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Forensic odontology

FORENSIC ODONTOLOGY QUIZ: TEST YOUR KNOWLEDGE IN DENTAL HUMAN IDENTIFICATION.

Quiz odontolegal: teste seus conhecimentos em identificação humana odontológica.

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ABSTRACT

Dental human identification is a core component of forensic dentistry education. Scientific literature provides evidence-based guidance for best practices, and international guidelines support experts in this field. Education should cover both single-case identification and disaster victim identification (DVI), integrating research and practical applications. This study introduces a pedagogical approach and presents a 20-question quiz designed to enhance learning in dental human identification.

KEYWORDS

Education, dental; Forensic dentistry; Human identification.

INTRODUCTION

Human identification presents a substantial challenge in numerous tragic scenarios, requiring forensic expertise and the application of advanced methodologies. Homicides, suicides, and accidents are examples of violent deaths in which medicolegal human identification is required[1]. To this end, autopsies may be performed in cases involving single[2] or multiple[3] victims. The latter can escalate into mass disasters, which can be man-made (intentional or not) or natural[4]. Forensic odontology plays a crucial role in human identification, as teeth are among the most resilient structures in the human body, capable of withstanding extreme heat, trauma, and decomposition[5].

Alongside friction ridge and genetic analyses, dental assessment is recognized by the International Criminal Police Organization (INTERPOL) as one of the primary methods for human identification[4]. In this process, forensic

odontologists meticulously analyze dental evidence. To enable human identification, antemortem (AM) and postmortem (PM) dental data are collected and comparatively analyzed[1]. Morphological, therapeutic, and pathological dental features are documented and assessed for consistency or discrepancy[6].

Documentation is typically carried out in either a descriptive or coded format and may be based on direct visualization, photographic records or two-dimensional (2D) and three-dimensional (3D) medical imaging[7]. According to the American Board of Forensic Odontology (ABFO), positive identification is considered when "*data match in sufficient detail*" and "*there are no irreconcilable discrepancies*"[8].

Despite the significant involvement of forensic odontologists in human identification[9], there remains no global consensus on the curriculum for forensic odontology programs[10], leading to inconsistencies in training and knowledge acquisition. Consequently, educational strategies in the form of freely available quizzes[11] and academic testing materials become valuable tools to support and enhance learning in forensic odontology. The present study aimed to further promote forensic odontology education, an initiative supported by the Brazilian Journal of Forensic Odontology (*Revista Brasileira de Odontologia Legal*), through the development of a 20-question quiz specifically focused on dental human identification.

DENTAL HUMAN IDENTIFICATION QUIZ

1) Dental human identification can be achieved through the analysis of photographs, radiographs and written clinical records. During this process, dental features are documented. Regarding these features, indicate the correct statement:

a) In disaster victim identification, only highly distinctive dental features individually found on specific teeth can establish positive identification, meaning that combinations of missing, restored and virgin teeth have no value.

b) Written clinical records clearly and reliably describe intraoral characteristics in detail. Hence, this is the preferred type of material to be considered in dental human identification.

c) Intraoral photographs are superior sources of antemortem data compared to radiographs because they sharply register valuable features such as cavities, crowns, root dilaceration and orthodontic appliances.

d) Morphological dental features are becoming more valuable because of the growing trend of preventive dentistry worldwide. They can be registered photographically and radiographically, for instance.

2) "Selfies" can be valuable non-clinical photographs for dental human identification primarily because:

a) They are typically obtained with the frontal camera of a smartphone, having high spatial resolution and lack of angular and linear distortions.

b) They are obtained by third parties, who may be photograph experts.

c) They can register the smile and are normally stored in the victim's social media profile and in different networks.

d) They register the incisal edges and occlusal surfaces of both dental arches,

especially in individuals with pronounced overbite.

3) Which of the following dental codes compatible with KMD PlassData DVI cannot be charted based on selfies?

a) mpm

b) mam

c) foa

d) jew

4) Regarding the principles of dental coding for forensic charting, indicate the correct statement:

a) More extensive and detailed coding lists will always outperform shorter lists.

b) OdontoSearch has highlighted the value of missing, restored and virgin teeth.

c) WinID 3 uses a code list that is more extensive than the former PlassData's list with over 100 codes.

d) Coding is not essential, since most countries use the same notation and symbols.

