The International Register of Fetal Morphologists (IRFM) Expected Minimum Structure List for Fetal Morphology Examinations [Previously the UK Industrial Reproductive Toxicology Discussion Group Recommended Minimum Structure List for Fetal Pathology Examinations Version 3].

Introduction

Examination of the fetus is based on subjective judgments (there are no objective measurements) and is therefore heavily dependent upon thorough training and appropriate experience. The fetal examiner is required to decide whether or not the degree of variation or deviation from 'normal' is worthy of record, using 'recognition levels', i.e. boundaries or cut off points for recording which have been defined within their laboratory. Assessment is made against a definition of 'normal', for each body area of the developing fetus that is essentially arbitrary and is not provided in any standard reference text.

As an aid to these decisions, and to facilitate demonstration of familiarity with internal laboratory recognition levels and the regions, organs and structures referred to in "Terminology of developmental abnormalities in common laboratory mammals" (Makris S.L. et al, 2009) the International Register of Fetal Morphologists (IRFM) Expected Minimum Structure List for Fetal Morphology Examinations has been created. The competence of IRFM Certification candidates will be assessed against the structures listed in this document.

The expectation is that the IRFM Certification candidate's routine examination technique will include examination of each of the specific structures identified in the document, although their laboratory data collection system might not have option to record findings specifically under each of the detailed body systems listed in the document.

References

Terminology of developmental abnormalities in common laboratory mammals (version2). Reproductive Toxicology 28 (2009) 371 – 434.

Susan L Makris, Howard M Solomon, Ruth Clark, Kohei Shiota; Stephane Barbellion, Jochen Buschmann, Makoto Ema, Michio Fujiwara, Konstanze Grote, Keith P Hazelden, Kok Wah Hew, Masao Horimoto, Yojiro Ooshima, Meg Parkinson, L David Wise.

EXTERNAL/VISCERAL
Head
Upper and lower jaw
Upper and lower lips
Snout
Naris
Nasolabial sulcus/cleft
Nasal cavity
Nasal septum
Eye bulge
Eyelid
Eye
Lens
Retina
Cornea
Aqueous chamber

Posterior/vitreous chamber
Cranium
Pinna
Internal ear (presence/absence)
Oral cavity
Incisors
Tongue (including attachment)
Nasopharynx
Palate
Olfactory lobe
Cerebral hemispheres
Lateral ventricle
Cranial nerve/trigeminal
3rd ventricle
4th ventricle
Cerebral aqueduct
Pituitary
Pineal gland
Thalamus
Midbrain
Brain stem
Cerebellum
Perimeningeal space
External torso
Body surface/skin
Body wall
Neck
Umbilical cord
External genitalia
Anal opening (presence)
Tail
Limbs
Limb
Individual digits
Individual claws
Thoracic cavity
Cavity
Larynx
Thyroid
Trachea
Esophagus
Thymus
Lung lobes
Bronchus
Azygos vein
Diaphragm
1st level of thoracic vessels - Great vessels
Aorta
Pulmonary trunk
Ductus arteriosus
Pulmonary vein
Pulmonary artery

Vena cavae – cranial
2nd level of thoracic vessels - Aortic arch arteries
Subclavian artery
Common carotid artery
Innominate/brachiocephalic artery
Heart
Pericardium
Atrium
Ventricle
Ventricle wall
Ventricular septum
Atrioventricular valve
Semilunar valve
Abdominal cavity
Cavity
Liver
- gall bladder (where appropriate)
- liver lobes
Stomach
Spleen
Pancreas
Intestine (amount)
Ureter
Kidney (cortex/medulla)
- renal pelvis
- renal papilla
Renal artery (rabbits only)
Renal vein (rabbits only)
Adrenal gland
Umbilical artery
Bladder
Testis
Ovary
Uterine horn
Dorsal aorta
Vena cava – caudal
SKELETAL BODY AREAS
Skull
Interparietal
Parietal
Supraoccipital
Frontal
Nasal
Hyoid
- body
- greater horns/cornua (rabbits only)
Zygomatic arch
- squamosal processes
- jugal
- maxilla process
Squamosal

Maxilla
Premaxilla
Orbital socket
Alisphenoid
Presphenoid
Basisphenoid
Pterygoid process
Palatine bone
Basioccipital
Exoccipital
Tympanic annulus
Mandible
Dental socket (not teeth)
Sutures
Frontal/frontal
Frontal/parietal
Interparietal/supraoccipital
Nasal/frontal
Nasal/nasal
Parietal/interparietal
Parietal/parietal
Fontanelles
Anterior
Posterior
Vertebrae
Odontoid process
Ventral arch
Individual cervical arches
Individual cervical centra
Individual thoracic arches
Individual thoracic centra
Individual lumbar arches
Individual lumbar centra
Individual sacral arches
Individual sacral centra
Caudal vertebrae
Sternebrae
Individual sternebrae
Ribs
Individual ribs (including supernumerary)
Pectoral girdle
Clavicle
Scapula
- blade/spine
Pelvic girdle
- position of articulation
Pubis
Ilium
Ischium
Forelimb
Humerus
Radius

Ulna
Individual metacarpals
Individual phalanges
Epiphyseal ossification centre (rabbits only)
Hindlimb
Femur
Tibia
Fibula
Individual metatarsals
Individual phalanges
Calcaneum (where appropriate)
Astragalus/talus (rabbits only)
Epiphyseal ossification centre (rabbits only)