



English translation, the Swedish version takes precedence.

Supporting work environment document

Pregnant and nursing personnel in KI laboratories

The Work Environment Act states that balance between the demands of the work and individual conditions should primarily be created by adaptations of the work to the individual. Pregnancy and breastfeeding are often associated with specific work risks and requirements. The provisions *AFS 2007:5 Pregnant and nursing employees* (amended in May 2018) states that employers shall conduct a risk assessment of the work tasks and, if required, take preventive measures for employees/students that are pregnant, have given birth 14 weeks prior to the work task, or who is breastfeeding.

As the risks are high in early pregnancy, there is a need for the employer to conduct a general risk assessment *before* any employees becomes pregnant. Known risks or procedures that entail risks shall be surveyed, documented and communicated to affected employees and students (in a fertile age).

The individual risk assessment shall be conducted by the employer together with the affected employee/student. It may be necessary to consult medical expertise or the Occupational Healthcare if the risks are difficult to assess. The risk assessment shall include the complete risk situation of the individual including medical risk factors such as chronic diseases (*e.g.* diabetes) and previous pregnancy complications. The individual medical risk factors shall be added to the established work risks. Together, these form the basis for the required preventive measures.

The employer must take immediate action if the risk assessment shows a risk for the pregnant or breastfeeding employee. Any action that is practically possible and reasonable shall be undertaken to eliminate the risk, firstly. The following types of action are to be taken, listed in order of priority:

1. adapt the work with technical protective measures or changes in procedures and work methods
2. change the organization of the work
3. temporary redeployment to other work tasks

If none of the above actions can minimize the risks or are feasible, ultimately the employer can:

4. decide that the employee/student cannot remain at the work/studies during the pregnancy or breastfeeding period.

Adaptation of the work: Note that technical measures in the form of protective equipment may increase the work load, for example protective clothing may increase heat load, gloves may reduce dexterity and a protective mask may encumber respiratory- and circulatory organs.

Organization: Work tasks or procedures that entail risks shall be avoided during pregnancy or breastfeeding so that risky exposure is eliminated.

Redeployment: Pregnant employees are entitled to redeployment from work that entails risk of ionizing radiation. Other risks that entitle pregnant employees to redeployment are risks of threats and violence, exposure to noise that can impair hearing, risks of microbiological infection, infectious agents in blood or exceeded hygienic limits for chemical work environment risks.

Prohibition: Pregnant women cannot be employed in occupations with risk of exposure to rubella and toxoplasma. Pregnant and breastfeeding women cannot be employed in work with lead.

If redeployment to safe work is not possible, it is Försäkringskassan that decides if the employee is entitled to pregnancy benefits.

Aspects to consider when performing a risk assessment for pregnant or breastfeeding employees

Karolinska Institute has developed tools in the form of templates for risk assessments (KLARA for chemicals, BARA for biological agents, etc.) in order to facilitate the risk assessment procedure.

The questions below are a complement to these templates with focus on pregnant and breastfeeding employees and with references to relevant provisions. The questions are general and you may need to add or ignore questions depending on your lines of activity. Please note that the questions may need to be supplemented with specific risks in your activities.

Point of reference for risk assessments:

- Serious risks are to be resolved immediately,
- Elevated risks shall be investigated, and planned activities required to eliminate the risk, including the person responsible for the activities and deadline, shall be included in an action plan. The responsible manager is to ensure that the planned activities are concluded.

1. *Is there a possibility to, under suitable conditions, temporarily rest in a lie-down position in the vicinity of the workplace?*

The increased requirement for rest for many pregnant or breastfeeding employees may make solitary work unsuitable. The resting room should be separate but within such a distance from the employee's workplace so that no further stress is added.

Source: AFS 2020:1 Arbetsplatsens utformning and AFS 2007:5 Gravida och ammande arbetstagare.

2. Is there suspicion of air pollution?

The hygienic limit corresponds to the highest approved medium level of air pollution in the inhalation air. An exposure measurement shall be conducted if there are suspicions of pollution. The manager can contact a work environment engineer at the Occupational Healthcare Service for arrangement of measurements. In addition to the degree of pollution, the workload shall be assessed as well as the ability of some substances to be adsorbed through skin. If there is exposure that exceeds the hygienic limit, there should be redeployment to other work. Example of air pollution of the inhalation air is the use of anesthesia gases in for example research animal facilities (see table below). From the comments to the appendix: List of work environment factors and work conditions referred to in 4 § in *AFS 2007:5 Gravida och ammande arbetstagare*. "The knowledge of the effects of newer anesthetics is incomplete. Exposure of pregnant employees should be minimized since negative effects on pregnancy cannot be completely excluded. In the provision on anesthetic gases there are rules on how the work should be conducted to minimize the leakage of anesthetic gases to the surroundings."