5) According to INTERPOL's Disaster Victim Identification (DVI) guide (2023) – Annexure 5, when the antemortem dental records cannot be obtained from the missing person's family dentist, which of the following may serve as alternative potential sources of information?

a) Police officers

b) Lawyers

c) School dental services

d) Medicolegal institutes

6) Consider the following dental chart, the antemortem and postmortem colour-code (yellow and pink), the FDI (Fédération Dentaire Internationale) dental notation, some of the dental codes compatible with KMD PlassData DVI software, and select the correct alternative:

11	mam	mam	21
12	mam	mam	22
13	mam	mam	23
14	tcc	tcc	24
15	tcc	tcc	25
16	tcc	tcc	26
17	mcf O	mcf O	27
18	pre	pre	28
48	pre	pre	38
47	mcf O	mcf O	37
46	mcf O	mcf O	36
45	mam	mam	35
44	mam	mam	34
43	pre	pre	33
42	pre	pre	32
41	pre	pre	31

11	tcc	tcc	21
12	tcc	tcc	22
13	tcc	tcc	23
14	tcc	tcc	24
15	mpm	mpm	25
16	mpm	mpm	26
17	mcf O	mcf MOD	27
18	une	une	28
48	une	une	38
47	mcf O	mcf O	37
46	mcf O	mcf O	36
45	mcf O	mcf O	35
44	mcf O	mcf O	34
43	mpm	mpm	33
42	mpm	mpm	32
41	mpm	mpm	31

Legend: mam: tooth missing antemortem, tcc: tooth coloured crown, mcf O: metal coloured filling on the occlusal surface, pre: tooth present, mpm: tooth missing portmortem, mcf MOD: metal coloured filling in the mesial, occlusal and distal surfaces, une: unerupted tooth.

a) The antemortem and postmortem charts correspond to the same individual.

b) The maxillary anterior teeth show non-explainable discrepancies.

c) "mam" is usually represented by empty sockets detected in dental autopsies.

d) Code "pre" can be used interchangeably with "non", "nad" and "vis".

7) In dental human identification practice, some of the differences between dental charts can be explained, such as (consider KMD Plass Data DVI's coding system):

a) When "mcf O" is charted on a yellow form and "mcf MOD" is charted on a pink form, this can be explained by time, progressive decay and the subsequent need for a larger restoration.

b) When "mcc" is charted on a yellow form and "amc" is charted on a pink form, this can be explained by progressive decay since the first letter of the code represents the restored surface of a tooth.

c) The only ways "rfx" can be charted on a pink form, after being charted "pre" on a yellow form, are by means of direct visualization, photographic analysis and intraoral scanning.

d) When "mam" is charted on a yellow form, it cannot be charted as "mam" again on a pink form because this feature can only be detected antemortem.

8) The postmortem phase of INTERPOL's Disaster Victim Identification Guide addresses specific aspects regarding the "Personnel for Odontology". Concerning this topic, indicate the correct statement:

a) As a rule, a single forensic odontologist should record the dental status of the body and perform photographic and radiographic acquisition.

b) Forensic odontologists' (FO) roles in each dental autopsy are predefined, fixed (non-variable between each other) and restricted to FO recorder and FO radiographic assistant.

c) There should be a rotation between roles and repetition of the examination to ensure precise and accurate data through a double-check quality control system.

d) Double-check is assigned only to the FO examiner, when all dental autopsies are concluded and identifications established.

9) The American Board of Forensic Odontology (ABFO) Body Identification Information & Guidelines defines four categories for body identification. In scenarios where antemortem and postmortem data are clearly inconsistent, indicate which is the alternative that is still considered "a valid technique in certain circumstances" to obtain identification:

a) Positive identification.

b) Possible identification.

c) Insufficient evidence.

d) Exclusion.

10) Dental analysis has particularities compared to other primary methods for human identification, such as:

a) The identification process is normally performed on a comparative basis between antemortem and postmortem data.

b) Identification can be established based on a single or multiple concordant dental features as long as there are no unexplainable discrepancies.

c) The identification process can be multidisciplinary, involve several experts in the field, and necessitate antemortem data collection through international agencies.

d) Identification can benefit from computer-aided solutions.

