Reproductive Hazards: information for workers planning families

This document aims to provide information to women and men concerning the risks to their reproductive capacity from carrying out work within the Department.

Introduction for supervisors/managers

In any one year between 330,000 and 750,000 working women in Britain will become pregnant. It is therefore fair to say that departmental managers are quite likely to have employees who are pregnant or have just given birth at any one time.
It is up to the worker to inform the University of their suspected, or confirmed, pregnancy.
Once alerted, supervisors MUST conduct a specific risk assessment of the work performed by the pregnant worker.
Apart from informing workers of risks to reproductive health detailed in the risk assessments, Departmental managers are required to;

1. Take particular account of risks to new and expectant mothers when carrying out such risk assessments. If the risk cannot be prevented then the worker's working conditions and/or hours of work should be temporarily adjusted.
2. Offer alternative work if those adjustments are not reasonable, or would not avoid the risk.
3. Suspend the worker (on full pay/benefits) if suitable alternative work cannot be provided.

If an employer has not carried out its duty of care towards a pregnant worker and her child is born with disabilities as a result, the child can claim for damages against the employer.
With demographic and labour force changes it has been suggested that there may be a continual growth in the number of women in the workplace with an associated increase in maternity leave and demand for childcare. Also, many women are working longer into their pregnancies. Therefore, the implications are that managers need greater awareness of the needs and risks to pregnant and nursing women.
There are numerous hazards facing some women both pre-conception, during pregnancy and after delivery. The reproductive effects that can occur include infertility, miscarriage, stillbirth, child abnormalities or child cancer.
However, directly linking them to occupation is often difficult. The statistics on miscarriage are unreliable and often the causes are attributed to non-occupational factors. It is difficult to produce a definitive list of dangerous substances and circumstances. But the reproductive effects are real and departmental members can be exposed to many hazards. Nevertheless, pregnant workers are not ill and most can continue working their usual hours and usual jobs.

Physiological changes

There are many general, non-specific problems which apply to all pregnant workers. Fatigue is more common in pregnancy, and often backache follows from the altered centre of gravity. The pregnant woman may also need to pass urine very frequently and will of course gain weight. As the weight gain increases, heartburn, indigestion and constipation are common. As the pregnancy progresses the pregnant employee may experience shortness of breath, difficulty in sleeping and a general feeling of being uncomfortable. The employee may also experience swollen feet and ankles and abdominal itchiness. Morning sickness is very common in the early months of pregnancy, and apart from the obvious distress this causes, it may also cause problems at work. The worker may be late for work - and this is at the very time she may wish to disguise her pregnancy from work. Many women do not tell their employers that they are pregnant until well into their second trimester - which is after the greatest risk to the developing foetus.

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Types of hazard potentially faced by workers

Biological agents. There are some biological agents present in the laboratory environment which can cause infection. Exposure may occur by transmission through the placenta, through close maternal contact or through breastfeeding. The following are examples:

Rubella, Tuberculosis, CMV, Varicella zoster (chickenpox), Herpes Simplex, HIV, Hepatitis B or Toxoplasma.

Rubella crosses the placenta, infecting and damaging the growing foetus, causing miscarriage, deafness or cataracts. If the pregnant worker has had the vaccination or disease itself, she is likely to be immune.

The Control of Substances Hazardous to Health Regulations 1999 (COSHH) set out the hierarchy of control measures needed to avoid exposure to hazardous substances at work. Associated guidance classifies biological agents into four groups of severity. Pregnant workers can be exposed up to hazard group 3 (HG3). HG3 agents can cause "severe human disease and may be a hazard to employees; contracted disease is likely to spread to the community but there is usually effective prophylaxis available". COSHH also requires the employer to assess and control the risk of exposure to biological hazards. The process should include identifying:

- the hazard group
- the possible routes of infection and ease of transmission
- the concentration and total amount of biologically active material to be handled
- the control measures needed.

Physical hazards. There are many physical hazards which can have an effect on the pregnant worker, such as extreme temperatures and loud noise. Departmental workers should not be exposed to such hazards. Extreme rises in temperature (exceeding 38° C) may affect the foetus. The foetus is, however, often protected from loud noise as its auditory system is filled with fluid which acts as a buffer. Nevertheless other physical hazards include vibration and hyperbaric atmospheres. Many of the traditional hazards experienced in industry by women are now adequately controlled.

