risk to the pilot and fetus, but also to ensure flight safety, that her obstetrician/gynecologist is aware of the type of flying she intends to do.

Since, the remit of this Briefing Leaflet is to highlight specific risks related to flying and pregnancy, there are other risks in pregnancy in day to day life that are not considered here.

LEGAL FRAMEWORK

ICAO PROVISIONS

The following are excerpts from ICAO Annex 1 (Twelfth Ed, July 2018), they highlight the international provisions relating to pregnancy and flying. Individual States use these provisions to develop their national legislation.

6.3.2.21 Applicants who are pregnant shall be assessed as unfit unless obstetrical evaluation and continued medical supervision indicate a low-risk uncomplicated pregnancy.

6.3.2.21.1 Recommendation. - For applicants with a low-risk, uncomplicated pregnancy, evaluated and supervised in accordance with 6.3.2.21, the fit assessment should be limited to the period from the end of the 12th week until the end of the 26th week of gestation.

6.3.2.22 Following confinement or termination of pregnancy, the applicant shall not be permitted to exercise the privileges of her license until she has undergone re-evaluation in accordance with best medical practice and it has been determined that she is able to safely exercise the privileges of her license and ratings.

NATIONAL DIFFERENCES

Regulations concerning pregnancy and flying vary considerably in different States. For example, EASA allows for female pilots to fly from the beginning of their pregnancy until the 26th week, but national regulations of EASA Member States may be different. For example, in Germany, legislation protects any pregnant women from shiftwork, and therefore she is not allowed to fly at all if she is pregnant. It is important to review the applicable legislation in your State.

INFERTILITY TREATMENT

The recommendation to ground a pilot during infertility treatment should be assessed on a case-by-case basis. The level of risk depends on both the type of treatment and medication used as well as the individual. Some medications are not compatible with flying. We recommend such an assessment should be undertaken / completed by both an Obstetrician and AME.

INCAPACITATION RISK

Miscarriage

Particularly during early pregnancy, the incapacitation risk is increased due to the higher probability of miscarriage. In the general population, we know, approximately 15 percent of embryos will spontaneously abort during the first trimester. By the 11th or 12th week of pregnancy the chances of miscarriage decrease to approximately 1-2%. More than half of all miscarriages are caused by a chromosomal abnormality in the fetus. Miscarriages may be a consequence of factors such as chronic diseases in mother, exposure to chemicals (e.g. alcohol, tobacco, caffeine), ionizing radiation, infection, hormone problems, obesity, or individual problems with the placenta, cervix, or uterus. Stress may also be a contributing factor.

Extrauterine Pregnancy

Ectopic pregnancy, also known as tubal pregnancy, is a complication of pregnancy in which the embryo attaches outside the uterus. Most ectopic pregnancies occur in the fallopian tube. 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 1-2% of all first trimester pregnancies and is the most common cause of maternal death in the first trimester. The risk of death among those in the developed world is between 0.1 and 0.3 percent while in the developing world it is between 1-3%. Ectopic pregnancies are difficult to predict and diagnose, frequently presenting with an abrupt onset of incapacitating pain and life-threatening bleeding. Consequently, a sudden ruptured ectopic pregnancy (which constitutes an emergency) during a critical state of flight, may result in both a medical and aviation emergency simultaneously. Due to the high risk of incapacitation with an ectopic pregnancy, some countries require an ultrasound examination at six weeks of pregnancy.

Morning Sickness

Nausea or vomiting in early pregnancy may occur in 50-80 % of all pregnancies, particularly during the first trimester. The severity, periodicity, and duration of morning sickness typically varies from woman to woman. While some women are sick at specific times during the day, others experience morning sickness without warning or throughout the day. Morning sickness is not compatible with flying duties. Medication may ameliorate such symptoms, however, if morning sickness requires medication, it is an indication that sickness is so severe that one should not be flying.

Hypotension (low blood pressure) and Syncope (loss of consciousness)

Blood pressure generally decreases in pregnancy. This is due in part to dehydration, but mainly because of hormonal effects on blood vessel relaxation. The relaxation of smooth muscles in blood vessel walls lowers the baseline blood pressure. In addition, about 25 percent of blood flow is directed to the uterus and placenta. This 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.

