LANDSPÍTALI
HÁSKÓLASJÚKRAHÚS

# Specialization in Forensic Pathology

## Education guidelines

### Introduction

Forensic Pathology is an independent medical specialization that focuses on medico-legal investigations of sudden and unexpected deaths as well as the examination of trauma victims and alleged victims of trauma inflicted by a third party.

Forensic pathologists have a critical and essential role in death investigation, examining the body of a victim to define the cause and manner of death/the injuries, factors contributing to death/the injuries and to assist with the reconstruction of the circumstances in which the death/injuries occurred.

As with all medical consultations the diagnostic process involves the forensic pathologist integrating evidence from the patient´s medical history, the supposed circumstances surrounding the event, the findings of (post-mortem) medical examination and the results of laboratory investigations.

The outcome of forensic medical investigations (autopsy findings, injury patterns, trace evidence analysis, chemical toxicological analysis, etc.) need to be reported and interpreted in court partly in writing and partly verbally by the forensic pathologist in his or her capacity as an expert witness in criminal proceedings. The forensic medical expert is accountable to all parties involved (the court, the counsel for the defense, the defendant, the public prosecutor´s office and the joint plaintiff) and must assume an impartial and issue-specific stance.

A forensic pathologist is challenged to use his or her medical knowledge for the scientific investigation of facts and causal relationships, as well as the analysis and interpretation thereof in the service of the law in its broadest sense. A sound forensic medical knowledge is essential for any physician wishing to practice this specialty.

As part of the medical scientific community, the forensic pathologist is also responsible for the continuous scientific development of forensic medicine and as such expected to perform research and hold lectures at the university.

The range of expert knowledge in the field of forensic medicine has expanded over the years and new fields of sub-specialization have evolved. At the Forensic Medical Department at Landspitali in Reykjavik the following specialties are pursued on a daily basis and can be taught to an assistant doctor in training:

1. Forensic Medicine and Pathology
2. Forensic Traumatology and Biomechanics
3. General Forensic Histopathology and Neurohistopathology
4. Clinical Forensic Medicine
5. Forensic Osteology
6. Forensic Radiology
7. Forensic Toxicology
8. Forensic Paternity Testing
9. Forensic Research
10. Forensic Teaching

## 1. Forensic Medicine and Pathology:

This field includes the traditional tasks of carrying out external postmortem examinations, assessing postmortem changes and performing autopsies for the purpose of establishing the cause and manner of death on the basis of pathological anatomical findings and determining the postmortem interval. Other fields of duty are exhumation, identification as well as the issue common to all cases of trauma resulting in death and differentiating between ante- and postmortem injuries. As medical specialists, experienced forensic pathologists use their expertise in autopsy pathology and its sub-disciplines (including e.g. forensic aspects of radiology, toxicology, neuropathology, paediatric pathology and anthropology) to offer an expert opinion in death investigation. A post-mortem examination typically involves careful examination and documentation of the appearances of the body of the deceased and dissection of internal organs and structures. A sound knowledge of normal anatomical findings and variants as well as anatomical pathology (including normal histological appearances and variants) is essential, particularly as microscopic assessment of body tissues is often needed to enable a precise diagnosis. Forensic pathologists work closely with other death investigators including coroners, police and forensic scientists. They are required to attend scenes of death and to testify in court. With a yearly autopsy rate of approximately 200 cases, the Forensic Medical Department at Landspitali offers a wide range of different forensic diagnoses with a high number of patients that enable the assistant doctor to gain an excellent knowledge in dissecting skills and forensic morphology.

### 1.1 Foundation knowledge and skills in postmortem external body examination

It is mandatory for all bodies to be medically examined at the scene of death in order to pronounce death and establish time, manner and cause of death. Findings, including medical findings, should be recorded on the death certificate.

The dead body should be examined in an undressed state under good lighting conditions. Moreover, the examination should include inspection of the anterior and posterior sides of the body as well as all orifices. Special focus should be on possible petechial hemorrhages in the conjunctivae of the eyelids and sclerae as well as the skin of the neck. Any plasters or dressings should be removed unless a forensic autopsy is envisaged due to suspected unnatural death or unknown cause of death. Naturally, determining death always takes priority and making alterations at the scene of discovery, to clothing and to the body is permitted to this end. Death is determined on the basis of identifying reliable signs of death such as rigor mortis, lividity, putrefaction and injuries not compatible with life. Under no circumstances should the determination of death be based on inconclusive signs of death. Information on time of death according to year, day and time of day are required. Inexperienced certifying physicians should restrict their time of death determinations to approximate time estimations based on the extent of rigor mortis, livor mortis and body temperature. A specialist forensic examination should be called for in cases where the time of death is of particular relevance.

An official death certificate is completed once an external postmortem examination has been performed. A scientifically and medically recognized pathophysiological mechanism should exist between the underlying morbid condition given and the immediate manner and cause of death given on the certificate. Each field of the document should be filled out carefully and should additionally include information on the duration of the morbid condition prior to death, thus enabling its time course to be checked for plausibility. Postmortem external body examinations are not only performed during an autopsy at Landspitali, but are sometimes also expected from the Forensic Pathologist at the discovery site of a body. Because of that, assistant doctors have the opportunity to observe and participate in these examinations.

**Outcomes**

At the end of their specialization, assistant doctors should be able to perform an external post mortem examination with the outcome of:

- Pronouncing death.
- Determining identification.
- Determining the cause of death.
- Determining the time of death.
- Determining the manner of death.
- Detecting contagious diseases.
- Determining whether a forensic autopsy is necessary.
- Knowing the physician´s role at a crime scene, evidence management and chain of custody.

**1.2 Foundation knowledge and skills in performing a forensic autopsy**

All autopsies should include recording basic data and taking specimens for further investigations. Before each autopsy, the clothes as well as the body surface is examined and digital pictures are taken. A decision on the necessity of CT-scan has to be made. Depending on the case in questions, specific alterations of the standardized autopsy are made. The high autopsy rate at Landspitali offers the assistant doctor a wide variety of different cases, which they can observe, assist and eventually be responsible for.

**Head**

To investigate the head cavity, a mastoid-to-mastoid incision across the parietal region is made with the body in a supine position and the scalp detached from the cranial vault by folding the flap backwards and forwards. The fascia of the temporal muscles can then be inspected and these muscles detached from the bony cranial vault. Before opening the cranium, the

periosteum should be stripped from the skullcap in order to better identify any possible fissures, fractures, open sutures, hyperostosis, scarring and necrosis.
The bony cranial vault is opened by making a cut using a circular saw. After removal of the bony cranial vault, fractures located above the occipital frontal circumference are visible, as are epidural hematomas. The lower portion of the brain, including the cerebellum, pons and medulla oblongata is removed together with the occipital lobes once both frontal and parietal lobes have been raised and the now visible tentorium cerebelli has been transected. Cerebrospinal fluid can be taken at this point from the anterior basal cistern prior to opening the posterior cranial fossa. The weight of the brain is measured and it is dissected by means of multiple sections in the frontal plane. The principle aim here is to detect hemorrhage, necrosis and pseudocystic areas resulting from previous trauma. The ventricular system is assessed as well as the vessels at the base of the brain.

