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# Sweat

Moisture loss via the skin and elimination of insensible (non-visible) sweat take place during normal breathing at a rate of 0.3–0.7L/day. Sensible sweat refers to perspiration that is actively excreted during stress, exercise or extreme temperature, at rates of 2–4L/h. About half the total volume of sweat is eliminated from the trunk of the body. The remaining fluid is lost from the legs or upper extremities and head in approximately equal amounts (Kidwell et al. 1998). Sweat is usually collected using an adhesive absorbent patch that is placed on the surface of clean skin or by wiping the skin with a swab or gauze. Careful preparation of the skin is necessary prior to placement of a sweat patch to minimise external drug contamination or bacterial de- gradation of the drug once it has been retained. Use of a semi-permeable membrane to cover the absorbent pad prevents non-volatile components in the environment from penetrating the pad externally, but allows oxygen, water and carbon dioxide to diffuse through. Salts, solids and drugs that pass through the skin are trapped in the absorbent pad, where they are temporarily stored in situ, until the patch is removed. Owing to the relatively small volume (mL) of insensible sweat secreted from a small absorbent area (typically 3-5 cm), patches are typically worn for several days on the outer portion of the upper arm or back. In practice most skin wipes or sweat patches contain a mixture of sweat and sebum, the oily secretion from the sebaceous glands. As with saliva, increased flow rate scan influence the quantity of drug eliminated into sweat. This specimen is particularly useful for compliance testing or monitoring long-term exposure (weeks), which might be desirable in probation or parole settings.

# Amniotic fluid

Amniotic fluid has been used to investigate prenatal drug exposure. Its collection (amniocentesis) typically takes place between weeks 16 and 20  of pregnancy. A needle is inserted through the abdomen into the uterus where there is the least chance of touching the placenta or the foetus. The collection of amniotic fluid is typically performed in conjunction with ultrasound visualisation in order to reduce the risk of damaging the developing foetus. Although complications are rare, miscarriage occurs in a very small percentage of women. Typically 5–30mL of amniotic fluid is removed during the procedure.

# Breast milk

During pregnancy, oestrogen and progesterone, secreted in the ovary and placenta, cause milk-producing glands in the fatty tissue of the breasts to develop and become active. The pituitary hormone prolactin stimulates the production of fluid (600–1000mL/day) by the milk- secreting cells. Contraction of the myoepithelial cells surrounding the alveoli allows the milk to be expressed. For specimen collection purposes, a breast pump can be used. The matrix is somewhat non- homogeneous. Colostrum, acre amy white to yellow pre-milk fluid, may be expressed from the nipples during the last trimester of pregnancy and shortly after delivery. Many drugs are excreted into breast milk and the scientific and medical literature contains numerous citations of the presence of drugs in this matrix. Drugs that are extensively protein bound may not readily pass into the milk, but emulsified fats contained in the milk may concentrate highly lipid-soluble drugs. The high lipid content and natural emulsifying agents present in breast milk mean that some sample pretreatment is often required.

# Meconium

Meconium formation begins between weeks 12 and 16 of gestation. As the first faecal matter passed by the neonate, it is typically collected within 1–5 days of birth. Analysis of drugs in meconium may provide a relatively long-term history of drug exposure during pregnancy, in particular the last 20 weeks of gestation. It provides more complete and long-term information on drug exposure than neonatal urine or cord blood. The specimen is complex and non-homogeneous. All available samples should be collected and homogenised prior to analysis. Meconium and other important matrices involved in maternal–foetal medicine have been reviewed (Gray, Huestis 2007; Lozano et al. 2007).