



# NEWSLETTER

INTERNATIONAL ORGANISATION FOR FORENSIC ODONTO-STOMATOLOGY

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## Impressum

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## Editor's Page



Dear Readers,

The first Newsletter of 2016 will inform you about several activities of the IOFOS and of the last Symposium of the International Academy of Legal Medicine in Venice in June of 2016. IOFOS organized a full day session within the symposium. Colleagues from all over the world came to Venice. The different aspects of forensics in dentistry were reported and discussed. All topics of the key note speakers of this meeting will be presented in this newsletter. Terrorism has not stopped this year and once again France was targeted some days ago. The attacks in Brussels and other places of the world show the need for awareness and preparedness.

After the IALM Symposium we look forward to the year that lies ahead. The congress of the International Association of Forensic Sciences will take place in Toronto from the 21<sup>st</sup> to the 25<sup>th</sup> August 2017. The next international IOFOS congress will be in Leuven in the middle of September (14<sup>th</sup>-16<sup>th</sup>) 2017. At the end of this newsletter you can find information about these conferences, and a course for Forensic Odontology in Aarhus under the patronage of IOFOS at October of this year. I wish all of you a nice summer time and relaxing holiday.

Yours,

**Ruediger Lessig**

## President's Page



Dear Friends and Colleagues,

This time the newsletter gives the opportunity to recall some relevant events that have occurred in the first half of the year. As usual I'd like to welcome in IOFOS family a new member the Laboratorio of Ciencias Forenses e Psicologicas Egas Moniz- Servico de Clinica Medico-Legal (Portugal), whose head is prof. Cristiana Pereira.

Some meaningful conferences and meetings took place where forensic odontologists had the opportunity to present research, cases and fostered discussion about issues relevant to forensic odontology.

The AAFS was held in February in Las Vegas and the usual meeting of Forensic Odontologists Working Group-DVI Interpol (WG-FOd) took place in May in Lyon. The general meeting of Interpol DVI Group gave the opportunity to participants to listen to very interesting presentations such as the reports about recent Paris and Belgium mass disasters due to terrorist attacks and Siem Pilot-Triton activity in the Mediterranean sea. The meeting of WGFOd was very effective as usual providing thorough discussion about dental codes, ID procedures, FOd enrollment, payment and contracts, standards, relationship with ISO-standards, issues related to irregular immigrants, etc. Elections took place during WG-FOd meeting and our congratulations go to Irena Davidson that has been elected as chair of the Group and Ruediger Lessig as deputy chair.

Recently IOFOS organized a one-day meeting and a workshop within the IALM Intersocietal Symposium that was held in Venice 21-24 June. Both the IOFOS session and workshop were a great success especially considering how huge the conference was (more than one thousand participants) and how distracting Venice can be with its architectural and natural beauties during June when the sun shines all the time. Extra seating would have been welcome for IOFOS session, which was addressed to discuss the issues connected with expert witness and reporting in court in the principal fields of forensic odontology as age estimation, bitemark, body identification, etc. Relevant speakers addressed these topics and fostered discussion with audience participation according to the best tradition of IOFOS meetings.

Proceeding to some important communications, I'd like to remind Member Societies that they should communicate changes in their Executive Boards and the contacts of reference people to be included in the IOFOS website. In September the activity of Election Committee of IOFOS will begin and emails will be sent to appropriate and updated contacts of all IOFOS member societies.

In the newsletter you will find detailed information about the Triennial International Conference of IOFOS, organized by IOFOS and Catholic University of Leuven with the patronage of VVTE, that will be held in Leuven, 14-16 September 2017. Calls for abstracts and detailed information will be sent through dedicated emails and indicated in IOFOS website, but meanwhile diarize earmark the event.

This half year has been full of events and work and I wish you some rest and regeneration during summer holiday.

**VilmaPinchi**

## **OVER OR UNDER THE AGE THRESHOLD? DENTAL AGE ESTIMATION AND LEGAL REQUIREMENTS IN CRIMINAL CASES AND ADMINISTRATIVE PROCEDURES**

### **Patrick Thevissen**

The title received for this keynote presentation contained multiple issues to consider. First, it is impossible to define THE age threshold. Indeed, any threshold is location, time and law or administrative regulation specific. In particular, the last two issues will cover (a) liability, regarding child protection or pension regulations. To set age thresholds will be in function of the age of being incapable of forming the intent to commit a crime or tort (*doli incapax*), the age of maturity or the age of retirement .