Ionising and non-ionising radiation. Non-ionising radiation from visual display units (VDUs) has long been the subject of debate, especially when considering the hazards it may cause to the pregnant employee. Studies have not found any significant hazard and the HSE says that VDUs do not pose a significant risk to health. However, assessments of VDU workstations must be carried out where necessary.

Ionising radiation is a different story. Defects have been found in children born to women exposed to very high doses of radiation. Strict procedures are laid down in legislation to protect the unborn child. But some workers may be exposed to radiation, especially x-rays. Exposure to ionising radiation is controlled by the Ionising Radiation Regulations 1999. The International Commission on Radiological Protection (ICRP) recommends that the dose to a woman's abdomen should be restricted to 2 mSv (milliSievert) for the remainder of the pregnancy.

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Chemical hazards. Pregnant workers in almost all working environments will face exposure to both every-day and industrial chemicals. Chemical hazards include solvents, pharmaceuticals and metals such as lead and mercury. Several chemicals can cause damage to the foetus, particularly in the early stages of pregnancy, or can cause miscarriage. Some may cause harm to breast-fed babies. Labels and safety data sheets which carry the codes R46, R61, R63 and R64 indicate such a risk.

Mercury, present in some thermometers, can be a hazard by inhalation or by direct contact with the skin. However, there has been a move to the use of non-mercury thermometers.

Ergonomic/manual handling hazards. Back strain is the biggest and most common health risk facing pregnant women. Prolonged standing can lead to dizzy spells and fainting, and pregnancy can also lead to varicose veins. Prolonged sitting can also be harmful as swelling of the ankles can be a risk. The dangers from manual handling affect everyone, not just the pregnant worker, but awkward and repetitive heavy lifting has been linked to miscarriage.

Ergonomically, the increasing size of a pregnant woman may mean that she needs more space to continue to work comfortably. Her degree of mobility, dexterity and co-ordination may also be reduced. Her balance may also be affected.

The Manual Handling Operations Regulations 1992 state that a suitable and sufficient assessment of all manual handling operations which may involve a risk of injury must be performed. Risks associated with manual handling must be reduced to the lowest level reasonably practicable. Where a manual handling assessment is carried out an individual's capability must be taken into consideration (including the fact that they might be pregnant).

Psychosocial/organisational risks

Stress. The risks from stress are well established and are linked with raised blood pressure which is dangerous for pregnant women. Combined with long hours it may affect pregnancy.

Working time/hours. In some cases a correlation between long working hours and a high risk of miscarriage has been found. However, it is difficult to assess exactly the reproductive hazards as there are so many factors involved. Managers can assist pregnant workers by being flexible in working patterns, for example giving the worker the opportunity to miss the rush hour or to come in later if they are suffering from morning sickness.

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Conclusion. Employers must remember that they still have duties when the employee has given birth. The woman's body will still be readjusting, both physically and psychologically - she may have had a caesarean or be breast feeding. The Management of Health and Safety at Work (Amendment) Regulations 1994 do not specify a time-limit for the period of breast feeding and so any measures taken for the breast feeding mother must continue for the entire period in which she chooses to breast feed.

Employers must seek to understand that pregnancy is not only a period of many physiological changes but of many emotions and so must seek to understand what happens in the different trimesters. Managers can also help the pregnant worker generally by helping her to understand the complex issues of maternity leave and returning to work.

Managers can also look to occupational health departments, health and safety advisors and occupational hygienists. These professionals will be able to advise workers on the risks, help adjust workplaces and monitor control measures where necessary.

Occupational health departments will also be able to carry out health surveillance, check a worker's vaccine status in the case of risks to biological agents and help on return to work. Often pregnant workers may be worried if they need to receive prophylactic vaccinations, but many vaccinations are safe in pregnancy - indeed any risks outweigh those that might be present if an infection is contracted.

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Information for women of child-bearing age

It is prudent for all women of childbearing age to consider the reproductive hazards involved in their work. It may be that a woman is unaware, or not sure, of the fact that she is pregnant. The early stages of pregnancy can be a time when the developing baby is most susceptible to developmental aberrations. Risk assessments should highlight any particular risk to pregnant women.

