3.19 Chemical Management

Information Sheet: Workers and reproductive toxicity (female & male fertility, pregnancy and breastfeeding)

Purpose

The purpose of this information sheet is to provide safety information on reproductive toxicity to female and male workers causing adverse effects: on sexual function and fertility; pregnancy; on or via lactation; and development of the offspring.

Note: The term "seek medical advice" in this document refers to advice from medical practitioners or obstetricians as appropriate.

Q1 What Agents in the University can affect reproduction (fertility, pregnancy or breast feeding)?

Agents which can affect the body's reproductive systems include the following:

- Some chemicals
- Radiation
- Some biological agents
- Manual handling
- Noise
- Excessive vibration
- Temperature.

Q2 What does an "adverse effects on sexual function and fertility" mean?

This refers to any effect of Agents that would interfere with sexual function and fertility. This may include, but is not limited to, alterations to the female and male reproductive system, adverse effects on the onset of puberty, reproductive cycle, sexual behaviour, fertility, childbirth, pregnancy outcomes, or modifications in other functions that are dependent on the integrity of the reproductive systems.

Q3 What does an "adverse effects on development of the offspring" mean?

Developmental toxicity includes any effect which interferes with normal development of the embryo, either before or after birth. It is primarily intended to provide hazard warnings for pregnant women and men and women of reproductive capacity. These effects can be manifested at any point in the life span of the foetus.

Q4 What does an "adverse effects on or via lactation for breastfeeding mothers" mean?

Substances which are absorbed by women may interfere in lactation, or be present in breast milk in amounts sufficient to cause concern for the health of a breastfed child.

Q5 How do I identify chemicals / substances that are toxic to reproduction or cause heritable damage?

Via the Safety Data Sheet (SDS) for the chemical. Each SDS is slightly different so you may find that there is information in one section but not another**.** ***Important Note:*** Health and safety data on chemicals is subject to change, sometimes frequently, and before you use any chemical you should check the most up-to-date SDS for that chemical to determine if the potential risks associated with it have changed. Whether it is for reproductive or other human health issues, always observe the precautions and document them in a RA and SOP.

Extract from a Chemwatch SDS

Section		
Section 2 Hazards Identification	Risk Phrases	R46 May cause heritable genetic damage R60 May impair fertility R61 May cause harm to the unborn child R62 Possible risk of impaired fertility R63 Possible risk of harm to the unborn child R64 May cause harm to breast-fed babies
	GHS Classification	Reproductive Toxicity Category 1A Reproductive Toxicity Category 1B Reproductive Toxicity Category 2, Lactation Effects* Germ cell mutagenicity Category 1A Germ cell mutagenicity Category 1B Germ cell mutagenicity Category 2
	Label elements	
	Signal word	Warning or Danger
	Hazard Statement(s)	H340 May cause genetic defects. H341 Suspected of causing genetic defects. H360 May damage fertility or the unborn child. H361 Suspected of damaging fertility or the unborn child. H362 May cause harm to breast-fed children.
	Precautionary Statement(s): Prevention	P308 +P313 If exposed or concerned: Get medical advice/attention. P263 Avoid contact during pregnancy / while nursing.
Section 11 Toxicological Information	Chronic	*This section refers to specific testing results. Most of the time this is related to animal trials but there may be results from human trials also. Phrases such as 'exposure to the material may cause concerns for human fertility'* - *Possible developmental toxic effects.* - *Maternal toxicity* - *Birth defects* - *Teratogenic effects* - *Defects in the developing embryo (teratogenesis)*
Section 12 Ecological Information	Toxicity	Harmful to aquatic organisms. *Note: typically chemicals that will affect aquatic organisms may affect the unborn baby – this is the view considered by professionals in this field.*

Please refer the Appendix A for more examples.

Q6 What does "No data available" mean in the Safety Data Sheet (SDS)?

'***No data available'*** is a phrase used in the SDS when the company does not have its testing data available for this chemical. It is recommended that you also consult another SDS e.g. Chemwatch to see if the information is included in an alternative SDS.