11) Dental human identification can present varying levels of difficulty depending on the body under examination. Indicate the correct statement:

a) Dental human identification of young individuals is a simpler process compared to adults because of the lower frequency of dental treatments in children.

b) The diversity of radiographically detectable dental features and their patterns of occurrence decrease with age.

c) The diversity of dental patterns is higher when solely assessed via clinical examination rather than combining clinical and radiographic examination.

d) The diversity of dental patterns can increase when assessed via three-dimensional imaging rather than through bidimensional view.

12) Considering the INTERPOL guide, Annexure 4, and an optimal logistic scenario in disaster victim identification where three forensic odontologists are assigned per body, associate the roles with their description and indicate the correct alternative:

1 – Forensic Odontology Examiner

2 – Forensic Odontology Recorder

3 – Forensic Odontology Radiographic Assistant

[ ] Completes the postmortem forms.

[ ] Assesses dental status, cleans teeth, and examines oral structures.

[ ] Checks the postmortem record for quality.

[ ] Accesses the oral cavity and make incisions on soft tissues when necessary and allowed.

[ ] Assists in preparing, exposing and developing radiographs of the teeth.

[ ] Supervises and directs the photographic record of teeth.

a) 2 / 2 / 3 / 1 / 1 / 2

b) 1 / 2 / 2 / 2 / 3 / 1

c) 1 / 1 / 3 / 1 / 3 / 2

d) 2 / 1 / 2 / 1 / 3 / 1

13) In disaster victim identification (DVI), some technical procedures require especial observation. Regarding the current INTERPOL's considerations to jaw removal (Annexure 4), for example, indicate the alternative that correctly classifies the sentences below as true (T) or false (F):

[ ] As a rule, jaw removal should be performed in all dental autopsies in DVI.

[ ] Whenever the lower jaw is removed, the upper jaw should also be removed.

[ ] Jaws removed should be kept in separated containers, distant from the body.

[ ] Jaw removal should be considered only in very exceptional circumstances, and follow local jurisdiction.

a) F / T / T / F

b) F / F / F / T

c) F / F / T / T

d) T / F / F / F

14) Which of the following medical imaging techniques is not included in INTERPOL's postmortem radiographic approach for dental registration according to Annexure 4?

a) Bitewings and periapicals

b) Orthopantomograms

c) Computed tomography scans

d) Magnetic resonance imaging

15) Virtual autopsy has been promoted as a minimally invasive approach to support postmortem examinations for at least 20 years. Regarding this topic, indicate the correct sentence:

a) Magnetic resonance imaging can be part of the virtual autopsy protocol as the ideal tool to visualize hard tissue, such as bones and teeth.

b) Photogrammetry can create a 3D model of the body surface and has been widely used intraorally during dental autopsies.

c) Some of the coded dental features used in KMD Plass Data DVI have been addressed and validated in virtual autopsy studies.

d) Virtual autopsy is now replacing traditional autopsies in most DVI operations worldwide.

16) According to INTERPOL's DVI guide and Annexure 6, indicate the correct alternative:

a) The participation of forensic odontologists is restricted to the antemortem and postmortem phases.

b) The postmortem team makes the final decisions regarding identification in DVI operations.

c) The Identification Board should comprise of the most experienced identification experts in the operation.

d) The reconciliation phase is only feasible when best-match computer programs are available.

Contextualization for items 17 and 18: In the scientific literature, alternative techniques have been proposed for human identification, examples are palatal rugoscopy, cheiloscopy, tongue prints and tooth prints. Despite their alleged contribution to forensic odontology, practical application has been scarce (not to say null for some of these techniques).

17) Based on the exposed, indicate the correct alternative regarding rugoscopy and cheiloscopy:

a) Palatal rugoscopy is the analysis of the transverse palatine folds, normally performed by means of cone beam computed tomography.

b) Palatal rugoscopy can be useful when the body is edentulous and the antemortem data include dental casts or intraoral scans.

c) Cheiloscopy is the analysis of lip prints and has been proved scientifically reliable as a method for sexual dimorphism and human identification.

d) Cheiloscopy can be registered and analyzed with intraoral scanning and is especially useful in charred bodies.