**Torso**

The anterior trunk is opened by making a midline incision running along the anterior mid-neck below the chin and extending from the jugular fossa to the pubic bone. After opening the abdominal cavity, the abdominal fat is measured at the navel region. Internal organs should be inspected for their normal location, in particular whether the appendix, gallbladder, spleen and internal female genitals (fallopian tubes, ovaries, and uterus) / male genitals are fully present and free from adhesions. The abdominal cavity including the lesser pelvis should be checked for effusion fluid, blood and fibrinous deposits on the peritoneum. A record is made of the dome of the diaphragm at the level of the midclavicular line in relation to the ribs. The sternum is removed and the attention is paid to whether the lungs are attached internally by the visceral pleura to the parietal pleura.
After that, the pericardial sac is opened using a lambdoid incision. The inferior vena cava is opened and the amount of blood exiting the heart and vena cava are measured. Specimens of

cardiac blood are taken. Larger and usually fulminant pulmonary thromboembolisms can be visualized in the main branches of the pulmonary arteries.

**Neck**

Under artificial bloodless conditions, the neck muscles are dissected in situ layer by layer to the base of the sternum, clavicles and thyroid lobes, showing possible signs of hemorrhages.
The neck and chest organs to the level of the diaphragm are removed together (as a so-called organ block) and then dissected.
The external and cut surfaces of the tongue are examined as well as the tonsils.
The mucous membrane of the pharynx, the hyoid bone and the laryngeal cartilages are controlled. Small fractures or fissures to the larynx and hyoid apparatus are to be diagnosed radiologically. In addition to assessing the stability and elasticity of the larynx and hyoid apparatus, fractures and hemorrhage in immediately adjacent soft tissue need to be excluded. Normal variants should be recorded.
After removing the oesophagus, the trachea is dissected. Its lumen as well as the lumina of the peripheral braches of the bronchioli are opened.
Both lobes of the thyroid gland are measured and the cut surfaces are analysed.
If the patient still has a thymus, it is being weighted and dissected.
Possible arteriosclerotic changes of the carotid arteries and the body's main artery are controlled.

**Heart**

The heart is weighed. When dissecting the heart, details are recorded of the width of the cardiac cavities, the foramen ovale (open, closed), left and right ventricular wall thickness, the size of the cardiac valves and their ability to swing open and shut, as well as details of the branch points and course of the coronary arteries. The degree of coronary sclerosis in the coronary arteries needs to be recorded, including the localization of high-grade luminal

narrowing and of lumen occlusion due to blood clots (coronary thrombosis). On sections through the chambers and papillary muscles, possible signs of scarrings or haemorrhages are evaluated.

**Lungs**

The lungs are weighed.

The central and peripheral branches of the bronchial tree and the pulmonary artery branches should be dissected to detect or exclude aspiration, purulent bronchitis, pulmonary edema and pulmonary thromboembolism. The lung parenchyma should be sectioned into slices and inspected for the brittleness of lung tissue, the extent of pulmonary emphysema should be assessed and focal lesions in pulmonary tissue excluded.

**Abdominal organs**

After applying two clamps at the level of transection of the small intestine at the duodenojejunal angle, the intestinal loops including the jejunum and ileum and extending to the cranial part of the sigmoid colon along with attached mesenterium and pericolic fatty tissue are removed.

The spleen and the liver are removed individually.

Dissection of the abdominal aorta and its branches to the iliac arteries together with the kidneys with adipose capsule, ureters and urinary bladder including the caudal part of the sigmoid colon with the rectum, prostate and seminal vesicles or fallopian tubes, ovaries, uterus, and vagina is performed.

**Liver**

The liver is weighed.

The thin liver capsule and the lower edge of the organ is examined. After incision, the tissue consistency and lobular arrangement are visualized.

The content of the gallbladder is taken for possible toxicological analysis.

The walls of the gallbladder and the biliary tract are opened. The portal system is analysed.

**Spleen**

The spleen is weighed.

The capsule and the parenchyma are looked at.

Dissecting the splenic artery and vein separately enables arterial aneurysms or venous thrombosis to be excluded at those sites

The adrenal glands are dissected and looked at.

**Kidneys**

The kidneys are weighed.

Their surface and cut surfaces are examined.

The renal pelvis, urinary tract and the urinary bladder are opened. Urine is taken for possible further toxicological analysis.

The prostate is dissected and looked at.

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The mucous membrane of the vagina and the cervix are dissected and looked at.

The uterus is evaluated together with the ovaries.

It is assessed whether the rectum and its content are unremarkable.

The stomach content is looked at and small amounts are taken for further analysis. Its mucosa is evaluated.

The small intestine and colon are opened and the mucosa is examined.

The size and tissue of the pancreas is looked at. The pancreatic ducts are dissected and evaluated.
Femoral Blood is taken for further analysis.

**Skeletal System**

As part of routine procedure at forensic autopsy, the cranial vault and skull base, the ventral aspect of the spine, internal aspect of the thorax skeleton, as well as the internal aspect of the pelvic skeleton are exposed. If certain structures need to be examined in greater detail, further dissection is required. This applies to the facial bones, larynx and hyoid apparatus, ribs, vertebrae and pelvic bones, as well as all bones of the extremities. In the case of traffic accident victims, radiological diagnosis prior to dissection is necessary.

**Autopsy report**

An autopsy report should be compiled both during and after a forensic autopsy. The report should in the first instance describe the principle findings at autopsy while documenting that the examination was conducted according to standard medical practice, i.e., in accordance with the requirements of a forensic autopsy. Therefore, the report should also include several short comments relating to negative findings, i.e., those instances where no local pathological findings could be made on the body.