Q7 What do I need to know about reproductive hazards if I am a male worker?

Reproductive hazards can affect the male reproductive system by affecting the number of sperm, sperm shape, sperm transfer, sexual performance and sperm chromosomes. Consult the Safety Data Sheet for the chemical (sections 2), before using it and ensure that a risk assessment is conducted for the task.

The Information below is specifically regarding male reproductive hazards (extract from Centre for Disease Control and Prevention).

Male Reproductive Hazards*				
	Observed effects			
Type of Exposure	**Lowered Number of Sperm**	**Abnormal Sperm Shape**	**Altered Sperm Shape**	**Altered hormones / Sexual Performance**
2,4-Dichlorophenoxy Acetic Acid (2,4-D)		X	X	
Bromine Vapor**	X	X	X	
Carbaryl (Sevin)		X		
Carbon Disulfide				X
Dibromochloropropane	X			
Ethylene Dibromide	X	X	X	
Ethylene Glycol Monoethyl Ether	X			
Kepone (When exposed to high levels)			X	
Lead	X	X	X	X
Mercury Vapor				X
Military Radar	X			
Perchloroethylene			X	
Toluenediamine and Dinitrotoluene	X			
Heat	X		X	
Welding		X	X	

Information Sheet: Workers and reproductive toxicity (female & male fertility, pregnancy and breastfeeding) (Continued)

Q8 What do men and women need to consider regarding their fertility and using radiation?

Radiation threshold doses for adverse effects on male and female reproductive tissues are outlined below.

Threshold doses – adverse effects in reproductive tissues.		
Tissues and effects	**Total dose Single brief exposure (mSv)**	**Annual dose rate received in highly fractionated or protracted exposure for many years (mSv/yr)**
Male Testes		
Temporary sterility	300	400
Permanent sterility	3500-6000	2000
Female Ovaries		
Sterility	2500-6000	>2000

Note: University of Adelaide radiation workers in general are allowed a maximum of 1 millisievert (mSv) per year and are monitored to ensure they receive no more than 0.2 mSv in any three month period. This is **1500 times lower** than the lowest single dose exposure known to cause temporary sterility.

1 Sv = 1000 mSv
1 millisievert (1 mSv = 0.001 Sv)
1 microsievert (1 μSv = 0.000001 Sv)

Q9 What are the considerations when using radiation whilst pregnant?

- The risk of ionizing radiation causing detriment to the fetus is higher than the risk to the worker. The normal dose limit for a worker is therefore reduced during pregnancy.
- The National Health and Medical Research Council (Australia's leading support for health and medical research) and Australian Radiation Protection and Nuclear Safety Agency (Federal Government agency governing radiation) recommend the same level of protection for the fetus as for a member of the public. This dose of 1 mSv in a year is equivalent to a limit of 0.75 mSv to the abdomen during the pregnancy.
- In practice the doses to workers in the University are normally well below 0.2 mSv per year and the risk to the fetus is very low.

If a radiation worker becomes pregnant the following steps are to be taken:

- Your doctor / obstetrician must be consulted regarding radiation work practices as soon as possible.
- Licenced Supervisors should be informed of your pregnancy (speak with your doctor / obstetrician about the timing of this discussion).
- A pregnant worker must re-evaluate her work practices and radiation exposure in order to minimise radiation exposure during pregnancy. This can be done by reviewing the risk assessment for the radiation tasks that you plan on undertaking during your pregnancy.

Q10 I'm a licenced radiation supervisor. What should I do if one of my workers informs me they are pregnant?

- Review work practices together i.e. risk assessments and any Safe Operating Procedures.
- Ask the individual what their doctor / obstetrician's advice is.
- Consult with the HSW Team. The University Radiation Safety Officer (URSO) advice will be sought if necessary.

Q11 What biological agents are pregnant women at risk from working with?

The following can present extra hazards to pregnant women:

- Toxoplasma gondii
- Listeria monocytogenes
- Cytomegalovirus (CMV)
- Parvovirus B19
- Rubella virus (German Measles)
- Human Immunodeficiency Virus (HIV)
- Q fever (Coxiella burnetii)
- Hepatitis Viruses
- Varicella-zoster virus VZV (Chickenpox)

Please refer to Appendix B for extra information

Note this is not an exhaustive list and hence workers should assess the risk of the biological material as a part of the hazard management procedure.