Second, the existing legal requirements will determine the age threshold(s), the age estimation method(s) to apply, the data registration technique(s) to use, the expert to appoint and the instructions given to the expert. Methodological legal requirements should be based on sound scientific methodology which means that applied methods should be tested or validated, published and peer reviewed, quality controlled, accepted in the field, reproducible and the error quantifiable (Daubert).

Third, these dental age estimations should be applicable in the living, meaning that mainly tooth development will be evaluated in children and subadults and to a minor extent, tooth morphology based examinations will be performed on adults. Consequently, medical imaging techniques are necessary for data collection. The applied age estimation methods will be based on the use of tables, atlases or models. The last are based on the conditional distribution of age given the specified age related variable(s) (regression analyses) or on the distribution of the age related variable(s) given age (Bayes rule). The age estimation outcomes are a point prediction of age, or a point prediction of age plus a measure of the uncertainty or a point prediction of age plus a measure of the uncertainty plus a related probability level, or the probability of being younger or older than a specific age.

Fourth, in my opinion being over or under a set age threshold can only be quantified within specific margins using models considering the distribution of the age related variable(s) given age, in fact using Bayesian models. They allow the calculation of the posterior density of age given (a) specific variable(s). From this distribution a point prediction of age can be calculated together with a quantified prediction interval. The coverage of this prediction interval can be validated. ROC analysis on the obtained distribution allows to quantify the percentage of individuals younger or older than a set age threshold. The specificity and sensitivity of this quantification can be calculated.

Fifth, science provides the methodology to consider whether one is over or under a set age threshold, but in addition to above second considered issue, legal

requirements are necessary to (1) set the probability threshold to classify an examined individual over or under the set threshold (is 51% enough, should it be 99,9% and what is the legally required intermediate %?) (2) to quantify the specific margins necessary to allow the use of a particular age estimation method, namely the magnitude of coverage of the provided prediction intervals, the specificity and sensitivity level of the used under or over classification method.

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## **DVI INTERPOL PROCEDURES AND RECOMMENDATIONS**

### **Ruediger Lessig**

Mass disasters with a large number of unknown victims and possible survivors are one of the biggest challenges for first responders, police and forensic disciplines. One task after a mass fatality incident is the accurate identification of the victims, and it is interesting how different methods which can be used, have developed in recent history. The Ring Theatre fire in Vienna (Austria) in 1881 with 449 victims of which 284 were identified, or the 1897 fire in the Bazar de la Charité in Paris (France) with 126 victims are examples for the usefulness of identification tools like forensic autopsy, odontology and dactyloscopy. These two disasters mark the beginning of modern identification processes in legal medicine. Amoëdo published his book of the forensic dentistry in legal medicine in 1897 based on the experiences of the two disasters in Vienna and Paris. . The content of his book include chapters such as bite marks or identification of unknown persons. He also describes the role of an expert witness in the court room and cases of dental neglect too. It is interesting to read what the problems were in that era compared with what we have now. In the following years, driven by the beginning of more frequent civil air transportation, several severe accidents demanded further development of methods and the establishment of an adequate DVI system. Amongst the new approaches is the inclusion of molecular biological methods for forensic purposes. In parallel, the need to establish permanent DVI organizations was recognized. Several countries established disaster victim identification teams, which include forensic pathologists, forensic dentists, forensic anthropologists, forensic molecular biologists, fingerprint experts and other specialists. These teams developed their own protocols for the identification processes and have been shown to be effective. The organization of the identification process differs from country to country depending on the historical and



political structures, but can also vary within a country depending on the nature of the incident.

Mass fatality incidents can be classified in different ways. One can differentiate between natural disasters like earthquakes, floods, or bush fires, versus man made incidents like transportation (airline, train) accidents, or terrorist attacks and war. Operationally, the important distinction is between an open and a closed disaster, which means there is either a known number of possible victims or an open victim pool. For open disasters experience has shown that there are many problems associated with how people are reported missing after a mass fatality incident. Individuals could have been reported missing even if there was only circumstantial evidence that they could have been near the disaster, and thus many of the reported could actually be alive. Often multiple family members and friends report the same person using variations of their name and such records have to be consolidated. This means that after an open disaster the reported missing list will initially grow rapidly but then has to be corrected downwards. On the other hand, some individuals do not have any social or family contacts and will not be reported missing at all. This may be rare but must be considered. Approaching the victim count by evaluating the numbers of recovered human remains can also lead to overestimates if bodies are fragmented and each body part will receive its own identifying number. An example is the train accident near Eschede, Germany where body part re-association led to a corrected victim count of 101 (personal communication). Depending on the circumstances, the discrepancy between the lists of individuals reported missing and the truly deceased can be very high. After the terrorist attack and collapse of the World Trade Center in New York, USA in 2001, 20,000 individuals were reported as missing, but the final victim count was established to be 2749.