**Typical cases in forensic pathology**

The assistant doctor should be able to assist and performed all types of autopsies at any time as deemed appropriate by the supervisor and as opportunity arises. Trainees should record cases performed to ensure a sufficient range of case types is performed. The following list includes typical cases in forensic pathology:

- Natural deaths: the majority of cases is related to cardiovascular and pulmonary causes of death
- Deaths resulting from blunt and sharp trauma
- Asphyxial deaths – including deaths related to pressure on the neck
- Immersion/Drowning deaths
- Deaths involving fire or burns
- Electrocution fatalities
- Firearm related deaths
- Deaths resulting from hypothermia or hyperthermia
- Deaths from or involving self-inflicted injury
- Motor vehicle related deaths including reconstruction of an incident
- Toxicological and/or poisoning related deaths
- Sudden deaths in infancy and the perinatal period
- Investigation of stillbirth vs live birth and infanticide
- Deaths resulting from or involving neglect
- Childhood deaths and including non-accidental injury in infants and children
- Deaths during anaesthesia, medical, surgical or other iatrogenic procedure
- In custody deaths
- Deaths at the workplace
- Barotrauma and dysbarism, including investigation of death whilst diving
- Air crash investigation
- Deaths related to explosions and identification of explosive injuries
- Disaster victim identification (DVI) and disaster preparedness, including mortuary design and preparedness and 5 phases of DVI
- High risk infectious cases
- Deaths in high profile people
- Deaths in obscure circumstances

- Deaths in suspicious circumstances
- Homicide
- Deaths with negative post-mortem examination findings, including subsequent investigations and actions
- Maternal deaths
- Injuries and deaths associated with sexual offences
- Decomposed or skeletal remains
- Exhumation

**Assessment of Medical Malpractice Claims**

Forensic medical experts are called upon to formulate expert appraisals on causality relating to a possible treatment error. Thus, an expert forensic medical report of this kind must address the issue of causality between a specific treatment error and existing damage or death. Expert reports such as these are often called for as a result of claims brought by relatives or due to information given on the death certificate by the certifying physician that may arouse suspicion of unnatural death due to a treatment error. In the case of a patient's death, the autopsy examination and subsequent analysis of, e.g. medical records form the basis of the expert forensic report. These cases are also part of the daily routine of forensic experts at Landspitali and thus will be a part of the assistant doctor´s education.

**Forensic Wound Ballistic**

Knowledge of firearms and ballistics is used to classify (fatal) gunshot wounds, to determine range of fire, type of weapon and whether or not death was caused by suicidal shooting. This field also deals with how different types of projectile behave within the body of the victim after firing (e.g. bullet fragmentation). Unnatural deaths due to firearms play a minor, however still

relevant part of forensic work in Iceland. Together with the crime scene unit from the police reconstruction work is done and educational courses are held regularly on this subject.

**Outcomes**

At the end of their specialization, assistant doctors should be able to perform an autopsy with the outcome of:

- Performing different dissecting techniques, beyond others:
    - Evisceration and block dissection including head and neck
    - Organ by organ dissection
    - Cardiac dissection, standard, line of flow
    - Dissection of the unfixed brain
    - Dissection of lower limbs and pelvis for deep vein thrombosis
    - Anterior layer by layer neck dissection
    - Demonstration of pneumothorax
    - Removal of the brain & spinal cord in continuity
    - Dissection of the brain following fixation
    - Vertebral artery dissection
    - Facial dissection
    - Removal of the orbital contents (anterior & posterior approach)
    - Dissection of the middle ear and opening the sphenoidal sinuses
    - Demonstration of air embolus
    - Posterior layer by layer neck dissection
    - Dissection of cardiac conduction system
    - Dissection of superior vena cava, subclavian and jugular veins
    - Subcutaneous dissection of trunk and limbs for occult bruising
    - Subcutaneous dissection for intravenous needle marks

  - In situ dissection of the vagina/rectum for sexual assault
  - Special paediatric and neonatal techniques
- Objectively record macroscopic findings, including relevant photography, so that another person at another time can independently evaluate the autopsy/death investigation and come to their own conclusions.
- Recognize the macroscopic features of the pathology of organs and regions, including congenital, inflammatory, degenerative, toxic, infectious, proliferative and neoplastic disorders and understand all aspects of their aetiology, pathogenesis, classification, epidemiology, gross pathology and clinical features.
- Detect vital reactions.
- Recognize the features of forensic morphology in cases such as blunt and sharp force trauma, gunshot and blast wounds, thermal injuries, electricity, asphyxia or intoxication.
- Recognize post-mortem changes and estimate time of death (post-mortem interval).
- Outline common methods of identification.
- Take and preserve appropriate samples from suitable sites for toxicology and other investigations, with awareness of risk of contamination and post-mortem processes, such as redistribution.
- Sources of expected organ weights and their limitations (obesity; prematurity & twins in infants).
- Demonstrate skills in photography relevant to forensic practice.
- Collaborate with clinical physicians in the evaluation of special cases such as malpractice claims.
- Perform a ballistic analysis of gunshot wounds.
- Understand basic principles of forensic wound ballistics, the causality nexus between the trauma and the damage.
- Be familiar with rules, procedures and techniques related to expert witness testimony.

## 2. Forensic Traumatology and Forensic Biomechanics:

Forensic Traumatology and Biomechanics deals with the typical traumatological and biomechanical sequelae of trauma in living and deceased individuals, as a result of blunt or sharp force trauma, gunshot and blast injuries and particular forms of trauma such as neck trauma, thermal injuries or injuries as the effect of electricity, lightning and gases. Forensic Biomechanic analyses the fundamental kinematic and dynamic variables and their relationships as well as the basic principles of injury mechanisms and physical parameters characterizing a victim in a person-to-person or person-to-object encounter. Here, the assessment of causal relationships between incidents and alleged injury sequelae are a main part. In the case of potential assault, forensic biomechanics includes an evidence-based analytical comparison between the actual injuries presented and the injuries that should be expected as a result of the proclaimed incident. With the help of kinematical and dynamical parameters of the described actions and the resulting loading situation, the forensic-biomechanical analyst can assess the plausibility of the proclaimed course of events. The Forensic Medical Department at Landspitali has a close research and working relation with the Forensic Biomechanical Division of the Forensic Medical Institute at the Ludwig-Maximilians University in Munich. Through several joint projects and publications, a continuous exchange and work cooperation has been established, from which the assistant doctor highly profit.

### 2.1 Foundation knowledge and skills in forensic biomechanics:

**Outcomes**

At the end of their specialization, assistant doctors should be able to analyze injuries with the outcome of:

- Reconstruct the incidents leading to each individual injury.
- Calculate a biomechanical injury mechanism.
- Basic knowledge of forensic biomechanic parameters and their use in a given scenario.

## 3. General Forensic Histopathology and Neurohistopathology

Microscopy plays an important diagnostic role in cause of death determination, trace evidence detection (e.g. sperm) and wound age estimation. Within the scope of routine diagnostic procedures, histological analysis of tissue samples often reveals (natural) causes of death, such as pneumonia, myocarditis, amyloidosis, early meningitis, ascending cholangitis, among many other diseases that are difficult, if not impossible to detect macroscopically. Histology is often indispensable in the forensic assessment of cause of death, on the one hand, in its capacity to confirm and complement diagnoses suspected macroscopically and, on the other hand, to rule out competing causes of death. Especially at Landspitali, forensic medicine and pathology work very closely together. They share the same facilities and personnel and often assist each other in special cases. Both, the assistant doctors specializing in pathology as well as the ones specializing in forensic medicine will be attending the other subjects autopsy and participate in their internal education program as well as in some parts of their routine work.