It is important that a pregnant worker informs the University (her supervisor or the HR department) in writing that she is, or suspects she is, pregnant.

- Information on the laboratory use of formamide
- Diagnostic Medical Exposures: Advice from the HPA on Exposure to Ionising Radiation During Pregnancy
- Embryotoxins. Laboratory chemicals with the potential to act during pregnancy to cause adverse effects on the developing foetus.
- Cancer and reproductive risks for working women (from Croner's Laboratory Manager Briefing)

Information for pregnant women, women who have recently given birth and breast-feeding mothers

It is important that a pregnant worker informs the University (her supervisor or the HR Department) in writing that she is pregnant. It is then the University's responsibility to ensure the working processes and environment are safe for her (and the child she is carrying) throughout her pregnancy.

Pregnancy should not be equated with ill health. It is part of everyday life and its health and safety implications can be adequately addressed by normal health and safety management.

- Health and safety for new and expectant mothers. This site draws together HSE's advice on protecting the health and safety of new and expectant mothers at work.
- Rest facilities in Biology for pregnant and breast-feeding women
- The University's policy on maternity Leave
- HSE guidance for pregnant women
- Healthy beginnings: Guidance on safe maternity at work, from the ILO (International Labour Office).
- The European Commission have produced "Guidelines on the assessment of the chemical, physical and biological agents and industrial processes considered hazardous for the safety or health of pregnant workers and workers who have recently given birth or are breastfeeding."

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Lifting and handling. This is one of the greatest areas of risk to pregnant women, largely because of the hormonal changes which make ligaments more elastic in preparation for the birth. An injury may not be discovered until some time after birth, when the joints return to normal. As the pregnancy proceeds there is an increased likelihood of postural problems.

There may also be risks for women who have recently given birth, especially if a woman has had a Caesarean section.

The HSE states that there is no evidence to suggest that breast-feeding mothers are at greater risk from manual handling than other workers. However, many health visitors advise that any strenuous activity can inhibit the production of breast milk.

In the guidance which accompanies the Manual Handling Operations Regulations 1992, the HSE points out that 'particular consideration should be given to workers who are, or who have recently been, pregnant'.

There is a Departmental generic risk assessment for manual handling operations.

If a risk is identified, consider whether the task can be avoided or performed by someone else.

If the task cannot be avoided or carried out by someone else then the Department must take steps to reduce the risk to the lowest level reasonably practicable (e.g. by using mechanical aids).

It will be necessary to review the situation periodically during a pregnancy as the changes in a woman's shape will almost certainly make it more difficult to perform lifting and handling tasks as the pregnancy progresses

Ionising radiation. The HSE recognises that 'significant exposure to ionising radiation can be harmful to the foetus' and recommends that 'work procedures should be designed to keep exposure of the pregnant women as low as reasonably practicable and certainly below the statutory dose limit for pregnant women.' The dose limits set (or recommended) by authoritative sources are;
IRR99 (Ionising Radiations Regulations 1999) the equivalent dose to the foetus is unlikely to exceed 1mSv during the remainder of the pregnancy and in relation to an employee who is breastfeeding, the conditions of exposure are restricted so as to prevent significant bodily contamination of that employee.
ICRP (International Commission on Radiological Protection) 2mSv to the surface of the abdomen
HPA (formerly the NRPB (National Radiological Protection Board)) 1mSv (as low as reasonably achievable and such as to make it unlikely that the equivalent dose to the foetus will exceed 1mSv during the remainder of the pregnancy)
For more information on these units (mSv), and what they mean, contact the URPO.
There is a Departmental generic risk assessment for work with ionising and non-ionising radiation.
Make sure a risk assessment is carried out into the likely doses expected to be received. This will probably require the involvement of the Departmental Radiation Protection Supervisor (RPS), Dr John Beeching and/or the University Radiation Protection Officer (URPO), Pete Jewell.
If a possible risk is identified, or if that fails to reassure the worker, then consideration should be given to moving the worker into another area or stopping the particular activity for the duration of the pregnancy/breast-feeding period.
Advice from the University Radiation Protection Officer;

> *"Simply walking into Departmental laboratories poses no radiological risk to pregnant workers and their unborn babies and is therefore safe."*