Lower G-tolerance

Hypotension is especially important to pilots exposed to G-forces as it increases the risk for G-LOC. G tolerances may differ significantly when pregnant; i.e. G tolerance may decrease when pregnant on comparison with pilot's normal G tolerance (when she is not pregnant). However, it is important for a pregnant pilot to understand these changes may vary throughout pregnancy and additionally may modify her ability to anticipate, recognize, and counter G-induced grey-out, black-out, or syncope. Pregnant pilots are generally restricted to low-G exposure aircraft for this reason.

RISKS TO MOTHER AND FETUS

Anemia

Hemoglobin (and hematocrit) begins to fall between the third and fifth month and is lowest by the eighth month. This is primarily due to increased blood volume that results from an increase in plasma, the watery portion of the blood. This dilutes the oxygen-carrying red blood cells, causing the physiologic condition anemia. Increased iron requirements in pregnancy may further complicate anemia. Usually, adequate diet with supplementary iron and folic acid is necessary; however, this will be assessed on an individual basis by the woman's family doctor, Obstetrician and or AME; self-medication should be avoided without consultation. A Class 1 Medical may be temporarily suspended in the event of a pilot becoming anemic and be reinstated following successful investigation and treatment of same.

Dehydration

Pregnancy produces an increase in urine production, commonly contributing to dehydration. Dehydration results in lower blood pressure, which may cause lightheadedness, dizziness, visual disturbances, loss of consciousness, or adverse consequences for the fetus. Lower blood pressure compromises blood flow to maternal and fetal tissue.

Hypoxia

It is known that Fetal Hemoglobin has a much higher affinity for oxygen than the mother's hemoglobin. Generally, it is believed adequate fetal oxygenation occurs at altitudes under 10,000 feet. Normal cabin altitudes in pressurized aircraft can therefore be considered safe. If flight operations with supplemental oxygen are required, these should only be done after medical consultation.

Changes occurring in the lungs, particularly, during the third trimester, are medically relevant in the context of aviation. Hormonal changes affect pulmonary function by lowering the threshold of the respiratory center to carbon dioxide, thereby influencing the respiratory rate. In addition, more fluid collects in the lungs of a pregnant woman, resulting in reduced residual lung volume. Other physiological changes during pregnancy lead to an increased oxygen demand and greater stress on the heart and lungs. For these reasons, a woman is more susceptible to the effects of hypoxia when she is pregnant.

Hypoxia may potentially cause fetal malformation, spontaneous abortion, or developmental disorders. It remains unclear how susceptible the fetus may be during transient and repeated hypoxic exposure.

Size of Abdomen

As the pregnancy progresses and the uterus expands, the girth of the abdomen may interfere with emergency egress and flight control manipulation. Abnormal flight (windshear, upset recoveries, engine loss, rapid depressurization, wake turbulence, and other emergencies) may require full deflection of flight controls and may impose increased G-loads. Depending upon the nature of the reject, force from an aborted takeoff may cause placental abruption.

Sleep

Often, a pregnant woman needs more sleep than normal due to associated hormonal and physical changes of pregnancy. During the third trimester, pregnancy-related hormones (progesterone, estrogen, cortisol, and oxytocin) markedly affect sleep quality. Studies have shown two-thirds of pregnant women suffer from sleep disorders; insomnia, restless leg syndrome, sleep apnea, nocturnal gastroesophageal reflux, and nighttime urination are common. Sleep deprivation during pregnancy is associated with longer labor, higher cesarean rates, and higher levels of pro-inflammatory serum cytokines (linked to preterm labor and post-partum depression). Irregular airline schedules negatively impact circadian rhythms and contribute to chronic sleep deprivation. Sleep deprivation attributed to shift work has been linked to a higher incidence of miscarriages and can affect pilot performance.