### 3.1 Foundation knowledge and skills in forensic pathology

During autopsy tissue samples are taken from every organ as well as from areas of special interests. In cases where the cause of death remains unclear based on macroscopic findings, histological and immunohistochemical investigations of organs and tissue samples serve the purpose to verify or falsify the initial working hypothesis and as such increase the evidential value of a given diagnosis (e.g. to detect early meningitis or diagnose myocarditis, myocardial infarct, ascending cholangitis, drug-reactive and/or drug-induced organ lesions, pneumonia, vascular diseases, etc.). Details on fixation, processing and the use of special histological and immunohistochemical staining techniques can be found in the relevant literature on forensic histopathology.

**Essential topics in forensic pathology**

The following list gives some guidance to conditions that may be encountered in forensic pathology practice. Assistant doctors should be familiar with the full range of microscopic morphology of these conditions.

**Generic list for all organs and tissues**

- Infections
    - Bacterial (e.g. tuberculosis, suppurative. clostridia, syphilis) o viral (eg cytomegalovirus, herpes, varicella)
    - fungal (e.g. aspergillus, mucor, candida)
    - parasitic (e.g. hydatid, schistosoma)
- Amyloidosis
- Sarcoidosis
- Neoplasia
- Leukaemic infiltrate
- Metastases
- Common mesenchymal tumours
- Langerhans cell histiocytosis (histiocytosis X)
- Vasculitis
- Infarction/Ischaemia
- Systemic disease (e.g. scleroderma, systemic lupus erythaematosus)
- Radiotherapy effect
- Storage diseases (e.g. Gauchers)
- Sickle cell/haemoglobinopathies
- Connective tissue disorders
- Antemortem vs post-mortem injuries and ageing of injuries
- Artifacts

- Common variants and common congenital malformations.
- Hamartomas/heterotopias/choristomas
- Emboli (fat, foreign body)

**Heart (additional to generic list above)**

- Valves
- Infective endocarditis
- myxoid/sclerotic degeneration
- chronic rheumatic fever
- papillary fibroelastoma
- Pericarditis (e.g. fibrinous; carcinomatous)
- Myocarditis (e.g. lymphocytic, eosinophilic, granulomatous, infective)
- Myocardial infarction (ageing)
- Muscular dystrophy
- Sarcoid heart disease
- Endocarditis and pancarditis (e.g. rheumatic fever)
- Sino-atrial (SA) node/atrio-ventricular (AV) node pathology
- Neoplasia (e.g. cardiac myxoma; rhabdomyoma)
- Cardiac transplant rejection
- Cardiomyopathy (e.g. arrhythmogenic right ventricular dysplasia,hypertrophic)
- Coronary arteries
- Dissection
- Vasculitis
- Aneurysm
- Thrombosis
- The “normal heart” and the role of Long QT, channelopathies and other cardiac arrythmias

**Blood/Lymphatic vessels (additional to generic list)**

• Atherosclerosis

• Vasculitis (e.g. polyarteritis nodosa; temporal arteritis, syphilitic aortitis)

• Aneurysm (e.g. mycotic, syphilitic)

• Dissection

• Common tumours (e.g. glomus, lymphangioma, kaposi's, bacillary angiomatosis, etc.)

• Fibromuscular dysplasia

• Myxoid degeneration of the aorta: Marfan's syndrome and age related change

**Lungs/Pleura (additional to generic list)**

• Pneumonia (e.g. aspiration, lentivirus, cytomegalovirus, herpes, adenovirus, cryptococcus, apergillus, mucor, pneumocystis)

• Lung abscess (e.g. fungal)

• Chronic obstructive pulmonary disease and complications (eg mucoid impaction)

• Asthma

• Pulmonary hypertension (with grading)

• Embolism (e.g. amniotic fluid, neoplastic, bone marrow, fat, cerebral)

• Interstitial lung disease (acute and chronic – e.g. asbestosis, cryptogenic organising pneumonia) Granulomatous disorders of the lung

• Wegener's granulomatosis

• Sarcoidosis

• IVI microgranulomatosis

• Haemorrhagic disorders (e.g. Goodpasture's)

• Pneumoconioses (e.g. anthraco-silicosis)

• Transplant rejection

• Common tumours (e.g. chondroadenoma, carcinoid, squamous cell carcinoma, adenocarcinoma, bronchoalveolar, oat cell, large cell anaplastic, mesothelioma, metastases)

**Head and Neck (additional to generic list)**

**Mouth**

• Ulcers (e.g. HSV, fungal infection, Wegener's)

• Tongue

• Muscular dystrophy

• Amyloidosis

• Pyogenic granuloma

• Neoplasia (e.g. squamous cell carcinoma, melanoma)

**Pharynx/Larynx**

• Pharyngeal infection/abscess (e.g. actinomycetes, fungi, fusospirochates)

• Neoplasia (e.g. embryonal rhabdomyosarcoma, olfactory neuroblastoma, nasopharygeal carcinoma)

• Rhinocerebral mucormycosis

• Angioedema

**Neck**

• Branchial cyst

• Thyroglossal duct cyst

• Paraganglioma

• Sialadenitis (e.g. cytomegalovirus)

• Salivary gland tumour (e.g. pleomorphic adenoma, adenoid cystic carcinoma, acinic cell tumour)

• Tonsils

• Lymphoid hyperplasia

• Actinomycetes

• Suppurative tonsillitis

• Neoplasia (e.g. lymphoepithelial tumour; non-Hodgkins lymphoma)

**Oesophagus (additional to generic list)**

• Oesophagitis, erosions, ulcers (e.g. candida)

• Varices

• Barrett's oesophagus

• Muscular dystrophy

• Progressives systemic sclerosis

• Neoplasia (e.g. squamous cell carcinoma, adenocarcinoma)

**Stomach (additional to generic list)**

• Acute gastritis (e.g. erosive, and variants such as emphysematous)

• Chronic gastritis (e.g. eosinophilic, granulomatous)

• Gastric erosions/ulcers (benign and malignant)

• Wischnewsky spots

• Hypertrophic gastropathy

• Neoplasia (common epithelial tumours; mucosa-associated lymphoid tissue (MALT) lymphoma; gastrointestinal stromal tumour

**Intestine (additional to generic list)**

• Infectious enteritis/colitis/enterocolitis (e.g. erosive, amoebic)

• Duodenitis/atrophy (e.g. giardiasis)

• Whipples disease

• Pseudomembranous colitis

• Crohn's disease

• Ulcerative colitis

• Infestation (e.g. Enterobius vermicularis; giardia)

• Appendicitis (e.g. amoebic)

• Diverticulitis

• Meckel's diverticulum

• Neoplasia (e.g. adenoma, carcinoid, carcinoma, mucosa-associated lymphoid tissue (MALT) lymphoma, gastro-intestinal stromal tumour( GIST)