18) Based on the exposed, indicate the correct alternative regarding tongue prints and tooth prints:

a) Tongue prints have been scientifically proved as unique features capable of distinguishing monozygotic twins.

b) Tongue prints are especially relevant in forensic odontology because of the vast databases recording antemortem data.

c) Tooth prints are the enamel rod end patterns on tooth surface, also known as ameloglyphics.

d) Tooth prints are as unique as fingerprints and have been implemented in DVI operations as a primary method for human identification.

19) According to the International Organization for Forensic Odonto-Stomatology (IOFOS), body identification, in single cases, could include the following procedures, except:

a) Sampling a sound tooth for genetic analysis.

b) Estimating the age interval of the deceased.

c) Assessment of dental status by two forensic odontologists.

d) Using different nomenclature between ante- and postmortem examinations.

20) According to the International Organization for Forensic Odonto-Stomatology (IOFOS), body identification, in single cases, can lead to different conclusions, namely identity established (I), identity probable or possible (II), identity excluded (III). Regarding this topic, indicate the <u>incorrect</u> alternative:

a) In conclusions I and III, nothing refutes identity.

b) In conclusion III, at least one characteristic refutes identity.

c) In conclusion II, there is limited dental comparison information, with at least one characteristic that is identical between antemortem and postmortem.

d) In conclusions I and II, any discrepancies are compatible with time difference between the antemortem dental records and the postmortem dental investigation

ANSWERS WITH EXPLANATIONS

Question 1.

d) Morphological dental features are becoming more valuable because of the growing trend of preventive dentistry worldwide. They can be registered photographically and radiographically, for instance.

Explanation: Restorative dentistry is still present and represents a large portion of clinical procedures. However, Forensic Odontology studies[7,12] have been highlighting the importance of getting familiar with morphological dental features – and their photographic and radiographic registration, especially because conservative dentistry has been constantly promoted. The other alternatives are incorrect because:

a) In disaster victim identification, only highly distinctive dental features individually found on specific teeth can establish positive identification, meaning that combinations of missing, restored and virgin teeth have no value. **– Combinations of features like missing, restored and virgin teeth can be powerful and highly distinctive for human identification.**

b) Written clinical records clearly and reliably describe intraoral characteristics in detail. Hence, this is the preferred type of material to be considered in dental human identification. **– These records can be useful but also very subjective and susceptible to human error.**

c) Intraoral photographs are superior sources of antemortem data compared to radiographs because they sharply register valuable features such as cavities, crowns, root dilaceration and orthodontic appliances. **– Intraoral photographs cannot fully register root shape features when teeth are in-socket, such as dilaceration.**

Question 2.

c) They can register the smile and are normally stored in the victim's social media profile and in different networks.

Explanation: Selfies have been important sources of antemortem data, especially when clinical records are scarce or null. Several studies have corroborated the importance of selfies for human identification[13-15].

The other alternatives are incorrect because:

a) They are typically obtained with the frontal camera of a smartphone, having high spatial resolution and lack of angular and linear distortions. **– Smartphone's frontal cameras do not necessarily have high spatial resolution and normally produce images with different levels of angular distortion.**

b) They are obtained by third parties, who may be photograph experts. **– A selfie is a photograph taken by the person who is also the subject of the image.**

d) They register the incisal edges and occlusal surfaces of both dental arches, especially in individuals with pronounced overbite. **– They may register incisal edges in smile photographs and occlusal surfaces when the mouth is**

opened (less common and more difficult), but they fail to register mandibular incisal edges if there is pronounced overbite.

Question 3.

a) mpm

Explanation: The dental code mpm stands for "missing postmortem" and cannot be charted based on selfies because these are photographs taken antemortem by the person who is also the subject of the image. The other alternatives are incorrect because:

b) mam, c) foa and d) jew **– These codes stand for missing antemortem, fixed orthodontic appliance and tooth jewelry, respectively, and all of them can be charted based on selfies.**

Question 4.

b) OdontoSearch has highlighted the value of missing, restored and virgin teeth.

