

ABFO Model of Curricular Topics for Forensic Odontology

I. Preamble

These curriculum guidelines for the teaching of forensic odontology in dental school predoctoral and auxiliary programs are the work of the American Board of Forensic Odontology, Inc. (ABFO). The ABFO is recognized by the American Academy of Forensic Sciences as a specialty organization that offers board certification to its members. One of the purposes of the Board is to encourage the study of, improve the practice of, establish and enhance standards for, and advance the specialty of forensic odontology. Although the guidelines are recommendations, their use as course development aids is suggested by official ABFO policy.

The guidelines were developed by the ABFO's Ad Hoc Dental Student Curriculum Committee and were approved by the ABFO Board of the Directors and membership in February, 2006. The members of the committee consisted of the following:

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II. Introduction

The objective of the guidelines is to delineate pertinent topics and basic content of teaching that will provide an optimal educational experience in the field of forensic odontology. It is recognized that individual dental schools' policies, philosophies, and curricular structures will vary and therefore so will the amount of time and weight that is afforded to this subject.

Also, forensic dentistry interrelates with most of the fields of dental study including anatomy, radiology, embryology, oral pathology, biomaterials and the various restorative sciences. Therefore, it is recommended that the teaching of this material be conducted in the latter part of the dental students' educational program.

III. Recommended Core Content

The core content of a course of study in forensic odontology should include:

A. Description of Forensic Odontology

1. Definition and derivation of the word "forensic".
2. Common tasks involved in forensic odontology and their relationship to the judicial system.

B. History of Forensic Odontology

1. Beginning and evolution of coroner/medical examiner systems
2. Pioneers in forensic odontology
3. Early textbooks on the subject

4. Historic identifications through dental records
5. Creation of current forensic organizations and agencies

C. The Judicial System

1. Principles of criminal law proceedings
2. Principles of civil law proceedings
 - a. Contract law
 - b. Tort law
3. Elements required for malpractice and negligence
4. Adversarial system
5. Common legal terms and definitions
6. Expert witness activities and guidelines
7. Procedures of Grand Juries or Preliminary Hearings
8. Hard vs. soft evidence
9. Chain of custody of evidence
10. Professional negligence peer review process
11. Admissibility of scientific evidence and landmark cases
 - a. Requirements of the scientific method
 - b. Kelly-Frye Rule
 - c. Federal Rules of Evidence (FRE-702)
 - d. Daubert vs. Merrell Dow Pharmaceuticals
 - e. Kumho Tire vs. Carmichael

D. Medicolegal Investigations

1. Definition of clinical time of death
2. Categories of deaths requiring a medico-legal autopsy
3. Objectives of a medico-legal autopsy
 - a. Cause of death determination
 - b. Mechanism of death
 - c. Manner of death
 - i. Natural causes
 - ii. Accidental
 - iii. Homicide
 - iv. Suicide.
 - v. Undetermined
 - d. Contributing factors to cause of death
 - e. Scientific basis of victim identification
 - f. Collection and presentation of evidence for the courts
4. Steps and procedures of a complete medicolegal autopsy
 - a. Tissues examined
 - b. Tissues and fluids collected
5. Characteristics of postmortem changes/Time since death
 - a. Livor mortis
 - i. Tardieu spots

- ii. Cherry-red lividity
- iii. Periorbital petechial spots
- iv. Pink teeth
- b. Rigor mortis
- c. Algor mortis
- d. Vitreous potassium
- e. Process of decomposition
 - i. Autolysis
 - ii. Putrefaction
 - iii. Saponification/Adipocere
 - iv. Mummification
 - v. Skeletalization

E. Age, Sex and Race Determination

1. Reliability and variability of methods
2. Age estimation
 - a. Dental techniques
 - i. Massler and Shour
 - ii. Ubelaker
 - iii. Gustafson method
 - iv. Gustafson and Koch
 - v. Bang and Ramm
 - vi. Moorees, Fanning and Hunt
 - vii. Burns and Maples
 - viii. Demirjian
 - ix. Mincer, Berryman and Harris
 - x. Histological disturbances in enamel and dentin
 - xi. Lamendin
 - xii. Aspartic acid racemization in dentin and enamel
 - b. Anthropological
 - i. Ossification centers
 - ii. Pubic symphysis
 - iii. Osteoarthritic lipping
 - iv. Cranial suture closure
3. Sex determination
 - a. Dental
 - i. Morphology of teeth and maxillofacial structures
 - ii. Barr bodies
 - iii. Amelogenin
 - b. Anthropological
 - i. Pelvic morphology
 - ii. Skull morphology
4. Race determination
 - a. Dental

- i. Alveolar size and prognathism
 - ii. Arch size and shape
 - iii. Tooth characteristics of races
 - b. Anthropological
 - i. Orbital morphology
 - ii. Nasal morphology
 - iii. Zygomatic arch
 - iv. Supraorbital morphology
 - v. Gonion angle and prognathism
- 5. Other techniques of age determination
 - a. Amino acid racemization (non-dental)
 - b. Serology
 - c. Metallic ratios

F. Human Identification

- 1. Scientific modes of identification
 - a. Fingerprint
 - b. Dental
 - c. Medical
 - d. Anthropological
 - e. DNA
- 2. Types of remains
 - a. Viewable
 - b. Non-viewable
- 3. Types of dental evidence
 - a. Antemortem
 - b. Postmortem
- 4. Radiology concerns with forensic specimens
 - a. Projection geometry
 - b. Beam energy reduction
 - c. Digital radiography
 - d. Hand-held x-ray devices
- 5. Dental autopsy techniques
 - a. Resection
 - b. Facial flap
 - c. Inframandibular
- 6. Tissue preservation
 - a. Hard tissue
 - b. Soft tissue
- 7. Dental-related comparisons
 - a. Missing, extracted and restored teeth
 - b. Tooth morphology
 - c. Non-tooth related findings
 - i. Sinus pattern