**Peritoneum/Mesentery (additional to generic list)**

• Peritonitis

• Torsion of appendix epiploicae

• Fat necrosis

• Decidualisation

**Liver (additional to generic list)**

• Hepatitis (e.g. alcoholic, Hepatitis C, cytomegalovirus)

• Chronic active hepatitis

• Massive hepatic necrosis (e.g. paracetamol)

• Hydatid disease

• Fibrosis/cirrhosis (e.g. Alpha 1anti-trypsin, haemosiderin, biliary, haemochromatosis)

• Steatosis (e.g. Reye's syndrome; pregnancy)

• Cholangitis

• Cholestasis & bile duct obstruction

• Sinusoidal ectasia/peliosis hepatis

• Veno-occlusive disease/central vein thrombosis

• Nodular hyperplasia

• Neoplasia (e.g. adenoma, hepatocellular carcinoma – common types, cholangiocarcinoma)

• Steatosis

• Regional necrosis

**Gall Bladder (additional to generic list)**

• Cholecystitis

• Neoplasia

**Pancreas (additional to generic list)**

• Cystic fibrosis

• Haemochromatosis

• Acute and chronic pancreatitis

• Cysts

• Ectopic pancreas in duodenum/Meckel's

• Neoplasia (e.g. adenocarcinoma; endocrine tumours)

**Kidney (additional to generic list)**

• Glomerulonephrities (acute – common forms - and chronic)

• Acute and chronic pyelonephritis

• Malakoplakia

• Tubular conditions (casts – e.g. myoglobin, Armanni-Ebstein lesion, acute renal tubulonecrosis)

• Arteriosclerotic nephrosclerosis

• Hypertensive nephrosclerosis & malignant hypertensive changes

• Diabetic nephrosclerosis

• Cholesterol microemboli

• Infarction

• Infections (e.g. cytomegalovirus, fungal)

• Polyarteritis nodosa

• Neoplasia (e.g. fibroma, Wilms', renal cell carcinoma, angiomyolipoma, oncocytoma, transitional cell carcinoma)

- Oxalate deposits (e.g. oxalosis, ethylene glycol toxicity)
- Polycystic/multicystic disease
- Tubulointerstitial disease (e.g. urate nephropathy, nephrocalcinosis)
- Amyloidosis
- Myeloma kidney
- Microangiopathy (e.g. haemolytic uraemic syndrome)

**Genitourinary Tract (additional to generic list)**

- Cystitis (e.g. acute, suppurative, follicular,)
- Schistosoma
- Malakoplakia
- Cystitis glandularis and cystica
- Nephrogenic metaplasia
- Neoplasia (e.g. transitional cell carcinoma)
- Testicular atrophy
- Orchitis/epididymitis (e.g. tuberculosis)
- Infarction of testis (e.g. torsion)
- Neoplasia testis (e.g. germ cell tumours)
- Prostatitis (e.g. suppurative, granulomatous, tuberculosis)
- Prostatic abscess
- Benign hyperplasia (infarction, squamous metaplasia)
- Neoplasia prostate
- Neoplasia cervix, uterus and ovaries (common tumours)
- Cervicitis
- Endometritis, salpingitis (e.g. acute, chronic, tuberculosis )
- Pregnancy
- Tubal ectopic pregnancy

- Pelvic vein thrombosis
- Hydatidiform mole

**Breast (additional to generic list)**

- Mastitis (e.g. acute, granulomatous)
- Fat necrosis
- Duct ectasia
- Fibrocystic disease (common variants)
- Lactating adenoma
- Radial scar
- Intraduct papillary lesions
- Fibroadenoma
- Phyllodes tumour
- Ductal carcinoma in situ
- Lobular carcinoma in situ
- Invasive carcinoma (common types)
- Pagets disease
- Angiosarcoma
- Gynaecomastia

**Pituitary (additional to generic list)**

- Rathke cleft cyst
- Necrosis/infarction
- Adenoma
- Craniopharyngioma

**Thyroid (additional to generic list)**

• Difffuse hyperplasia
• Multinodular goitre
• Thyroiditis (e.g. Lymphocytic, Hashimotos, De Quervain's)
• Adenoma – Follicular (and Hurthle cell)
• Carcinoma (common types, including micropapillary)

**Parathyroid (additional to generic list)**

• Hyperplasia
• Neoplasia – adenoma, carcinoma

**Adrenal (additional to generic list)**

• Adrenalitis
• Adrenal haemorrhage
• Cortical hyperplasia
• Atrophy (Addison's disease)
• Tuberculosis
• Tumours (e.g. cortical adenoma, carcinoma, myelolipoma, phaeochromocytoma, neuroblastoma)

**Skin (additional to generic list)**

• Electrical injury
• Bruise (age)
• Gunshot injury
• Tattoo
• Decubitus ulcer

• Common lesions – fibroepithelial polyp, seborrhoeic keratosis, basal cell carcinoma, squamous cell carcinoma, dermatofibroma, dermatofibrosarcoma protruberans, naevi, viral lesions
• Leukocytoclastic vasculitis
• Infestations (e.g. scabies, dermatophytoses, insect bite)
• Psoriasis
• Eczema
• Leprosy
• Mycosis fungoides
• Injection site
• Necrotising faciitis

**Musculoskeletal (additional to generic list)**

• Nodular fasciitis
• Fibromatoses
• Common soft tissue tumours (e.g. lipoma, common sarcomas)
• Osteoporosis
• Renal osteodystrophy
• Paget disease
• Healing fracture (age of fracture)
• Osteonecrosis
• Osteomyelitis (e.g. suppurative, tuberculosis)
• Common benign and malignant tumours of bone
• Muscular dystrophy
• Polymyositis
• Rhabdomyolysis
• Costochondral junction (infant)

**Brain and Nerve (additional to generic list)**

- Meningitis (e.g. acute, tuberculosis)
- Encephalitis (e.g. HSV)
- Cerebral abscess (e.g. fungal)
- Polio
- Rhinocerebral mucormysosis
- Rabies
- HIV-related menigoencephalitis
- Spongiform encephalopathy (Creutzfeldt-Jacob disease)
- Hypoxic-ischaemic encephalopathy
- Fat/bone marrow embolism
- Congophilic angiopathy
- Demyelination (e.g. multiple sclerosis)
- Tuberous sclerosis
- Storage diseases
- Subdural haemorrhage (age)
- Traumatic axonal injury
- Hypertension-related changes
- Alcohol-associated changes (vermal atrophy, acute /chronic Wernicke)
- Infarction (ageing)
- Contusion (ageing)
- Central pontine myelinolysis
- Interpretation of beta-amyloid precursor protein staining
- Common tumours (e.g. meningioma, glial tumours, metastases)
- Common degenerative disorders (e.g. Alzheimer's, Lewy Body, Parkinson's)
- Colloid cyst
- Pineal gland & cysts