Q12 What do I do if someone in my workgroup has contracted German measles, chicken pox or shingles and I am pregnant?

Discuss with your supervisor/doctor what the options are in your workgroup whilst the staff/student is in the infective period. Consult with your HSO and the HSW Team for more information.

Q13 What do I need to consider with Manual Handling (Hazardous Manual Tasks) whilst being pregnant?

Physical changes in new and expectant mothers:

Significant physiological changes during and after pregnancy can increase the chances of occupational injury:

- As the abdomen distends, the centre of gravity is moved forward. This change in body shape can sometimes affect balance and limit the workers ability to work in awkward areas.
- The exaggerated curve in the lower back can lead to discomfort from prolonged standing or sitting. It may become increasingly difficult to perform manual handling tasks as abdominal size increases.
- Muscles relax which can lead to increased chance of injury if overworking or overstretching.

Guiding principles when assigning tasks to a new or expectant mother:

- Task design should take account of the range of human dimensions and capabilities such as height, reach and weight. These parameters generally alter during the term of the pregnancy. Manual handling tasks should therefore be reassessed and adapted to accommodate the changing requirements of the pregnant worker.
- Adapt work systems to accommodate the health / fitness status of the worker.
- During pregnancy a staff member / student should not be obliged to perform physically hard work, such as lifting, pulling, pushing or carrying heavy objects, and operating foot pedals in standing position. Especially during the last trimester it is better to limit these activities as much as possible. If this is not reasonably practicable, consider not doing the task, if appropriate.
- Where possible, workers themselves should be given some control over how their work is organised such that the hours, volume and pacing of their work is not excessive. The opportunity to make regular position changes is important.

continue

Q13 What do I need to consider with Manual Handling (Hazardous Manual Tasks) whilst being pregnant? continued

Specific task-related points to consider:

Fatigue and seating:

- Fatigue from standing and other physical work has long been associated with problems of pregnancy. Well-designed seating should be provided where possible and regular rest breaks encouraged.
- Pregnant persons should avoid sitting or standing for longer than 4 hours or as comfortable. In the last trimester of the pregnancy, stooping, squatting or kneeling more than once per hour is not recommended.

Lifting:

- The new or expectant mother should pay particular attention to lifting technique and wherever possible use a mechanical aid e.g. a trolley. The additional size of her abdomen will prevent the worker from holding the load close to the body, and the additional weight of the pregnancy increases the load on the lumbar spine. Where repetitive lifting or manual handling is unavoidable and the task cannot be feasibly redesigned, the task may need to be assigned to another worker, particularly in later stages of pregnancy.
- Lifting heavy loads manually is to be avoided as much as possible. If lifting is unavoidable:
  - The load to be lifted in one lift should be less than ten kilograms.
  - From weeks 20-29 of the pregnancy, avoid lifting more than five kilograms more than ten times a day.
  - From week 30 of the pregnancy, avoid lifting more than five kilograms five times a day.

Conduct a risk assessment in consultation with your supervisor. Seek medical advice if necessary.

Q14 What level of noise exposure should be avoided whilst being pregnant?

During your pregnancy avoid occupational noise exposures over 85 decibels, if this is not possible then conduct a risk assessment on your task in consultation with your medical practitioner.
(http://web.ornl.gov/sci/psd/mst/rsg/pdf/Haz_to_Human_Reprod.pdf)

Q15 What do I need to consider regarding the excessive vibration during pregnancy?

During pregnancy there is a greater risk of back complaints due to exposure to bodily vibrations as a result of pregnancy. In addition, exposure to bodily vibrations involves a higher risk of premature and stillborn births and miscarriages.

During your pregnancy avoid occupational activities involving vibrations-either high frequency vibrations or regular low frequency vibrations, e.g., off road driving, if this is not possible then conduct a risk assessment on your task in consultation with your medical practitioner.