Explanation: OdontoSearch is a free-access software translated to several languages that is able to demonstrate how missing, restored and virgin teeth can compose distinctive dental patterns. For more: https://www.odontosearch.com/en/3.2/index.html

The other alternatives are incorrect because:

a) More extensive and detailed coding lists will always outperform shorter lists. **– This strong statement that does not necessarily reflects reality. It is not the number of coded dental features that will dictate their usefulness for human identification. The current list of INTERPOL dental codes compatible with KMD PlassData DVI is an example of a list that reduced from previous version.**

c) WinID 3 uses a code list that is more extensive than the former PlassData's list with over 100 codes. **– WinID3 has a shorter list.**

d) Coding is not essential, since most countries use the same notation and symbols. **– Different notations and symbols are found worldwide[16], making necessary establishing uniform communication in DVI operations.**

Question 5.

c) School dental services

Explanation: School dental services are mentioned by INTERPOL as potential sources of dental data in DVI. This is an additional and important reason to properly educate dental students on the correct production and storage of clinical records.

The other alternatives are incorrect because:

a) Police officers, b) Lawyers and d) Medicolegal institutes. **– These are not mentioned as sources of antemortem data in Annexure 5[17].**

Question 6.

b) The maxillary anterior teeth show non-explainable discrepancies.

Explanation: Teeth cannot be charted as missing antemortem (mam) in the yellow (antemortem) form and charted with tooth coloured crowns (tcc) in the pink (postmortem) form unless the forms are from different individuals.

The other alternatives are incorrect because:

a) The antemortem and postmortem charts correspond to the same individual. **– Because of the non-explainable discrepancies, the charts are not from the same individual.**

c) "mam" is usually represented by empty sockets detected in dental autopsies. **– The empty sockets detected during dental autopsies are normally charted as "mpm" instead.**

d) Code "pre" can be used interchangeably with "non", "nad" and "vis**". – The codes have different applications. Code "pre", for instance, states that a tooth is present, while "nad" indicates that the tooth is not only present but with no abnormality detected.**

Question 7.

a) When "mcf O" is charted on a yellow form and "mcf MOD" is charted on a pink form, this can be explained by time, progressive decay and the subsequent need for a larger restoration.

Explanation: The difference between the codes used in the alternative is the number of surfaces restored with metal coloured filling. Increasing the size and number of surfaces of a restoration can be explained by time, the effect of decay and the subsequent larger restoration. This is an explainable discrepancy because "mcf – O" was charted antemortem (yellow form) and "mcf – MOD" was charted postmortem (pink form).

The other alternatives are incorrect because:

b) When "mcc" is charted on a yellow form and "amc" is charted on a pink form, this can be explained by progressive decay since the first letter of the code represents the restored surface of a tooth. **– These codes differ not because of the restored surfaces but because they represent distinct dental restorative materials (metal ceramic and amalgam crowns, respectively).**

c) The only ways "rfx" can be charted on a pink form, after being charted "pre" on a yellow form, are by means of direct visualization, photographic analysis and intraoral scanning**. – Code "rfx" represents root filling and is ideally visualized by means of radiographic imaging. The other ways mentioned in the alternative can apply too if the tooth is fractured and when the filling material visible, but they are not the only ways to chart "rfx".**

d) When "mam" is charted on a yellow form, it cannot be charted as "mam" again on a pink form because this feature can only be detected antemortem. **– Despite meaning missing antemortem, code "mam" can be charted also on pink (postmortem forms) to indicate healed/old tooth loss.**

Question 8.

c) There should be a rotation between roles and repetition of the examination to ensure precise and accurate data through a double-check quality control system.

Explanation: The ideal scenario for postmortem odontological examinations in DVI operations is having two or three forensic odontologists per body. Rotating roles is advocated by INTERPOL to ensure double-check quality control.

The other alternatives are incorrect because:

a) As a rule, a single forensic odontologist should record the dental status of the body and perform photographic and radiographic acquisition. **– Multiple forensic odontologists are advocated instead.**

b) Forensic odontologists' (FOs) roles in each dental autopsy are predefined, fixed (non-variable between each other) and restricted to FO recorder and FO radiographic assistant. **– Roles should rotate and include also the FO examiner.**

d) Double-check is assigned only to the FO examiner, when all dental autopsies are concluded and identifications established. **– Double-check is performed as teamwork by rotating roles and repeating procedures. This is accomplished as a quality control procedure over data collection and is performed much earlier than establishing any identification.[18]**

Question 9.

d) Exclusion.