- ii. Rugoscopy
 - iii. Chieloscopy
 - iv. Removable dental appliances
- 8. DNA comparison
 - 1. DNA theory and terminology
 - 2. Polymerase Chain Reaction (PCR) and STR's
 - 3. Mitochondrial DNA (MtDNA) sequencing
 - a. Pedigree
 - 4. Automated comparison kits
 - 5. Dental DNA harvesting and storage
 - a. Tooth sectioning
 - b. Cryogenic grinding
- 9. ABFO degrees of certainty of dental identification
 - a. Positive identification
 - b. Possible identification
 - i. Consistent, no unexplained discrepancy
 - ii. Poor quality of remains or antemortem evidence
 - c. Insufficient
 - i. Insufficient evidence to form an opinion
 - d. Exclusion
 - i. Clearly inconsistent findings
- 10. Missing persons networks
 - a. Federal Bureau of Investigation
 - b. National Crime Information Center (NCIC 2000) and Canadian Police Information Centre (CPIC)
 - c. Automated Fingerprint Identification System (AFIS)
 - d. Combined DNA Index System (CODIS)
 - e. U.S. Army Central Identification Laboratory (CILHI)
 - f. Interpol
 - g. Namus

G. Victim Identifications in Mass Fatality Incidents

- 1. Federal assistance
 - a. Public Law 93-288
 - b. Family Assistance Act of 1996
- 2. Disaster assistance
 - a. FBI
 - b. FEMA
 - c. NTSB
 - d. NDMS
 - e. DMORT
- 3. Dental team divisions
 - a. Antemortem team protocol
 - b. Postmortem team protocol

- c. Comparison team protocol
- d. Information management
- 4. Stages of victim documentation
 - a. Login/assign escort
 - b. Personal effects
 - c. Photography
 - d. Radiography
 - e. Pathology/Medical Examiner
 - f. Anthropology
 - g. Fingerprint
 - h. DNA
 - i. Dental
 - j. Mortuary services
- 5. Common tooth numbering systems
 - a. Universal
 - b. Palmer
 - c. FDI- Federation Dentaire International
- 6. Computer-aided dental identification
 - a. CAPMI
 - b. WinID
 - c. DIP-2
 - d. Toothpics
 - e. D.A.V.ID
 - f. Primary and secondary dental sorting codes
 - g. Integration with digital radiography and photography
- 7. Management of team personnel
 - a. Team approach
 - b. Cumulative stress prevention and signs

H. Bitemark analysis

- 1. History of bitemark legal citations
- 2. Distinction between incisions and lacerations (blunt trauma)
- 3. Methods and variability of bitemark bruising and aging factor
- 4. Bitemark descriptive terms
 - a. Class characteristics
 - i. Shape
 - ii. Size
 - iii. Pattern
 - b. Individual characteristics
 - i. Arch characteristics
 - ii. Dental characteristics
 - c. Central ecchymosis
 - d. Linear abrasions
 - e. "Double bite" or multiple bites

f. Avulsion

5. Evidence collection and exemplars

a. Landmark legal citations

b. Characteristics of contusions and lacerations

c. Bitemark evidence protocol

i. Double swab for salivary DNA

ii. DNA preservation

iii. Photograph injury

iii. Soft tissue impression

iv. Tissue excision and preservation

d. Photography

i. ABFO ruler

ii. Geometric distortion and parallax

iii. Visible light technique

iv. Alternative light techniques/sources, films and filters

e. Suspect evidence protocol

i. Legal consent

ii. Impression requirements

iii. Study cast requirements

iv. DNA collection

v. Extraoral and intraoral exam

vi. Bite registration

vii. Excursion measurements

6. Bitemark analysis and comparison

a. Metric analysis

i. Teeth

ii. Arch

iii. Bite opening distance

b. Pattern association

i. Hollow volume transparencies

ii. Full volume transparencies

iii. Digital enhancement and superimposition

iv. Test bites

v. Transillumination

vi. Scanning electron microscopy

e. ABFO guidelines-confidence of existence of a human bitemark

i. Bitemark

ii. Suggestive of a bitemark

iii. Not a bitemark

f. ABFO guidelines-confidence of link to suspect

i. The Biter

ii. The Probable Biter

iii. Not Excluded as the Biter

- iv. Excluded as the Biter
- v. Inconclusive

I. Domestic Violence and Neglect

1. Statistics of Domestic Violence and Deaths
 - a. Child abuse
 - b. Spousal abuse
 - c. Elder abuse
2. Mandated reporting by the practitioner
3. Protection for reporters of abuse
4. Signs of abuse and neglect
 - a. "Battered child syndrome"-Kempe, 1962
 - b. Battle sign
 - c. Raccoon eyes
 - d. Retinal hemorrhage and displacement
 - d. Labial frenum tear
 - e. Scalding with spared areas
 - f. Broken and unrestored teeth
 - g. Angular abrasion
 - h. Lack of response to environment
 - i. Various neurosis and psychosis
 - j. Signs of trauma without reasonable cause
5. Organizational support
 - a. Prevention of Abuse and Neglect Through Dental Awareness (PANDA-Delta Dental)
 - b. Department of Human Services
 - b. Child Protection Services
6. Conditions simulating child abuse and neglect
 - a. Various forms of disease, malnutrition and pathology
 - b. Mongolian spot
 - c. Cao gio
 - d. Moxibustion