For technical details please refer to http://www.utwente.nl/hr/en/health-safety-environment/health-welfare/pregnancy-breastfeeding/working-during-p-b/

Q16 What factors should be considered regarding the temperature of the environment and pregnancy?

Pregnant workers are less tolerant of high temperatures. They are more prone to fainting and heat stress which can be dangerous for both the mother and fetus. Care should be taken when exposed to heat for prolonged periods. Internal body temperatures over 39°C in pregnant women can increase the chance of birth defects in the unborn baby.

It is a good idea to have drinking water readily available when working in hot environments.

For men, long and short term heat exposures can lower male sperm count and their motility resulting in lowered fertility.

Q17 What should I consider if I become pregnant and I work in a hazardous environment? E.g. laboratory, field work etc?

- Seek medical advice if you are concerned specifically about your proposed work schedule. Consider taking procedures and SDSs with you to the doctor if you think it would assist the conversation.
- If you have any problems do not hesitate to consult your doctor / obstetrician.
- There is no requirement for you to tell your supervisor you are pregnant, however it is beneficial to discuss your proposed work schedule for the 9 months of your pregnancy with your supervisor. Contact your HSO or HSW Team if you require assistance with this discussion.

Continued

Q17 What should I consider if I become pregnant and I work in a hazardous environment? E.g. laboratory, field work etc?
Continued

- Are there any experiments involving risk factors planned? Consider if they can be delayed until after the first trimester or for the duration of the pregnancy?
- Consider alternative work schedules e.g. Do you have any papers to write or grants to apply for? That you may need to work on during the critical first trimester.
- In consultation with your supervisor(s), is there another worker in your laboratory who is able to help during your experiment(s) with the step(s) that require the chemical that may be toxic to reproduction?
- Do you have a risk assessment and Safe Operating Procedure for all the tasks you are going to conduct? Reassess the tasks you will conduct over the pregnancy period, as pregnancy may not have been considered when the documents were written. Are there any additional controls that can be put in place?
- If you have an incident where you are exposed to a substance/chemical/radiation seek medical advice immediately and report it your HSO.

Q18 What do I do if I am a supervisor and my staff member/student has informed me they are pregnant?

- You need to consider confidentiality of that conversation**.**
- Consider the tasks and processes that are given to the worker.
- Review the risk assessment and Safe Operating Procedures in consultation with the workers for the activities within your area.
- Contact the HSW Team for more information if you are unsure on what to do.

Q19 What are additional controls that can be considered when conducting a risk assessment?
Using the hierarchy of controls is the process to eliminate or where this is not possible, manage the risks to as low a level as is reasonably practicable.

1. Elimination – Can the task or chemical be eliminated?
2. Substitution - Is there another task or chemical that can be used? Can a liquid instead of a powder be purchased?
3. Isolation / Engineering – Can the fume cupboard be used? Can a new piece of equipment be used?
4. Administration – Review all risk assessments and Safe Operating Procedures that will be conducted over the next 9 months of your pregnancy. Are there any additional controls that can be included that were not considered when the documents were originally written?
5. Personal Protective Equipment – Consider wearing two pairs of gloves or long cuff gloves, safety glasses, face shield, laboratory coat

Note: any of these controls can be used by any staff / student, you do not have to be considering pregnancy, pregnant or breastfeeding to consider these controls these are just ideas.

Carefully planning your experiments over the next 9 months can be an important step in hazard management process whilst pregnant.

There may be no changes that need to be made to your processes.

Consult the Hazard Management Handbook chapter for more information.

Further Information

If you require further information, please contact a member of the HSW Team**.**

EXAMPLES OF SAFETY DATA SHEET INFORMATION

The following are different examples of what an SDS may contain for reproductive toxicity and possible harm to foetuses and babies.

Chemwatch Mini SDS

Health Hazard Information			
	Blue and white pictograms	Risk code	Risk phrases
Chronic Health Effects		R60	May impair fertility.
		R63	May cause harm to unborn child.
		R64	May cause harm to breastfed babies.