Explanation: Exclusion can lead to identification in very specific circumstances, including closed and more controlled scenarios where other individuals have been identified, for instance, and options to directly identify the only remaining unknown body were ruled out. In this case, via elimination, the body can be identified since it does match any other antemortem record.

The other alternatives are incorrect because:

a) Positive identification, b) Possible identification, c) Insufficient evidence **– None of these are described by ABFO[8] as "*a valid technique in certain circumstances*" for human identification. These are the descriptions given to positive identification: "*The antemortem and postmortem data match in sufficient detail to establish that they are from the same individual. In addition, there are no irreconcilable discrepancies*"; possible identification: "*The antemortem and postmortem data have consistent features, but, due to the quality of either the postmortem remains or the antemortem evidence, it is not possible to positively establish dental identification*"; and insufficient evidence: "*The available information is insufficient to form the basis for a conclusion[8]".***

Question 10.

b) Identification can be established based on a single or multiple concordant dental features as long as there are no unexplainable discrepancies.

Explanation: One of the different aspects of dental human identification compared to other methods, namely friction ridge analysis and genetics, is the possibility of enabling identification through a single distinctive concordance between antemortem and postmortem data if necessary[19,20]. To this end no unexplainable discrepancy should be present.

The other alternatives are incorrect because:

a) The identification process is normally performed on a comparative basis between antemortem and postmortem data, c) The identification process can be multidisciplinary, involve several experts in the field, and necessitate antemortem data collection through international agencies, d)

Identification can benefit from computer-aided solutions**. – These alternatives do not demonstrate a particularity of forensic odontology compared to other primary methods for human identification. Friction ridge analysis and genetics also can be performed on a comparative basis, multidisciplinary and benefit from computer-aided solutions.**

Question 11.

d) The diversity of dental patterns can increase when assessed via three-dimensional imaging rather than through bidimensional view.

Explanation: Three-dimensional imaging enables a more detailed and realistic charting compared to bidimensional view. An example is the differentiation of restorative materials between vestibular/buccal and lingual/palatal surfaces. Hence, when more surfaces are visible more detailed charting can be accomplished, possibly increasing the diversity of dental patterns. Kindly note the modal verb “can” in the sentence, meaning possibility.

The other alternatives are incorrect because:

a) Dental human identification of young individuals is a simpler process compared to adults because of the lower frequency of dental treatments in children. **– The lower frequency of dental treatments in children makes human identification more challenging since a higher number of treatments (in adults) can increase the distinctiveness of dental patterns.**

b) The diversity of radiographically detectable dental features and their patterns of occurrence decrease with age. **– Radiographic studies have demonstrated that the diversity of dental patterns increase with age[21,22].**

c) The diversity of dental patterns is higher when solely assessed via clinical examination rather than combining clinical and radiographic examination. **– Combining clinical and radiographic examinations can increase the spectrum for detecting dental features, such as finding root canal fillings in radiographs. Radiographic assessment is fundamental in dental human identification[6].**

Question 12.

d) 2 / 1 / 2 / 1 / 3 / 1

Explanation: This is the only sequence of associations that correctly reflects some of the roles allocated to each position among the Personnel for Odontology in DVI operations.

The other alternatives are incorrect because:

a) 2 / 2 / 3 / 1 / 1 / 2, b) 1 / 2 / 2 / 2 / 3 / 1 and c) 1 / 1 / 3 / 1 / 3 / 2. **– These alternatives mix the roles of the Personnel for Odontology in DVI operations. A detailed assessment of the roles involved in each forensic odontology position can be found in the INTERPOL DVI guide (2023) Annexure 4.[18] Examples of their roles are:**

- Forensic odontologist examiner: *“…accesses the oral cavity using the necessary procedures, including but not limited to incising soft tissues as required; cleaning the teeth and jaws; examining the structures; and assessing*

***the dental status of the body"; "… also supervises and directs the production of an adequate photographic record of the teeth, jaws, related oral structures and individualising dental traits/characteristics*"**.