Chemical hazards. There are about 200 chemical substances labelled with the following risk phrases;

R40 Possible risk of irreversible effects
R45 May cause cancer
R46 May cause heritable genetic damage
R49 May cause cancer by inhalation
R61 May cause harm to the unborn child
R63 Possible risk of harm to the unborn child
R64 May cause harm to breastfed babies

More information is detailed in the text of the HSE guidance.
By 2016 a new scheme for classifying and labelling chemicals will operate. Both the CHIP risk and safety phrases are being phased out in favour of **Hazard Statements** and **Precautionary Statements** under the EU's implementation of the worldwide Globally Harmonized System (GHS) of Classification and Labelling of Chemicals. In adopting GHS the EU implemented European Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation). Pictograms will also be changing.
Additional information on embryotoxic chemicals is also available below.
There is a Departmental generic risk assessment for work with toxic and corrosive chemicals.
Ensure that the relevant risk assessments have been carried out, are read and understood.
If a substance is identified as being potentially harmful to the worker or foetus, the first step is to see if it can be replaced with a substance which is less harmful. If that is not possible then consideration must be given to moving the worker away from the risk.
Ensure that personal protective equipment is always available for use.

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Biological agents. There are some infections the expectant mother can contract which can affect the unborn child. More information is detailed in the text of the HSE guidance document. The Department Safety Co-ordinator also has a copy of the ACDP/HSE guidance booklet 'Infection risks to new and expectant mothers in the workplace'.
There is a Departmental generic risk assessment for work with biological agents.

Working with Display Screen Equipment. In the past there were concerns about the possible effects of radiation emissions from display screens (VDUs) on pregnant women. To date there has been no evidence that there are any adverse risks either to the woman or foetus. The HSE gives the following advice, which it says summarises scientific understanding;

> "The levels of ionising and non-ionising electromagnetic radiation which are likely to be generated by display screen equipment are well below those set out in international recommendations for limiting risk to human health created by such emissions, and the NRPB does not consider such levels to pose a significant risk to health. No special protective measures are therefore needed to protect the health of people from this radiation. In the light of scientific evidence pregnant women do not need to stop work with VDUs. However, to avoid problems caused by stress and anxiety, women who are pregnant, or planning children, and worried about working with VDUs should be given the authoritative scientific information and advice."

Additional information is available from the NRPB; Health Effects Related to the Use of Visual Display Units: Report of an Advisory Group on Non-Ionising Radiation

There is a Departmental generic risk assessment for work with display screen equipment.
Ensure an assessment has been made of the workstation to determine if it is likely to cause postural fatigue, especially as the pregnancy progresses
If the worker is anxious about working with a VDU ensure that she has the opportunity to discuss her concerns with someone (e.g. the University Safety Officer) who is adequately informed about the latest evidence regarding VDUs and radiation.
If that fails to reassure the worker then consideration should be given to finding alternative work not involving DSE use

Extremes of heat or cold. There is no evidence that low temperatures can cause specific problems, although the HSE advises that warm clothing should be provided where necessary.
Pregnant women tolerate heat less well and may be at risk of fainting or liable to heat stress. The risk may well extend to women who have recently given birth, as it is not certain at what stage an improvement would come about. Breast-feeding may also be hampered by heat dehydration. Information on thermal comfort.

Stress. Pregnancy can be a stressful time, especially so for women who have had difficulty conceiving or who have had actual or threatened miscarriages. Stress is recognised as a potential hazard for all workers, and it may well be the case that extra anxiety caused by being pregnant would cause the risk associated with workplace stress to become unmanageable.
The Department is not under a legal duty to prevent ill health due to stress arising from circumstances outside work, such as personal and domestic problems. However, it may be in the Department's interest (as well as that of the worker) to deal sympathetically with staff whose domestic circumstances or state of health make it difficult for them to cope, for the time being, with pressure of work. The HSE has published guidance for employers on tackling stress which states;
"Ill health from stress caused by work has to be treated the same as ill health due to other physical causes in the workplace. Employers have a legal duty to take reasonable care to ensure employees' health is not placed at risk through excessive and sustained levels of stress arising from the way work is organised, the way people deal with each other at work (management styles, harassment etc.) or from day-to-day demands. Employers should bear stress in mind when assessing possible health hazards in their workplaces, keeping an eye out for developing problems and being prepared to act if harm to health seems likely."
Stress can involve various ill health effects, including raised heart rate, headaches, dizziness, aching neck and shoulders, lower resistance to infections, sleeping difficulties, poor concentration, anxiety and depression. In a worker who is pregnant, stress and its physical and behavioural effects are detrimental to health and safety.
Make sure the worker is aware that stress is a recognised health hazard.
If a risk from stress is identified thought must be given as to how to remove the risk most effectively, for example, by temporarily moving to less stressful work or by adapting the current job to the individual's circumstances.
The University does provide support via counsellors.
There is a Departmental generic risk assessment for occupational stress.