Vendor SDS

Hazard statement(s)

H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

Precautionary statement(s)

Prevention

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.

Chemwatch SDS

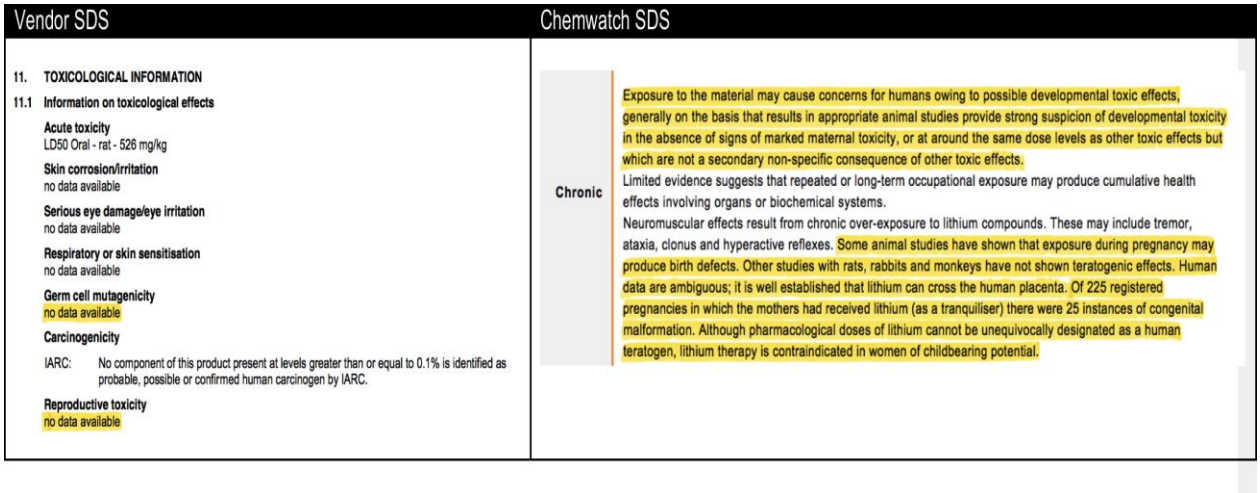
Hazard statement(s)

H302	Harmful if swallowed
H319	Causes serious eye irritation
H351	Suspected of causing cancer
H361	Suspected of damaging fertility or the unborn child
H362	*May cause harm to breast-fed children**
H335	May cause respiratory irritation
H402	Harmful to aquatic life

*LIMITED EVIDENCE

Precautionary statement(s): Prevention

P201	Obtain special instructions before use.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P263	Avoid contact during pregnancy/while nursing.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.



Vendor SDS	Chemwatch SDS
11. TOXICOLOGICAL INFORMATION **11.1 Information on toxicological effects** **Acute toxicity** LD50 Oral - rat - 526 mg/kg **Skin corrosion/irritation** no data available **Serious eye damage/eye irritation** no data available **Respiratory or skin sensitisation** no data available **Germ cell mutagenicity** no data available **Carcinogenicity** IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. **Reproductive toxicity** no data available	**Chronic** Exposure to the material may cause concerns for humans owing to possible developmental toxic effects, generally on the basis that results in appropriate animal studies provide strong suspicion of developmental toxicity in the absence of signs of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not a secondary non-specific consequence of other toxic effects. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Neuromuscular effects result from chronic over-exposure to lithium compounds. These may include tremor, ataxia, clonus and hyperactive reflexes. Some animal studies have shown that exposure during pregnancy may produce birth defects. Other studies with rats, rabbits and monkeys have not shown teratogenic effects. Human data are ambiguous; it is well established that lithium can cross the human placenta. Of 225 registered pregnancies in which the mothers had received lithium (as a tranquiliser) there were 25 instances of congenital malformation. Although pharmacological doses of lithium cannot be unequivocally designated as a human teratogen, lithium therapy is contraindicated in women of childbearing potential.

Table 5: Labelling and reproductive toxicity an extract from the Work Health and Safety Regulations 2012 : Classification and labelling for workplace hazardous chemicals poster.