A closed disaster is a mass fatality event with a defined number of casualties, for example an airline accident with a passenger manifest. The DVI process after a closed disaster has the advantage of more rapid availability of ante mortem data, which will often lead to shorter identification timelines. Especially problematic are DVI efforts after mass fatalities that not only have an open victim list but also involve destruction of primary residences and ante mortem references. This was the case during the war in Bosnia Herzegovina and Kosovo and the mudslide catastrophe in Rio de Janeiro. Aside from the type of disaster, the DVI effort is also influenced by the degree of destruction affecting the human remains, and the post mortem interval. Extreme fragmentation and commingling of remains led to an almost exclusively DNA based identification effort for the World Trade Center victim. Even DNA may not be feasible after events with complete carbonization of bodies, as was the case after the traffic accident and fire in the Swiss section of the Mont Blanc tunnel in 1999, the Kaprun tunnel train fire in Austria in 2000 and the Black Saturday Bushfires in the Australian state Victoria in 2009.

Mass fatality events with victims from multiple countries require international cooperation of local forensic experts and national and international agencies. Examples here are the 1994 victim identification of the Solar Temple cult tragedy in

Switzerland where the 48 victims belonged to five different nationalities, and the 852 victims from 17 countries that perished in the disaster involving the Finnish ferry MS Estonia. An outstanding example for international collaboration was the effort of more than 30 international teams on the island of Phuket after the 2004 Tsunami. In order to identify the victims the Thai Royal police formed an organization called the Thai Tsunami Victim Identification Center Information Management Center (TTVIC IMC). In all cases a successful identification effort is contingent on consistent nomenclature, adequate documentation, and standardized findings. This is especially important in international incidents with individuals from multiple countries.

International DVI standardization efforts date back to 1981 when the General Secretary of the international police agency Interpol formed a standing committee on victim identification after mass catastrophes. At the 1996 Interpol general assembly in Antalya, Turkey all member countries agreed to a binding recommendation requiring the use of a standardized identification form for all unknown bodies, even in scenarios with a single victim. As an international police organization, Interpol has many different activities including the maintenance of a standing committee on DVI. This committee was tasked with generating international standards and has published an updated DVI guide that addresses all critical areas. Up to date the DVI Working Group has several subgroups as shown at this slide. A lot of different topics were developed and discussed in the international context in these subgroups. For example imaging, using modern techniques in the DVI process or the problems of investigations in a CBRNE case. Especially after the mission in Thailand several activities took place to analyse what kind of problems the international cooperation has shown. The evaluation report shows all problems which were obtained during the mission after the Tsunami and was a good base to update the DVI Guide that addresses all critical areas. Several mass disasters after this time follows this and could prevent errors in the identification process, for example the crash of Air France Flight 470 in 2006. The existing international structures and standards under the umbrella of Interpol were very helpful. Following the Interpol DVI guide (Interpol 2009) the different modalities of the identification process are classified in two groups, primary and the secondary identification (ID)-methods. Forensic odontostomatology, dactyloscopy and forensic molecular biology belong to the primary ID-Methods. All others represent secondary ID-methods. Most of the methodical standards listed below were developed in recent years. The structure of the Victim Identification Teams may differ based on national differences. In most countries that follow Interpol standards mass fatality response is primarily a police function. Since in most cases forensic medical experts are not part of the police, forensic pathologists and odontologists join the DVI teams as external specialists. Mass fatality identification efforts can only work with centralized data processing and need very effective information flow. Parallel structures with multiple teams reporting to various government agencies should be avoided.

Concerning the primary and secondary identification methods the following experts are part of the team:



1. Expert of Dactyloscopy
2. Forensic Dentist
3. Forensic Molecular Biologist
4. Forensic Pathologist

#### Fingerprint Standards

- 1.) Fully rolled and flat (plain) impressions of all ten fingers
- 2.) Plain impressions of the right and left palm
- 3.) Footprints from infants

#### Forensic Pathology Standards

1. Participation of a forensic pathologist in the recovery
2. Full autopsy if possible
3. Use of imaging techniques if necessary
4. Participation in the identification process
5. Determination of the cause of death if possible
6. Reconstruction of the accident using pathological findings

The role of the forensic pathologist is multicentric and causes the need of participation in the different parts of the identification process. First of all the forensic pathologist has to follow the Interpol PM-form for documentation of the findings. This differs from the routine autopsy process. But on the other hand the responsibility for the collection of body fluids for toxicological investigations or DNA samples stays the same. Whenever it is possible the forensic pathologist should be included in the recovery team. This is important from the point of view of getting first hand information about a possible identity or cause of death. In special cases the pathologist will be able to give information about the time of death and can differentiate between human and nonhuman body fragments.