Substance	CAS-number	Level limit value (NGV) ¹		Short time value (KTV) ²	
		ppm	mg/m ³	ppm	mg/m ³
Nitrous oxide	10024-97-2	100	180	500	900
Halotane	151-67-7	5	40	10	80
Enflurane	13838-16-9	10	80	20	150
Isoflurane	26675-46-7	10	75	20	150
Desflurane	57041-67-5	10	70	20	140
Sevoflurane	28523-86-6	10	80	20	170

Source: *AFS 2001:7 Anestesigaser*, *AFS 2007:5 Gravida och ammande arbetstagare* and *AFS 2018:1 Hygieniska gränsvärden*.

3. Is part of the work conducted in strong heat?

The body temperature is more difficult to regulate at the later stages of pregnancy, especially when standing up. Pregnancy causes reduced heat resistance due to the oxygen demand of the fetus which leads to a higher oxygen usage and thereby larger risk of exceeding the woman's circulatory capacity. This is particularly so for the later stages of the pregnancy. Factors such as heat must be weighed

¹ **Level limit value** is the highest approved medium level (time medium level) of air pollution in inhaled air for exposure during a full work day.

² **Hygienic limit value** for exposure during a reference period of 15 minutes.

together with factors such as physical load e.g. heavy work or work with prolonged standing, which can result in swollen legs, varicose veins and blood clots/embolism.

Source: AFS 2020:1 *Arbetsplatsens utformning* and AFS 2007:5 *Gravida och ammande arbetstagare*.

4. *Is the workplace designed so that the work can be performed without risk of falling?*

The foundation shall have suitable roughness, be free from obstacles, irregularities, spills, waste or other extraneous objects. Falls can cause a risk for the pregnant employee of miscarriage or fetal harm.

5. *Ergonomic aspects*

Are there manual lifts (15 kilos or more)? Are work levels and reaching distances adjusted to the employee's individual condition?

The load on the low back increases in pregnant women due to the displacement of the point of gravity as the belly grows. This requires special regard for manual handling as the load will be located far from the vertebral column. Take into account if the work allows proper work positions with short moment arm, erect upper body and hands in front of the torso.

Is there tiring leg work, such as repeated climbs on a stool, prolonged squatting or is one leg more often used as support?

Pregnancy causes increases in blood circulation with increased strain on the legs in particular. It is good if there is a possibility to shift between standing and sitting work.

Is there prolonged or repeated work where the back is stooped forwards, backwards or to the side, twisted or stooped/twisted in combination?

The hormonal change in pregnant women cause reduced stability in the joints of the back and the pelvis. Great caution should be exercised for work with joints in outer positions.

Is there a possibility to minimize strictly governed or restricted work to vary work positions/movements and include short breaks as needed?

It is important to enable a pregnant woman to have short breaks as well as periods of recovery.

Is there enough functional work equipment that facilitates the work?

Great physical strain can cause contractions in the uterus or uterine prolapse in women who have recently given birth.

In the risk assessment for pregnant or breastfeeding employees, regard must be taken to combined factors where high physical load is weighed together with psychological load such as time pressure, high demands and expectations, high concentration that may increase the effects of the physical load. Other affecting factors are limited flexibility or low social support. Vibrations and unsuitable climate conditions increases the risk of problems with physical load.

Source: *AFS 2012:2 Belastningsergonomi* and *AFS 1981:14 Skydd mot skada genom fall*.

6. *Is there exposure to disturbing or damaging noise?*

Pregnant women shall avoid work in environments where the limit values for damaging noise are exceeded and where ear protection is required, especially during the later stages of the pregnancy. Disturbing noise can cause stress and tiredness, increased heart frequency, high blood pressure and secretion of stress hormones which becomes an additional strain on the pregnant woman.

Noise affects the fetus in such a way that high frequent noise is considerably dampened whereas low frequency noise can cause impair the hearing of the unborn child. Exposure to noise exceeding 85dB(A) may increase the risk for growth disturbances and high noise levels elevates the risk of reduced circulation of the placenta.

Pregnant women shall be offered redeployment if there is exposure to noise in the range 75-80 dB(A), especially during the later stage of the pregnancy. Low frequent noise in the range 30-79 dB(A) in the frequency interval 20-200Hz must be avoided during the length of the entire pregnancy as it may result in impaired hearing of the unborn child.