Classification				Labelling	
Hazard		Pictogram code	Signal word	Hazard Statement	
Class	Category			Code	Text
Germ cell mutagenicity	Category 1A Category 1B	 GHS08	Danger	H340	May cause defects(1)
	Category 2		Warning	H341	Suspected of causing genetic defects(1)
Reproductive toxicity	Category 1A	 GHS08	Danger	H360(2)	May damage fertility or the unborn child.
	Category 1B			H360F(3) H360D(3) H360FD(3) H360Fd(3) H360Df(3)	May damage fertility. May damage the unborn child. May damage fertility. May damage the unborn child. May damage fertility. Suspected of damaging the unborn child. May damage the unborn child. Suspected of damaging fertility.
	Category 2		Warning	H361(2) H361f(3) H361d(3) H361fd(3)	Suspected of damaging fertility or the unborn child. Suspected of damaging fertility. Suspected of damaging the unborn child. Suspected of damaging fertility. Suspected of damaging the unborn child.
	Additional category for effects on or via lactation	No pictogram	No signal word	H362	May cause harm to breast-fed children.

Note:
(1) State route of exposure if it is conclusively proven that no other routes of exposure cause the hazard.
(2) (State specific effect if known)(State route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).
(3) F= fertility, D= Development (lowercase f, d=suspected effect).

*Adapted from Safe Work Australia Classification and labelling of workplace hazardous chemicals poster 13/4/2012.

BIOLOGOCAL AGENTS

Toxoplasma gondii

A single-celled parasite called *Toxoplasma gondii* causes a disease known as **toxoplasmosis**. A healthy person's immune system usually keeps the parasite from causing illness. However, pregnant women (and individuals who have compromised immune systems) should be cautious; for them, a Toxoplasma infection could cause serious health problems.

People can contract toxoplasmosis by:

- eating undercooked, contaminated meat;
- accidental ingestion of undercooked, contaminated meat;
- eating food that has been contaminated by knives, utensils, cutting boards and other foods that have had contact with raw, contaminated meat;
- drinking contaminated water; accidently swallowing the parasite through contact with cat faeces that contain *Toxoplasma; or*
- accidently ingesting contaminated soil and mother-to-child (congenital) transmission.

Listeria monocytogenes

Listeria infection is caused by eating food that contains the *Listeria monocytogenes* bacteria. These bacteria are widespread in the environment and can sometimes contaminate certain high risk foods that have not been thoroughly cooked or properly prepared or stored. Listeria infection is not normally transmitted between people, although it can pass from a pregnant woman to her unborn baby. While Listeria infection is uncommon in healthy people, people at greater risk of infection include
pregnant women and their unborn or newborn babies (and people whose immune system has been weakened due to illness such as cancer, diabetes, alcoholism, or medications that impair immunity such as steroids and anti-cancer drugs).

Cytomegalovirus (CMV)

CMV can be transmitted from a pregnant woman to her fetus during pregnancy. The virus in the mother's blood crosses over the placenta and infects the fetus' blood. The virus is generally passed on from infected people to others through direct contact with body fluids, such as urine, saliva, vaginal secretions and semen.

Parvovirus B19

Parvovirus B19 is a virus that commonly infects humans. The most common illness caused by parvovirus B19 is 'fifth disease', a mild rash illness that occurs most often in children. (Dogs and cats may be immunised against 'parvovirus', but these are animal parvoviruses that do not infect humans.)

Infection by parvovirus B19 generally causes only a mild illness. However, if a pregnant woman is infected, the infection may be transmitted to the ffetusetus. In less than 5% of cases, parvovirus B19 infection may cause the unborn baby to have severe anaemia (low blood count) and the woman may have a miscarriage. This occurs more commonly if infection occurs during the first half of pregnancy. There is no evidence that parvovirus B19 infection causes birth defects or intellectual disability. Still, a pregnant woman who has been exposed to parvovirus B19 should seek the advice of the doctor managing your pregnancy.