Working at night/shift work. In addition to an increased personal security risk, pregnant women are more likely to suffer from tiredness if they work long hours, particularly overnight.

Lone working. Pregnant workers must not work alone in the Departmental laboratories.

Avoid sheep during the lambing season. Pregnant women who come into contact with ewes (female sheep) during the lambing season run a serious risk to their own health and to that of their unborn child, the Department of Health has advised. To avoid the risk of exposure to infections such as chlamydiosis, toxoplasmosis and listeriosis, which are common causes of abortion in ewes, pregnant women have been advised that they;

- should not help to lamb or milk ewes
- should avoid contact with aborted new-born lambs or with the afterbirth
- should avoid handling clothing or boots which have come into contact with ewes or lambs.

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Rest facilities for pregnant and breast-feeding women

The Workplace Regulations 1992 require the University (or Department) to provide suitable rest facilities for workers who are pregnant or breast-feeding. They also require that rest areas include arrangements to protect non-smokers from discomfort caused by tobacco smoke, which may affect the birth weight and health of the unborn child of an exposed mother. The 4 South Pavilion does provide a rest area but more private facilities are available in 4S 1.18.

Information for men

It is worth mentioning that males who are overexposed to some chemicals may contribute to abnormalities of reproduction. This is an issue which should be considered when risk assessments are undertaken.
The Effects of Workplace Hazards on Male Reproductive Health from NIOSH.

Embryotoxins are substances that act during pregnancy to cause adverse effects on the developing foetus. These effects may include embryolethality (death of the fertilized egg, the embryo, or the foetus), malformations (teratogenic effects), retarded growth, and postnatal function deficits.
The following is taken from the University of Texas Lab Safety Manual section on Basic Rules and Procedures for Working with Chemicals. Some changes have been made to reflect our procedures here.
A few substances have been demonstrated to be embryotoxic in humans. These include aniline, DMSO, formaldehyde, formamide, phenol, toluene and xylene:

acrylic acid	**dimethyl sulfoxide**	nitrobenzene
aniline	estradiol	nitrous oxide
benzene	**formaldehyde**	**phenol**
cadmium	**formamide**	polychlorinated and polybrominated biphenyls
carbon disulphide	hexachlorobenzene	thalidomide
N,N-dimethylacetamide	odoacetic acid	toluene
dimethylformamide	lead compounds	vinyl chloride
diphenylamine	mercury compounds	xylene

Because the period of greatest susceptibility to embryotoxins is the first 8-12 weeks of pregnancy, which includes a period when a woman may not know that she is pregnant, women of childbearing potential should take care to avoid skin contact with all chemicals. The following procedures are recommended to be followed routinely by women of childbearing potential in working with chemicals requiring special control because of embryotoxic properties:

1. Each use must be reviewed for particular hazards by the Principal Investigator or Lab Supervisor, who will decide whether special procedures are warranted or whether warning signs should be posted. Consultation with appropriate safety personnel may be desirable. In cases of continued use of a known embryotoxin, the operation should be reviewed annually or whenever a change in procedures is made.
2. Embryotoxins requiring special control should be stored in an adequately ventilated area. The container should be labelled in a clear manner such as the following: EMBRYOTOXIN: READ SPECIFIC PROCEDURES FOR USE. If the storage container is breakable, it should be kept in an impermeable, unbreakable secondary container having sufficient capacity to retain the material, should the primary container fail.
3. Women of childbearing potential should take adequate precautions to guard against spills and splashes. Operations should be carried out using impermeable containers and in adequately ventilated areas. Appropriate safety apparel, especially gloves, should be worn. All hoods (fume cupboards), glove boxes, or other essential engineering controls should be operating at required efficiency before work is started.
4. Supervisors must be notified regarding all incidents of exposure or spills of embryotoxins requiring special control. A qualified physician should be consulted about any exposures of women of childbearing potential above the acceptable level (i.e., any skin contact or inhalation exposures).