• Pituitary gland & tumours

**Eye (additional to generic list)**

• Retinal haemorrhage

• Meningitis

• Phthisis bulbi

• Common tumours

**Spleen (additional to generic list)**

• Infarct

• Septicaemia/splenitis

• Perisplenitis

• Mycobacterium avium-intracellulare infection

• Angioma

• Neoplastic infiltrate (e.g. leukaemia, non-Hodgkins lymphoma)

• Storage disorder

**Lymph Nodes (additional to generic list)**

• Epithelial cell inclusions

• Follicular hyperplasia

• Sinus histiocytosis and paracortical hyperplasia

• Dermatopathic lymphadenopathy

• Lymphadenitis (e.g. suppurative, granulomatous,lipogranulomatous)

• Sarcoidosis

• Silicone

• Metastatic disease

• Hodgkin's lymphoma

• Non-Hodgkins lymphoma

**Bone Marrow (additional to generic list)**

• Myeloproliferative disease
• Multiple myeloma
• Myelodysplasia
• Myelofibrosis
• Aplastic anaemia
• Metastases
• Leukaemia

**Thymus (additional to generic list)**

• Hypoplasia
• Thymoma
• Involution (paediatric)
• Non-Hodgkin's /Hodgkin's disease

**Perinatal (additional to generic list)**

• Periventricular leukomalacia
• Chorioamniitis
• Funisitis
• Hyaline membrane disease
• Necrotizing enterocolitis
• Placental infarction
• TORCH infections (myocarditis, encephalitis, hepatitis, etc)

**Outcomes**

At the end of their specialization, assistant doctors should be able to perform a histological examination with the outcome of:

- Recognize the microscopic features of the pathology of organs and regions, including congenital, inflammatory, degenerative, toxic, infectious, proliferative and neoplastic disorders and understand all aspects of their aetiology, pathogenesis, classification, epidemiology, microscopic pathology and clinical features.
- Explain principles of and demonstrate competence in sample selection.
- Explain principles of and demonstrate competence in tissue fixation.
- Explain principles of embedding and sectioning tissue.
- Explain principles of performing and interpreting routine stains, with awareness of their uses, limitations and artefacts particularly with regard to post-mortem derived tissue.
- Explain principles of histochemistry.
- Explain principles of immunohistochemistry.
- Explain principles of electron microscopy.
- Explain principles of frozen sections: their uses, limitations and artefacts.
- Understand the investigative aspects of clinical pathology disciplines relevant to forensic practice, particularly post mortem microbiology, clinical biochemistry and toxicology, immunopathology.

## 4. Clinical Forensic Medicine

Clinical forensic medicine deals with the examination of living individuals for the purposes of collecting evidence and documenting injuries. The majority of examinations are carried out on victims of trauma (including child abuse and sexual abuse) resulting from domestic violence, trauma occurring in association with alcohol and drugs, as well as trauma to particular groups of individuals. Furthermore, the accused are also being examined in the process of establishing the type and severity of injuries and for the purposes of reconstructing an incident. The close cooperation with the Icelandic police as well as doctors from other departments within Landspitali enables the assistant doctors to gain access to a large amount of potentially trauma-related cases and gives them the possibility to gain detailed knowledge in examination, documentation and interpretation of injuries.

### 4.1 Foundation knowledge and skills in Clinical Forensic Medicine

A precise observation of potential injuries as well as an empathic but at the same time critical approach is the key to achieve an objective examination of a victim or suspect.

**Outcomes**

At the end of their specialization, assistant doctors should be able to perform a clinical forensic examination with the outcome of:

- Objectively record macroscopic findings, including relevant photography, so that another person at another time can independently evaluate the examination and come to their own conclusions.
- Recognize the features of forensic morphology in cases such as blunt and sharp force trauma, gunshot and blast wounds, thermal injuries, electricity, asphyxia or intoxication.
- Differentiate between self-infliction and a second-party involvement.
- Take and preserve appropriate samples from suitable sites for toxicology, DNA-analysis and other investigations, with awareness of risk of contamination.

- Dealing with the crisis and grief of victims during a physical examination and at the same time avoiding secondary victimization and testimony contamination.

## 5. Forensic Osteology

Forensic osteology is concerned with the classification of bone and skeletal findings in terms of human specificity, age, sex, stature, origin, postmortem interval, preexisting diseases and injuries. Specialist knowledge and methods are required in cases where, due to postmortem changes, the human remains to be analyzed consist (almost) only of bone tissue. The main question to be answered on finding bones is whether or not they are of human origin. Where this is the case, the next important question relates to postmortem interval—historical bones are of no relevance to the investigating authorities. Since the Forensic Medical Department at Landspitali is responsible for the whole island, a rather large number of bones are being found, especially on the shorelines after rough weather conditions. Most common non-human skeletal remains in Iceland are horse, cows, sheep, different sea birds and whales.
The assistant doctors will therefore be exposed to bones from different species and ages and learning how to perform a forensic ontological assessment.

### 5.1 Foundation knowledge and skills in Forensic Osteology

When analyzing a bone, which was found by a third party, a CT-scan should be performed and the bone structure measured. With the help of comparative analysis, the species and anatomical body region is to be determined. The age of the bone is estimated with the help of special bone age assessment methods.

**Outcomes**

At the end of their specialization, assistant doctors should be able to perform a osteological examination with the outcome of:

- Recognize the anatomical features of human and animal bone tissue.
- Differentiate between human and animal bone tissue.
- Identify the bone, its according species and body region.
- Estimate the time since death of the bone tissue.

- Assessment of age, sex and ancestry in human skeletal remains.
- Identification of common skeletal injuries and diseases.

## 6. Forensic Radiology

This particular field of forensic medicine is concerned with the use of radiological diagnosis to answer forensically relevant questions related to injuries. It also plays an important role in the documentation of primarily bone injuries as well as in autopsy planning, e.g. in order to localize projectiles combining virtual and real autopsies produces. Comparative X-ray analysis is an old and effective method of determining identity. In cases where ante mortem X-ray images of a missing person are available, these can be compared with postmortem images made of the region in question on an unidentified body. In clinical forensic medicine, X-rays are often included in the expert appraisal of fresh or healed bone fractures, while CT or MRI data sets are used increasingly in the assessment of soft tissue injuries. Due to the short distances on-site as well as the good cooperation with the Radiology Department at Landspitali, post mortem CT-scans are performed regularly (approximately on 25% of the cases). This provides the opportunity for the assistant doctor to deepen their knowledge and understanding of radiological post mortem findings.

### 6.1 Foundation knowledge and skills in Forensic Radiology

In order to be able to achieve high quality forensic radiology, direct and intense communication between the disciplines of forensic medicine and radiology is necessary. A basic understanding of forensic pathology by radiologists as well as a foundational knowledge of postmortem imaging by forensic pathologists leads to a profound and reliable interpretation and usage of postmortem imaging. At Landspitali, the assistant doctor has the possibility not only to participate in the implementation of CT-scans, but will also see these images practically applied in forensic everyday routine.