Edema, Deep Vein Thrombosis, and Pulmonary Embolism

The incidence of varicose veins is three times higher in women than men. Due to the expanding uterus compressing the venous cava, the risk of edema and blood clot formation increases substantially during pregnancy. Increased estrogen levels increase blood coagulation. Deep vein thrombosis and pulmonary embolism are among the most common serious vascular diseases that occur during pregnancy and account for the greatest number of maternal deaths.

Sitting for prolonged periods increases the risk of lower extremity edema, thrombophlebitis, and deep vein thrombosis. Pilots, and especially pregnant pilots, should walk around every hour or two.

Cosmic Radiation

Cosmic radiation is linked to elevated numbers of chromosome aberrations which may cause intellectual development disorders, developmental anomalies, congenital anomalies, growth restrictions, and Down Syndrome. These changes may also lead to miscarriage. According to current ICRP (International Commission of Radiation Protections) recommendations, the radiation exposure to the fetus should not generally exceed a limit of 1.0 mSv after declaring the pregnancy to the operator (the same limit applies to the general flying public and pregnant crew members). It should be noted that a flight crew member may have been exposed to some cosmic radiation prior to confirmation of pregnancy.

The average annual radiation exposure for a pilot is between 2-5 mSv.

The IFALPA position paper **18POS02** on Ionizing Radiation provides relevant additional information about this topic.

Cabin Air Quality

Although cabin air is normally of acceptable quality, fume events may cause quality of cabin air to deteriorate. Fume events may pose a risk to passengers and crew in general and this would include to a pregnant woman and the unborn fetus.

Exposure to Viral Infections During Layovers

Several viral diseases may cause birth defects. The Zika virus is a notable example. It is carried by mosquitoes and may result in microcephaly in the offspring of exposed women. Current recommendations advise pregnant women not to travel to areas where Zika virus is present. In addition, if a pregnant woman's sexual partner lives in or has travelled to a Zika affected area, it is recommended to practice safer sex, including the use of condoms, for the rest of the pregnancy.¹ Pregnant women should check the current and updated recommendations concerning Zika from health authorities. Pregnant women may have a more severe reaction to malaria than women who are not pregnant. Malaria can increase the risk for serious pregnancy complications including, but not limited to, premature birth, miscarriage, and stillbirth. It is recommended that pregnant women should avoid travelling to areas where malaria transmission occurs.²

Foodborne Illness

Pregnant women should follow the advice of local health authorities on what foods should be avoided due to the risk of foodborne illness. Advice about this issue is publicly available such as **FDA Food Safety for Pregnant Women**.³

Returning to Flying

ICAO Manual of Civil Aviation Medicine, Third Ed. 2012 states that provided the puerperium is uncomplicated and full recovery takes place, pilots could be able to resume aviation duties four to six weeks after birth or termination of pregnancy.

Postpartum Depression

Postpartum depression (PPD) is a non-psychotic depression that women may experience shortly after childbirth. PPD is different from the "baby blues," which begin within the first three or four days of giving birth, require no treatment, and improve within a few hours or up to 10-14 days. PPD is a deeper depression that lasts much longer. It usually starts within the first month after childbirth (although it can occur any time within the first year) and can last weeks to years. In more serious cases, it can develop into chronic episodes of depression.⁴ Apart from the fact that it happens soon after childbirth, PPD is clinically no different from a depressive episode that occurs at any other time in life. PPD symptoms are the same as in general depression and must meet the same criteria for diagnosis.⁵ Often medical treatment is needed. A pilot has to be free of symptoms of depression and any medication prescribed should be acceptable for use while flying before they return to duty.

1. <http://www.who.int/csr/disease/zika/information-for-travelers/en/> (accessed 15 Jan 2018)

2. <http://www.who.int/malaria/travellers/en/> (accessed 15 Jan 2018)

3. <https://www.cdc.gov/parasites/toxoplasmosis/epi.html> (accessed 15 Jan 2018)

4. http://www.camh.ca/en/hospital/health_information/a_z_mental_health_and_addiction_information/Postpartum-depression/Pages/default.aspx (accessed 15 Jan 2018)

5. http://www.camh.ca/en/hospital/health_information/a_z_mental_health_and_addiction_information/Postpartum-depression/Pages/default.aspx (accessed 15 Jan 2018)