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Alcohol consumption

Although occupational exposure is not an issue here, this section is included to provide valuable comparative information.
Maternal alcoholism is probably the leading known cause of embryotoxic effects in humans, but the exposure to ethanol typically encountered in laboratories is unlikely to be embryotoxic. Many substances, some as common as sodium chloride, have been shown to be embryotoxic to animals at some exposure level, but usually this is at a considerably higher level than is met in the course of normal laboratory work.
According to the March of Dimes women who drink alcoholic beverages during pregnancy can give birth to children with Foetal Alcohol Syndrome (FAS) or Foetal Alcohol Effects (FAE). Children with FAS may have mental retardation, behavioural problems, poor co-ordination, malformed hearts and brains, and distinct facial features, such as small eyes and a small upturned nose. Many of the same problems are also observed in children with FAE, but the symptoms are less severe.
Woman who drink while pregnant are also more likely to have a miscarriage, a stillbirth, or a low birth weight baby. Because a safe level of alcohol intake during pregnancy cannot be determined, the March of Dimes (MOD) recommends that pregnant women do not consume any alcohol. Women who are breast feeding are also advised to stop drinking because small amounts of alcohol can enter the milk, and alcohol can also affect the release of milk into the breast.

Alcohol intake by fathers

According to the March of Dimes "To date, there is no proof that heavy drinking by the father can cause FAS. There is, however, increasing evidence that heavy alcohol use by the male may have some effect on pregnancy and the health of the baby. Heavy alcohol use by males can lower the level of the male hormone testosterone, leading to low sperm counts and, occasionally, to infertility. More studies are needed to fully understand how male exposure may affect pregnancy outcome. Men who stop drinking during their partner's pregnancy also help the partner to avoid alcohol."
FAS is not associated with drinking by fathers, but alcohol intake can reduce sperm counts in men. In an effort to prevent FAS, organisations such as the March of Dimes and US government agencies such as the Centers for Disease Control and

Prevention (CDC) sponsor programs to conduct research, educate the public, and identify high risk groups which may benefit from intervention programs.

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HSE Guidance to Employers on Hazards to New and Expectant Mothers

In the first three months of pregnancy some women experience nausea and vomiting, particularly in the morning which may be a problem for early shiftworkers. Some women are particularly sensitive to bad odours which may increase nausea, and longer rest periods may be required for those experiencing extreme tiredness. Compulsory overtime should not be required.
During the second three months women often experience low back discomfort and stiffness, so the provision of comfortable workstations is even more important. There may be a tendency for blood to pool in the legs, leading to dizziness and fainting, with prolonged standing or working in hot environments. Varicose veins may also develop under these conditions.
During the last three months many women experience increasing fatigue, insomnia and shortness of breath. There is also a tendency to urinate more frequently. Prolonged standing or jobs requiring balance (such as working on slippery surfaces), endurance, exertion, work in hot environments or far from bathroom/toilet facilities may become increasingly difficult. Also, increasing size has implications for the use of protective clothing and work in confined areas, as well as manual handling.
When breast-feeding the main concern is exposure to toxic substances, such as lead, which can enter breast milk.
Summary of guidance on the hazards to new and expectant mothers
Physical agents which could cause foetal lesions or disrupt the placental attachment, in particular;

- shocks, vibration and movement
- manual handling of loads where there is risk of injury
- noise
- ionising radiation
- non-ionising electromagnetic radiation
- extreme of heat or cold
- movements and postures, travelling inside or outside the establishment, * mental and physical fatigue, and other physical burdens, and
- work in hyperbaric (high pressure) atmosphere such as pressurised enclosures and underwater diving.