**Outcomes**

At the end of their specialization, assistant doctors should be able to use the technology of post mortem imaging with the outcome of:

- Recognize the necessity of using forensic radiology, such as performing a pre- or postmortem CT-scan, X-rays, etc.
- Confirm the identity of both living and deceased subjects.
- Identify skeletal trauma.
- Assist in the determination and/or confirmation of cause of death.
- Locate hidden foreign bodies, such as packages of illegal substances and fragments of e.g. explosives.

## 7. Forensic Toxicology

Forensic toxicology is concerned with the analytical determination of organic and anorganic toxins, as well as the interpretation of analysis results for the purposes of answering forensically relevant questions, such as cause of death, fitness to drive and criminal responsibility. In the case of suspected intoxication, forensic medical institutes are able to analyze specimens obtained at autopsy (e.g. heart blood, femoral vein blood, gall, cerebrospinal fluid, urine, hair), while in the case of living patients, specimens are sent for analysis (clinical toxicology). In Iceland, the forensic medical specialist can decide when a toxicological analysis is necessary. Due to the close relation with the employers at the toxicological laboratory, the assistant doctor will not only be involved in the decision making of what substances to analyze and how to interpret the results, but also has the opportunity to observe the analytical process behind it.

### 7.1 Foundation knowledge and skills in Forensic Toxicology

Intoxication as a main or contributing factor to one´s death plays an essential part in the evaluation of forensic autopsies. The assistant doctor should not only gather basic pharmaceutical knowledge, but also needs to understand the possibilities and limitations of different toxicological analyses.

**Outcome**

At the end of their specialization, assistant doctors should be able to interpret the results of forensic toxicology with the outcome of:

- Recognize in which cases the use of forensic toxicology is necessary.
- Develop basic level skills in analytical techniques.
- Have solid knowledge of pharmacology and pharmacokinetics.

## 8. Forensic Paternity Testing

Paternity testing today falls within the remit of forensic molecular genetics. The objective here is to compare DNA for the purposes of determining paternity, sometimes even maternity, on behalf of, e.g. a family court. At Landspitali, the department of paternity testing and forensic medicine share the same facilities, They have a close working connection, which enables the assistant doctor to participate in the DNA-analysis of these cases during his or her training.

### 8.1 Foundation knowledge and skills in Forensic Paternity Testing

Even though the assessment of forensic paternity testing is not the responsibility of the forensic pathologist in Iceland, this division still plays an important part of forensic medicine.

**Outcome**

At the end of their specialization, assistant doctors should be able to interpret the results of forensic paternity testing with the outcome of:

- Know the basic principles of forensic paternity testing.
- Be able to interpret a forensic paternity test.

## 9. Forensic Research

Forensic pathologists have responsibilities with regard to the processes of scientific inquiry, research and education. In order to maintain a high level of professionalism and quality, it is essential to keep up-to-date with new knowledge in both the technical aspects of forensic pathology and wider professional aspects. It is expected from every forensic medical doctor to critically appraise scientific literature and to contribute to the collection, analysis and interpretation of data relating to the quality of practice. Forensic medical research activities relate to the abovementioned fields using widely varying approaches in terms of method and content: epidemiological studies, case–control studies, clinical forensic studies using various analytical methods, basic forensic research, population genetics studies and microscopic analysis (histology, immunohistochemistry, cytology, etc.). Forensic medical investigations and findings are essential prerequisites to assessing and resolving expert lines of inquiry and affect not only the decision- making process in the higher courts but also the laws set down by the legislator and the public administration. As an important field of forensic training, each assistant doctor will be educated in the principles of forensic scientific research and will be supported in publishing at least one case-report and one paper during his specialization.

### 9.1 Foundation knowledge and skills in Forensic Research

Due to the large variety of sub disciplines within forensic medicine, the assistant doctor can choose between patient-oriented research, basic science and laboratory-based research. During his or her residency at Landspitali, the trainee is offered a variety of scientific research approaches with the goal to develop both core and specific skills, which enable him or her to pursue academic forensic medicine after the training.

**Outcome**

At the end of their specialization, assistant doctors should be able to understand the possibilities of forensic research with the outcome of:

- Develop the ability to ask research questions, plan and perform research and be familiar with research tools and approaches used be basic laboratory scientists.
- Develop basic writing and presentation skills.
- Gain communication and interpersonal skills for presentation, publication, networking and negotiation.
- Be familiar with research terminology.
- Have basic knowledge in statistics.
- Be able to outline research design.
- Conduct a literature search using the medical library and electronic resources.
- Gather and interpret relevant data to make judgments.
- Critically appraise sources of medical information, discriminating between them in terms of their currency, format, authority and relevance.
- Be able to communicate information to both the medical and non-medical community.
- Whilst complying with the requirements of relevant bodies concerned with ethics in human and animal research, prepare reports and papers for publication that comply with the conventions and guidelines for reporting biomedical research.
- Participate in at least one international forensic medical conference.

**Meetings and Conferences:**

- American Academy of Forensic Science
- Australasian Coroners Conference
- Australian and New Zealand Forensic Science Society
- Canadian Society of Forensic Science
- Deutsche Gesellschaft Rechtsmedizin annual meeting

- International Association of Forensic Science
- International Symposium Advances in Legal Medicine
- The International Association of Forensic Toxicologists

## 10. Forensic Teaching

As one of the largest medical specialties tasked with diagnosis and expert appraisal, the teaching of forensic medicine includes all the above-mentioned topics. Especially in the field of post mortem examination, it is essential for a physician to recognize signs of trauma and evidence of an unnatural death. Continuous tutoring and teaching is important to maintain a high standard of expertize in Iceland. The assistant doctor will be part of the further education of police officers, first-responders and local physicians. Furthermore, a detailed teaching program for students of the University of Iceland is being established in which the assistant doctors play a central role in developing tutorials and helping with lectures.

### 10.1 Foundation knowledge and skills in Forensic Teaching

**Outcome**

At the end of their specialization, assistant doctors should be able to understand the basic principles of forensic teaching with the outcome of:

- Apply learner-centered approaches to teaching and/or design for learning in higher education.
- Integrate current curriculum design, assessment and evaluation principles and practices in the daily routine work of forensic medicine.
- Develop teaching capability in face-to-face, blended and online learning contexts.

## 11. Professional qualities

Forensic pathologists are required to uphold the legal and ethical responsibilities of the profession and to behave with honesty, diligence, integrity and compassion. Their concern for safe practice and the reputation of the profession should be evident in their daily practice. They use appropriate pathology investigations to ensure timely and accurate reporting and they maintain their professional competence throughout their career. They conduct respectful communications with colleagues, relatives of the deceased, coroners and other members of the legal system and are skilled in a variety of modes of communication and able to use them appropriately, depending on the circumstances. They seek and take advice from colleagues and others as appropriate, but they exhibit courage of their convictions and are prepared to stand on aspects of the rights of the individual as well as human rights in general. They respect legal and ethical aspects of practice as well as all aspects of confidentiality and conduct themselves in a professional manner at all times.