Rubella virus (German Measles)

Rubella infection in a woman in the first eight to 10 weeks of pregnancy results in death of or damage to the fetus in up to 90% of cases. Multiple defects are common (e.g., deafness, blindness, brain and heart damage, and mental handicap) and late complications are being increasingly recognised. The risk lowers to about 10-20% if the mother gets rubella at 16 weeks gestation and defects are rare after 20 weeks.

All pregnant women with suspected rubella or exposure to rubella should seek specialist obstetric advice, regardless of a history of rubella or rubella vaccination. Rubella re-infection, often without symptoms, can occur in individuals who have had previous infection or vaccination, although foetal damage is very rare in these cases.

Human Immunodeficiency Virus (HIV)
Without treatment, HIV infection will usually result in Acquired Immunodeficiency Syndrome (AIDS). New HIV therapies have resulted in much lower AIDS-related illness and death; however, HIV remains a life-long infection.

HIV infection occurs when particular body fluids (blood, semen, vaginal fluid and breast milk) containing the virus come into contact with another person's tissues beneath the skin (e.g., though needle puncture or broken skin), or mucous membranes (lining of eyes, nose, mouth, anus, vagina and urethra).

Infections which can be passed on by:

- coming into contact with body fluids via a needle stick injury
- mother-to-baby transmission during pregnancy, birth or breastfeeding

Administration of anti-HIV medication to HIV positive pregnant women during pregnancy and labour and after delivery, as well as to the newborn baby, reduces mother-to-baby transmission of HIV.

Q fever (Coxiella burnetii)
Q fever is an infection caused by *Coxiella burnetii*, a type of bacteria that is found worldwide (except New Zealand). The infection is almost always related to direct or indirect contact with animals such as cattle, sheep or goats, although a wide range of animals including cats, dogs and kangaroos may carry the infection without symptoms.

A Q fever vaccine has been developed and is 96-100% effective in preventing the disease. However, vaccination of those already exposed to Q fever can result in severe reactions, so before being vaccinated a person must be tested to see if they have previously been exposed, either naturally or by previous vaccination. This is done by having a blood test and a skin test. If there is evidence of previous Q fever exposure, the person should not be vaccinated.

Pregnant women who are infected may be at risk for pre-term delivery or miscarriage. The three groups at highest risk for chronic Q fever are pregnant women, immunosuppressed persons and patients with a pre-existing heart valve defects.

Hepatitis Viruses
During pregnancy, viral hepatitis is associated with the lowest risk of obstetric complications when compared with other potential liver complications. In most cases, no special treatment is required during the acute phase.

Hepatitis B (HBV)
- HBV infects the liver and has an incubation period of 6 weeks - 6 months.
- Many carriers of HBV are asymptomatic.
- HBV is excreted in body fluids, including blood, saliva, vaginal fluid and breast milk.

Hepatitis C (HCV)
- HCV is a blood borne viral liver infection that can result in liver disease, such as cirrhosis, liver failure and hepatocellular carcinoma.

The incubation period is 6 - 10 weeks; however, seroconversion (development of detectable specific antibodies to
- microorganisms in the blood serum as a result of infection or immunisation) may occur up to three months
- The initial acute hepatitis may not be diagnosed as symptoms are mild or absent.

Transmission of HCV is primarily through blood to blood contact, e.g.
- Needle stick injury.
- Transfusion of contaminated blood or blood products.
- There is minimal risk of transmission of Hepatitis C through medical procedures in Australia (due to the introduction of standard precautions for all procedures). There is no vaccine available against HCV

Varicella-zoster virus VZV (Chickenpox)

Varicella (chickenpox) is a highly contagious disease caused by primary infection with varicella-zoster virus (VZV). Reactivation of latent infection, usually many years after the primary infection, may result in herpes zoster (shingles), a painful vesicular eruption in the distribution of sensory nerve roots. Infection with chickenpox may occur through airborne/respiratory droplet and direct contact with vesicle fluid.

In herpes zoster (shingles), transmission of infection usually requires contact with vesicle fluid; however, there is also evidence of respiratory spread.

Seek medical advice before beginning or continuing work with human pathogens whilst considering pregnancy, pregnant or breast feeding.