Biological agents in ACDP hazard groups 2, 3 and 4 which can affect the unborn child if the mother is infected during pregnancy include hepatitis B, HIV (the AIDS virus), herpes, TB, syphilis, chickenpox and typhoid. Laboratory workers, those in health care, animal welfare and those dealing with animal products are at a higher risk of infection than other groups of workers. Agents known to cause abortion of the foetus, or physical and neurological damage include rubella (German measles) and toxoplasma (a disease of mammals and birds transmitted from uncooked meat, contaminated soil or direct contact), chlamydia in sheep and cytomegalovirus (a member of the herpes group of viruses which is common in the community) can harm the foetus.
Chemical hazards which endanger the health of pregnant women and the unborn child;

- Substances labelled;
  R40 Possible risk of irreversible effects
  R45 May cause cancer
  R46 May cause heritable genetic damage
  R61 May cause harm to the unborn child
  R63 Possible risk of harm to the unborn child
  R64 May cause harm to breastfed babies
  The 'R phrases' are being superseded by hazard and precautionary statements (refer to the departmental generic assessment for toxic and corrosive chemicals)
- Chemical agents and industrial processes listed in Annex 1 of the European Directive (90/394/EEC) on the control of carcinogens (cancer causing substances)
- Mercury and mercury derivatives
- Antimitotic (cytotoxic) drugs
- Chemical agents which may be absorbed through the skin including some pesticides
- Carbon monoxide and
- Lead and lead derivatives capable of being absorbed by the body.

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Laboratory Manager Briefing. Newsletter Article from Issue No.: 29 dated: 27 September 1999
Cancer and reproductive risks for working women

A cancer mortality study of female laboratory technicians was reported in the August issue of Laboratory Manager Briefing (No. 28). This investigation was one of a number of papers from a conference held in Reykjavík, Iceland in May 1998, which focused on cancer and reproductive risks and other aspects of women's health and occupation affected by the changing work patterns among women over the last three decades.

Cancer. Although occupational exposures are thought to be responsible for 5% of human cancer in developed countries, this figure is mainly based on data from men, and from exposures to hazardous substances during the 1950s and 1960s. With

women now a major part of them workforce in many countries and facing possible hazardous exposure in their jobs, a reassessment is needed of the proportion of cancers in women attributable to occupation.

Gender differences, in particular the female-specific cancers of the breast and gynaecological organs and the sex-related differences in metabolism and susceptibility, also justify a re-examination of cancer data. Breast cancer is the most common tumour among women, and although some risk factors are known, eg reproductive and hormonal factors, family history, ionising radiation and alcohol consumption, causes for the majority of breast cancers remain unknown. Several speakers at the conference discussed the link between occupational exposure and breast cancer. An increased risk of this disease was reported among female workers exposed to each of the following occupational hazards: organic solvents, asbestos, and man-made vitreous fibres. The role of solvent exposure as a factor in breast cancer was supported by a Danish study of relatively young women (20 to 55 years) which showed an increased risk for women employed in industries such as metal products, wood and furniture, printing, chemical, and textiles and clothing, where solvents are extensively used. The relative risk was significantly elevated for women with over ten years employment. There is also experimental evidence that some solvents such as benzene, 1,1-dichloroethane and styrene cause benign or malignant mammary gland tumours. Associations have also been reported between breast cancer and some service occupations such as food and beverage preparation and serving, childcare, dry cleaning, and office and domestic cleaners.

A positive association has been found between ovarian cancer and occupational exposure to organic solvents, leather dust, asbestos, man-made vitreous fibres, and diesel and petrol engine exhausts. Ovarian cancer was linked to employment in the printing industry, and the paper and pulp industry. Nurses, physicians, pharmacists, and radiographers also had a greater than expected mortality from ovarian cancer.

The incidences of other cancers in women (which can also occur in men) were reviewed. Occupational exposures are thought to be responsible for a sizeable fraction of lung cancers among non-smoking women in Europe. In a German study, an elevated risk of lung cancer was found in females employed in both manufacturing (eg chemical, oil, glass, pottery, automobile) and service industries (stock clerks, hairdressers, and restaurant workers). New mortality data for all women in the European Union show a steady increase in lung cancer rates, particularly over the last ten years (Lancet , August 28, 1999, 354 , 742). An increase in smoking among women is implicated in the rise of lung cancers.