Source: *AFS 2005:16 Buller* and *AFS 2007:5 Gravida och ammande arbetstagare*.

7. *Are pregnant employees who work with pharmaceuticals/chemical substances that are reproduction toxic or that may have harmful effects on pregnancy or breastfeeding informed about the risks?*

The employer must ensure that the employees have sufficient knowledge about the risks of the work in order to ensure that ill health and accidents are avoided, and long-term satisfactory work environment is achieved. Cytostatics are examples of pharmaceuticals that are cytotoxic. Prolonged exposure or occasional extremely high exposures are associated with increased risk. It is probable that the fetus can be affected during the pregnancy as well as the baby during the breastfeeding period. Some pharmaceuticals can be absorbed through the skin and may affect entire systems of organs. Numerous cytostatics are irritants or can cause tissue damage.

Even though the pharmaceutical/chemical substance is prepared in ventilated hoods and use of personal protective equipment there is a risk of low-level exposure for personnel that prepare and administer cytostatics. Note that pharmaceuticals and/or active degradation products can be excreted via feces, urine, saliva or blood under a period of days after the last treatment. Health risks are also associated from dust formed out of dry contaminations. In particular when such substances have been used in the animal research facilities when animals are moved to new cages and dirty cages and bottles are transported to the dishing facility. Caution must also be taken when handling biological waste or if there is suspicion of the presence of concentrated pharmaceuticals or active degradation products. From the comments to the appendix: List of work environment factors and work conditions considered in 4 § (in *AFS 2007:5 Gravida och ammande arbetstagare*), freely translated "It can be suitable to temporary redeploy a pregnant employee who prepares cytostatic/cytotoxic pharmaceuticals." If work with cytostatics shall be conducted by pregnant

employees a precondition is that adequate protective equipment (fume hoods, protective clothing etc.) is functional in an optimal way and used.

Source: 2005:5 *Cytostatika och andra läkemedel med bestående toxisk effekt* and AFS 2007:5 *Gravida och ammande arbetstagare*.

8. *Is the pregnant employee at risk for exposure of hazardous chemical substances?*

Lists of the workplace's chemicals are available in the Chemical Register KLARA. Assess the impact of the chemicals each on their own as well as in combination, as well as risks for accidents and ill health associated with the chemicals.

For those who are pregnant and breastfeeding, special attention should be paid when working with CMR substances, specifically organ toxicants, mercury and mercury compounds, carbon monoxide and chemical substances that are harmful when absorbed through the skin.

When working with CMR substances with the risk phrases below it must be ensured that there is no risk whatsoever of exposure for pregnant or nursing employees:

H360	May damage fertility or the unborn child
H361	Suspected of damaging fertility or the unborn child
H362	May cause harm to breastfed children

Be attentive of chemicals with the hazard pictograms below. Work with such chemicals shall always be assessed for risks so that the risk of exposure is minimized for all staff categories.



Regarding substances that have hygienic limit values, it is necessary to ensure that the workplace, with good margins is below such levels.

At the animal research facilities, it is of particular importance to ensure that researchers are submitting risk assessments and that these cover the entire experiment; how the animals should be handled during the experiment as well as how carcasses and cages shall be safely handled.

For breastfeeding employees, it is important to consider that the child may come into contact with hazardous substances via clothes or skin that have been contaminated when the mother have come into contact with these.

Source: AFS 2011:19 *Kemiska arbetsmiljörisker* and AFS 2007:5 *Gravida och ammande arbetstagare*.

9. *Is there risk for pregnant employees to be exposed for electromagnetic fields that exceed the limit values for the public?*

In certain professions higher exposure than what is recommended for the general public is allowed. The work environment authority and the Radiation Safety Authority have formulated a precautionary principle, pregnant employees must not be exposed to higher levels than what is considered acceptable for the public. Limit values are listed in the provisions AFS 2016:3 *Elektromagnetiska fält*.

Source: AFS 2016:3 *Elektromagnetiska fält* and AFS 2007:5 *Gravida och ammande arbetstagare*.

10. *Is the pregnant employee at risk for exposure to infectious agents?*

Infectious agents in risk groups 2-4 can cause illness and may be particularly harmful during pregnancy and breastfeeding. The employer must investigate if there is risk for exposure to such agents in the work environment.