### 11.1 Professional qualities in forensic training

During training, trainees should reflect on and strive to adopt the attitudes and values that underpin professional practice and take advantage of opportunities to extend themselves in these areas. By the end of training, they should be fully able to assume their professional responsibilities.

**Outcomes**

At the end of their specialization, assistant doctors should be able to understand the basic principles of professional qualities, which are expected from a forensic pathologist with the outcome of:

- Demonstrate a strong grounding in and commitment to ethical principles relating to: consent, privacy, prompt reporting and confidentiality.
- Interact appropriately with medical and scientific colleagues and other death investigators.

- Recognize and preserve the dignity of deceased.
- Comply with legal, ethical and medical requirements relating to records and documentation, including confidentiality, informed consent and data security.
- Differentiate between ethically appropriate and ethically inappropriate procedures.
- Recognize and respect cultural and religious factors impacting on professional practice.
- Ensure that independence and neutrality of investigation is maintained in all cases.
- Understand ethics of peer review, second opinions and second autopsy (including exhumation).
- With regard to the health implications of the death investigation, communicate as appropriate with families, counsellors, clinicians and other relevant persons.
- Communicate relevant findings, reports, opinions in a timely fashion to coroners, police, families, colleagues, conferences, journals, courts, lawyers, etc.
- Use appropriate language in all communications, showing awareness of cultural and linguistic diversity.
- Provide relevant autopsy information to families of deceased persons, demonstrating understanding of loss and grief and stress reactions.

## 12. Training pathways and requirements

Forensic pathology practice requires up-to-date knowledge of medical practice, the forensic sciences, all the pathology disciplines and a sound knowledge of anatomical pathology. Because of that, contemporary forensic pathology demands a life-long commitment to continuing professional education and development.

### 12.1 Activities

During his or her training, the assistant doctor is expected to participate in the daily routine work at the Forensic Medical Department at Landspitali University Hospital as well as select activities that are appropriate to each individual training environment and level of knowledge. The following activities are part of the 1 ½ years training program:

- Assist with post-mortem examinations of suspicious death victims.
- Review and evaluate medical records and other material relevant to death investigations.
- Undergo instruction in forensic toxicology.
- Undergo training in paediatric pathology.
- Attain experience in forensic neuropathology.
- Undergo instruction in clinical forensic medicine.
- Observe and evaluate discussions and expert evidence provided by colleagues in order to understand the rules of evidence and the role of the expert.
- Attend pre-trial conferences and courts.
- Review colleagues' reports.
- Undergo instruction in a forensic DNA techniques and procedures.
- Attend at police crime scene investigation unit and/or death scene simulations.
- Visit a field forensic science facility (e.g.: ballistics, fingerprints, physical evidence recovery, etc);.
- Attend forensic odontology procedures.

- Identify and evaluate relevant publications and similar cases from the archives of the institution or databases, implementing the principles of evidence based practice.
- Seek and read legislation, codes, guidelines, policies, manuals and literature.
- Participate in daily departmental activities, including all aspects of forensic practice.
- Participate in organized interaction with local forensic science facilities/courses.
- Participate in organized interaction with toxicology laboratories, courses, etc.
- Participate in staff and business meetings in the workplace.
- Undertake laboratory projects under supervision and write up for submission for publication.
- Use clinical and laboratory databases for research for collecting, organizing and analyzing data.
- Use a standard bibliographic application to download citations from a literature search and organize them into a personal database.
- Read reference material on basic statistical concepts including distribution, mean, median, standard deviation, statistical significance, confidence intervals, correlation, sensitivity, specificity, predictive values, incidence and prevalence.
- Participate in and contribute to departmental teaching sessions, clinicopathological meetings and conference presentations.

**12.2 Requirements**

- Attend court on at least 5 occasions.
- Conduct an average of 30 post-mortem external examinations.
- Perform and be responsible for an average of 50 autopsies including the histological and toxicological interpretation of these cases.
- Assist in the radiological interpretation of at least 12 post mortem CT-scans.
- Attend an average of 8 scenes of death.
- Perform a bodily examination of an average of 8 patients in clinical forensic medicine.

- Publish 1 case report and 1 additional full paper in a recognized, peer-reviewed medical journal.
- Photograph at least 100 bodies/specimens.
- Manage an average of 12 bodies/cases through the entire process, including associated procedures.
- Participate in 6 major crime review and other case management meetings.
- Handling and evaluating of 5 osteological /anthropological specimens.

**12.3 Supervision**

During the specialization as a forensic pathologist all training must be supervised. More than one supervisor can be appointed, e.g. if the assistant doctor for some time is being educated at two or more unrelated laboratories.

The supervisor must have gained a certificate specialization in the field of forensic medicine as well as obtained habilitation or professorship in forensic pathology as proof of his or her excellent knowledge in forensic research and education.

If the assistant doctor spends significant periods working in an area where the supervisor has no personal involvement (e.g. pathology, toxicology, radiology), the supervisor must certify that suitable supervision is being provided. The supervisor must also ensure that adequate supervision is arranged in their absence.

In some circumstances, shared supervision may be necessary, but there must be a nominated primary supervisor with overall responsibility.

**The role of the supervisor**

Supervisors should devise a prospective training (or research) program on initial registration and annually. Supervisors should also ensure that the trainee has sufficient time and

opportunities to carry out the required training activities. Supervisors and others to whom aspects of training have been delegated are expected to monitor and provide regular feedback on the development of the trainee's competence. Formal meetings with the trainee are expected to occur every three months. They should observe the trainee's performance and interaction with scientists, peers and clinicians and review result reporting. This may be delegated to other trainers where appropriate, e.g. when the trainee is temporary at another laboratory for a segment of training.

The supervisor should regularly review the trainee's Autopsy and Training Record.

**12.3 Assessment**

Assessment is by formal examination, by submission of a record of workplace activities completed during training and through periodic and annual supervisor's reports.

**Workplace activities**

Evidence must be presented to demonstrate that trainees have successfully completed a range of activities that form part of their daily work. The Autopsy and Training Record documents the trainee's progress in developing technical skills and professional values, attitudes and behaviors.

Assistant doctors have the responsibility of initiating these activities and ensuring that they have completed the required number by the required dates. Where indicated, they should identify suitable opportunities to have their competence assessed, negotiate a suitable time for the assessment with a suitably qualified assessor and provide the appropriate form. Assessments should be able to be done regularly without significant disruption to workplace productivity.

**Supervisor Reports**

Trainees must submit a supervisor report for the time of training and for periods of rotation. An additional examination report is required prior to assessments with an oral examination component.

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