Mortality data for women from the USA and from Europe link a variety of occupational exposures to an excess of leukaemia and other lymphatic and haematopoietic cancers: agricultural workers, clinical laboratory and science technicians, nurses and pharmacists, and hairdressers, textile workers, teachers, and housewives.

Among other malignancies discussed at the conference, a case-control study conducted in Minnesota showed an association between renal cell carcinoma and exposure to organic solvents, and in particular exposure to the chlorinated hydrocarbon trichloroethylene, among women but not in men. This gender difference may be a chance finding based on the small numbers used for the study or may be due to differences between men and women in body fat content, metabolic activity, rate of excretion, or level of exposure, even within the same job title.

Reproduction. New ways are being developed for assessing the influence of occupation on reproductive health. Pregnancy outcome has traditionally been used, but other indicators such as time to pregnancy, spontaneous abortion, pre-term birth, small size-for-gestational-age, plus hormonal indicators of early pregnancy loss and menstrual cycle characteristics are now being adopted. In two separate studies from Finland, a delayed time to pregnancy was observed among woodworkers exposed to formaldehyde and among women exposed to organic solvents. Both maternal and paternal exposures to organic solvents were associated with spontaneous abortions. A multicentre case control study in 16 European countries found a small but significant elevation in risk of pre-term birth among employed women with long working hours, long hours of working in a standing position, and a high level of job dissatisfaction.

Risk factors for size-for-gestational-age (SGA) were evaluated in a few studies. A cohort study from Germany revealed an increased risk of SGA births related to organic solvent exposure. A slight increase of having an SGA baby was observed among female hairdressers in a Swedish study, and heavy physical work was an independent risk factor of SGA in a Polish study.

Other speakers at the meeting described and compared the statistical databases used in Europe and the USA from which these occupational risk factors for women have been evaluated. The deteriorating conditions in terms of poverty and inequality for working women in some developing countries was also noted.

The meeting concluded with the view that research into occupational health in women has advanced during this decade. There has been a transition from data generated as a by-product of studies in men, to studies that address specifically occupational risks in women. Current research is also more concerned than previously with the effects of specific and identifiable occupational exposures.

All the presentations summarised in this report are published in the American Journal of Industrial Medicine , 1999, 36 (July issue).

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Further information

- Reproductive Hazards. U.S. Department of Labor, Occupational Safety & Health Administration.
- Male and Female reproductive health hazards in the workplace. International Labour Organization.
- Health and Safety Issues for Women. TUC.
- The NTP Report of the Endocrine Disruptors Low-Dose Peer Review (487 pages)

- The Health and Safety Executive publish HS(G)122 New and Expectant Mothers at Work - a Guide for Employers . This publication includes a table of hazards to which employers should pay attention when carrying out risk assessments, and advice on the subsequent action to be taken.
- Maternity Action is a national charity working to end inequality and promote the health and well-being of all pregnant women, their partners and children from before conception through to the child's early years. They can be contacted on 0845 600 8533**.**
- The text of some HSE Guidance to Employers on Hazards to New and Expectant Mothers

- The Royal Society of Chemistry's Environment, Health & Safety Committee Note Pregnant workers, chemicals and the law.
- The US National Toxicology Program (NTP) Center for the Evaluation of Risks to Human Reproduction (CERHR). The NTP provides information about potentially hazardous effects of chemicals on human reproduction and development.
- Link to UK women's health information. This site has information for women and their partners regarding pregnancy choices, complications and investigations, in addition to some information on common gynaecological conditions.
- Another UK site; ukparents, mainly for those who have graduated from pregnancy!
- Toxnet - A free search interface provides access to the TOXNET system of databases on toxicology, hazardous chemicals, and related areas.
- Reprotox - An Information System on Environmental Hazards to Human Reproduction and Development. The database covers available information on every aspect of human reproduction including fertility, male exposure, and lactation. However, individual reports cost $35.00 each.
- The American March of Dimes (birth defects foundation) site has a wide variety of information.
- Introduction to Hormone Disrupting Chemicals. Other terms used to describe these chemicals include xenoestrogens, oestrogenic (estrogenic), hormone mimicking and endocrine disrupting chemicals. This link is allied to Friends of the Earth.

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