- Forensic odontologist recorder: "*…assists the odontologist examiner to record the victim's dental status."; … prepares and completes the relevant PM forms and records the dental data as dictated by the odontologist examiner; checks the post- mortem record for quality (accuracy, legibility, clarity); signs the record and ensures that the odontology examiner and odontologist radiographic assistant also signs the record.*"

- Forensic odontologist radiographic assistant: "*assists the odontologist examiner and odontologist recorder in preparing, exposing and developing radiographs of the teeth and takes joint responsibility for the quality of the PM radiographs with the other odontology team members*."

Question 13.

b) F / F / F / T

Explanation: This is the only sequence of true or false associations that correctly reflects the descriptions of INTERPOL regarding the unusual and specific practice of jaw removal in DVI operations.

The other alternatives are incorrect because:

a) F / T / T / F, c) F / F / T / T and d) T / F / F / F. **– These alternatives states the opposite of what is considered best practices. Specifically: As a rule, jaw removal should not be performed, this procedure is an extreme exception and must be justified; removal of the upper jaw should be avoided, and should not necessarily be performed if the lower jaw is removed; jaws removed should be kept with the body; the last sentence is correct ("jaw removal should be considered only in very exceptional circumstances, and follow local jurisdiction").**

Question 14.

d) Magnetic resonance imaging

Explanation: This type of imaging modality is not listed under INTERPOL's technique for dental registration. Annexure 4 addresses the importance of postmortem full body imaging, which especial emphasis on computed tomography scans, but especially for dental registration, Magnetic Resonance Imaging (MRI) is not mentioned. MRI is relevant for dental registration, especially because it enables dental age estimation of the living without using ionizing radiation. In DVI, however, application for dental registration is unusual and would require advanced facilities that may not be feasible worldwide.

The other alternatives are incorrect because:

a) Bitewings and periapicals, b) Orthopantomograms and c) Computed tomography scans. **– These alternatives are described in Annexure 4 under the necessary "Radiographs of the teeth."**

Question 15.

c) Some of the coded dental features used in KMD Plass Data DVI have been

addressed and validated in virtual autopsy studies.

Explanation: The scientific literature[12] has tested dental charting from computed tomography scans simulating a scenario that could be similar to virtual autopsy context. Some of the dental codes compatible with KMD PlassData DVI have been confirmed as applicable for dental human identification.

The other alternatives are incorrect because:

a) Magnetic resonance imaging can be part of the virtual autopsy protocol as the ideal tool to visualize hard tissue, such as bones and teeth. **– Magnetic Resonance Imaging can be used to register teeth, but this is not the ideal tool to visualize hard tissue.**

b) Photogrammetry can create a 3D model of the body surface and has been widely used intraorally during dental autopsies. **– This technique is not widely used in dental autopsies, especially not intraorally (given to anatomic difficulties). Extraoral devices have been promoted, however, but most postmortem photogrammetry has included full body registration.**

d) Virtual autopsy is now replacing traditional autopsies in most of DVI operations worldwide. **– In specific circumstances, where virtual autopsy is applicable, it has been used as an additional complimentary tool to traditional autopsies.**

Question 16.

c) The Identification Board should comprise of the most experienced identification experts in the operation.

Explanation: According to INTERPOL, the Identification Board is responsible for the final identifications, meaning that this team should be composed of the most experienced experts, such as Directors, Commanders and Section heads.

The other alternatives are incorrect because:

a) The participation of forensic odontologists is restricted to the antemortem and postmortem phases. **– Forensic odontologists are not restricted to these phases. Their participation can include, for instance, the reconciliation phase.**

b) The postmortem team makes the final decisions regarding identification in DVI operations. **– The Identification Board makes the final decisions regarding identifications.**

d) The reconciliation phase is only feasible when best-match computer programs are available. **– Computer programs can be valuable resources in DVI, but they can not be more than a helpful tool, according to INTERPOL[23].**

Question 17.

b) Palatal rugoscopy can be useful when the body is edentulous and the antemortem data include dental casts or intraoral scans.