Pregnant or breastfeeding employees are prohibited to perform tasks involving risk for exposure to rubella (German measles) or toxoplasma. Other infectious agents that confer risk to pregnant and breastfeeding employees are parvovirus B19 (*Erythema infectiosum*), tuberculosis, cytomegalovirus (CMV), hepatitis B, hepatitis C, *Herpes simplex*, enterovirus, Listeria, influenza, whooping cough, measles, Varicella (chicken pox), HIV and *Chlamydia psittaci*. There are also other microorganisms that can harm the fetus or newborn child. It is thus important to perform a risk assessment even if the work involves microorganisms that are not listed above. Observe that risks to the embryo/fetus are often greatest following exposure during the early stages of pregnancy. The decisive factor is the actual risk for exposure. It is important to take temporarily high exposure levels into consideration. An accident is an example of the type of temporary exposure that may entail risks. At the risk assessment, the pregnant woman's concern/fear must be taken into consideration even if there are no documented cases of fetal damage for the organism in question. If desired, the pregnant woman may consult with separate experts such as the occupational health service or the Biosafety Committee for risk assessment before she contacts her responsible manager. In addition to these recommendations, the "[INPREG, Knowledge center for infections during pregnancy](http://www.medsinet.se/infpreg/)" (<http://www.medsinet.se/infpreg/>) provides specific information on known fetal damage and harm to the newborn child after being infected with different infectious agents. More information is available at the Work Environment Authority's webpage.

Source: AFS 2018:4 *Smittrisker* and AFS 2007:5 *Gravida och ammande arbetstagare*.

11. *Vaccinations to avoid infections*

The employer may offer vaccinations against agents such as rubella, tuberculosis, hepatitis, whooping cough, measles and Varicella as well as seasonal influenza. The employer must ensure that employees receive information about the advantages and disadvantages of vaccination, that vaccines do not always provide complete protection against infection and that, therefore, other protective measures must also be taken. There is information on which vaccinations to be avoided during pregnancy in the knowledge database INFPREG.

Source: AFS 2018:4 *Smittrisker*

12. Are there forceful shocks or whole-body vibrations in the work?

Forceful shocks and whole-body vibrations are considered to increase the risks of bleeding uterine contractions and miscarriage as well as premature birth.

Source: AFS 2005:15 *Vibrationer* and AFS 2007:5 *Gravida och ammande arbetstagare*.

13. Employers shall inform female employees/students of childbearing age involved in work with ionizing radiation about the importance of reporting their established pregnancy or ongoing breast-feeding to their employer at an early stage.

There are risks associated with work involving ionizing radiation and pregnancy or breast-feeding. Employers shall inform female employees/students of childbearing age involved in work with ionizing radiation about the importance of reporting their established pregnancy or ongoing breast-feeding to their employer at an early stage. If it is not possible to relocate the pregnant employee, the work shall be organized so that the equivalent dose to fetus will be as low as reasonably achievable, and never expected to exceed 1 millisievert (mSv) during the remainder of the pregnancy. However, a female employee/student (who has reported her pregnancy to their employer) always has the right to be reassigned to a job that does not involve exposure levels exceeding the radiation dose limit for people in general public.

Regarding dose limited measures during breast-feeding periods, the work must be organized so that breast-feeding staff does not risk being ingested or contaminated with radioactive substances, which could result in the child being exposed to ionizing radiation (thus risk receiving a radiation dose exceeding the radiation dose limit for people in general public).

Source: Strålskyddslagen (2018:396, Kapitel 4, 7 - 11 §§) and AFS 2007:5 *Gravida och ammande arbetstagare*.

14. Is there a risk of threat or violence or other strong psychological stress?

Risks of violence or threats may be a direct risk for the pregnant woman that can cause miscarriage or harm to the unborn child. It is also important that strong psychological stress, regardless of its cause can entail a risk to the unborn child, especially during the first trimester of the pregnancy.

Pregnant employees are entitled to be relocated in their work.

Source: AFS 1993:2 *Våld och hot i arbetslivet*.

15. *Are there night shifts or solitary work?*

For work with no obvious psychological and/or physiological stress with possibility to sufficient pauses are night shift, according to AFS 2007:5, normally no increased risk for pregnant or breastfeeding employees. Night shift that include obvious physical and/or mental strain should be avoided during pregnancy. Redeployment to day shift should be considered.

Source: *AFS 1982:17 Anteckningar om jourtid, övertid och mertid*, *AFS 2019:3 Medicinska kontroller i arbetslivet* and *AFS 2007:5 Gravida och ammande arbetstagare*.