Explanation: The analysis of the palatal rugae can be of supplementary value to support human identification when the body is edentulous. These morphological

features are normally registered in dental casts or in images of intraoral scanning.

The other alternatives are incorrect because:

a) Palatal rugoscopy is the analysis of the transverse palatine folds, normally performed by means of cone beam computed tomography**. – These features are normally assessed by means of dental casts, their photographic analysis, digitally scanned dental casts and via intraoral scanning.**

c) Cheiloscopy is the analysis of lip prints and has been proved scientifically reliable as a method for sexual dimorphism and human identification. **– Recent investigation has demonstrated important limitations of lip prints for human identification, specifically their weak evidence for sexual dimorphism.**[24]

d) Cheiloscopy can be registered and analyzed with intraoral scanning and is especially useful in charred bodies. **– The destruction of soft tissue in charred bodies hinders the application of cheiloscopy. Hence, this method is not especially useful in charred bodies.**

Question 18.

c) Tooth prints are the enamel rod end patterns on tooth surface, also known as ameloglyphics.

Explanation: The sentence provides an adequate definition for tooth prints (or ameloglyphics).

The other alternatives are incorrect because:

a) Tongue prints have been scientifically proved as unique features capable of distinguishing monozygotic twins. **– Tongue prints have been speculative tools with potential forensic interest, but there is no substantial evidence of their usefulness neither their uniqueness for human identification.**

b) Tongue prints are especially relevant in forensic odontology because of the vast databases recording antemortem data. **– One of the drawbacks of tongue prints, as well as other disputable methods such as cheiloscopy, is their restricted alleged applicability given the scarcity of antemortem records.**

d) Tooth prints are as unique as fingerprints and have been implemented in DVI operations as a primary method for human identification. **– Tooth prints also suffers from the scarcity of antemortem records. Their value has been discretely explored in the academic scenario, but this tool has not been transferred to real-world forensic practice, especially not in DVI.**

Question 19.

d) Using different nomenclature between ante- and postmortem examinations.

Explanation: The item's command requested the exception, meaning that the International Organization for Forensic Odonto-Stomatology (IOFOS) states that the same nomenclature should be used between antemortem and postmortem data.

The other alternatives are incorrect because:

a) Sampling a sound tooth for genetic analysis, b) Estimating the age interval of the deceased and c) Assessment of dental status by two forensic odontologists**. – All these procedures are mentioned by**

IOFOS in their quality assurance document for single body identification[25].

Question 20.

a) In conclusions I and III, nothing refutes identity.

Explanation: The item's command requested the incorrect alternative. In this case, this alternative is incorrect because "nothing refutes identity" is not considered by IOFOS when it comes to the definition of "identity excluded" (conclusion type III).

The other alternatives are incorrect because:

b) In conclusion III, at least one characteristic refutes identity, c) In conclusion II, there is limited dental comparison information, with at least one characteristic that is identical between antemortem and postmortem, and d) In conclusions I and II, any discrepancies are compatible with time difference between the antemortem dental records and the postmortem dental investigation. **– These alternatives are correct because they include descriptions of IOFOS for identity established (I), identity probable or possible (II) and identity excluded (III)[25].**

REMARKS ON PREVIOUS QUIZ

If you are studying from our series of quiz-based articles, kindly note that in the previous dental age estimation article[11], Section A, Question 3, alternative "d" (correct answer) should be read "*Presentation of tooth-specific results from the assessment of dental development*" instead of the longitudinal data context originally addressed. Additionally, in the same section, Question 4, "he" should be replaced by "she" to best fit textual sex-concordance.

RESUMO

A identificação odontológica humana é um componente essencial na formação em Odontologia Legal. A literatura científica fornece orientações baseadas em evidências para as melhores práticas, e diretrizes internacionais apoiam os especialistas nessa área. A formação deve abranger tanto a identificação em casos isolados quanto a identificação de vítimas de desastres (DVI), integrando pesquisa e aplicações práticas. Este estudo apresenta uma abordagem pedagógica e um questionário de 20 perguntas elaborado para aprimorar o aprendizado em identificação odontológica humana.

PALAVRAS-CHAVE

Educação, odontologia; Odontologia legal; Identificação humana.

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