#### Forensic Odontology Standards

The forensic dentist is included in a similar way. Following guidelines are developed for the odontostomatological investigation:

1. Jaws will not be taken out. Only if an examination is not possible the lower jaw will be removed while the upper jaw is left in his origin position in situ. In selected cases a preparation of both jaws is possible. After the investigation soft tissue and jaws should be reconstructed following aesthetic aspects.
2. X-ray of the teeth (see below for details)
3. Estimation of the age
4. Analysis of prosthetic materials to identify the country of origin.

#### Forensic Molecular Biology Standards

The DNA Commission of the International Society for Forensic Genetics (ISFG) published specific DVI recommendations for DNA laboratories. Subsequently, Lee at al. reported on the adoption of these recommendations in Australia and New Zealand in 2008 and could show that there is clearly a need for local structures to adopt international recommendations and to provide more detailed guidance to the appropriate DVI responders. The German DVI-team also augmented the DNA DVI recommendations as follows.

The recommendations of the DNA commission of the ISFG and the Interpol Standing Committee on DVI are the basis for the course of action.

1. Post mortem (PM) samples both from victims and body parts have to be collected as soon as possible. Unambiguous labeling, documentation and adequate storage have to be guaranteed.
2. The PM samples shall be collected as described by Prinz et. al. In addition to recommendation #3 the following can be used for victims with putrefaction: healthy teeth (the extraction of a tooth is permitted only after documentation in the dental chart and approval by the responsible forensic dentist) and / or fingernails.
3. Ante mortem (AM) sample collection is based on recommendation #4 of Prinz et al. The persons collecting these samples have to inquire about the exact genetic relationships within the respective family. The samples have to be labeled unmistakably and assigned to the relevant AM case/-s.
4. AM samples of genetic relatives have to be collected in every case and sample storage shall only be carried out by trained personnel.
5. The selection of samples for analysis has to be performed by a specialist of the responsible police authority. The specialist must come from a laboratory which fulfills the criteria listed above. All samples have to be taken in duplicate to allow a replication of the analysis, if necessary. The AM and PM samples have to be retained until identification has occurred. All samples have to be destroyed within two years after identification has been declared. The final decision about the destruction of samples is made by the police authority in charge of the case after consultation with the laboratory.
6. The selection of genetic markers has to be completed by the police authority in charge after consultation with specialists (e.g. forensic geneticists). A minimal standard consists of twelve core STRs. Additional loci are suitable to increase the reliability of the final evaluation. In a given DVI operation the responsible coordination center will make the final decision about the STR loci to be used.
7. The following marker systems may be used in addition:

X- and Y-chromosomal STRs, mitochondrial DNA sequence markers or SNPs  
Documentation of all collected information, antemortem and postmortem, is an important component of the identification process. This includes the use of a standardized numbering scheme. Following the rules suggested for international incidents, one must keep a strict separation between antemortem (AM) and postmortem (PM) information for all documents. In addition, each set of information must be tagged with a country specific identifier, normally corresponding to the international telephone country code, so that it is easily discernible where the information is from. For antemortem data this number reveals the country of origin for the missing person data. In the PM area the number will indicate which country's team provided the examination.

Each set of human remains that is not attached and unambiguously connected to another larger part will receive a separate PM number. This also applies for situations

where the location of the remains would indicate an association between separate pieces. Any such assumptions must first be confirmed through appropriate scientific examinations.

Photography is a critical part of documentation and a means to objectively capture human remains, characteristic markings and personal effects. It is important to use a consistent numbering scheme as described above. High quality photographs with a reference scale for size will allow for comparisons between AM and PM data and clarify possible mistakes in the physical descriptions provided by family members or others.

As in other areas of forensic science, quality management is an important part of DVI efforts. Well-written standard operation procedures will ensure a consistent approach and allow for rapid training of new team members. This is especially important since the DVI process is not part of regular daily duties, and therefore will require a period of re-familiarization each time a team is mobilized. Quality management should be expanded to reviewing data forms for gaps and inconsistency as early in the process as possible. This will prevent delays or even worse misidentifications based on transcriptional errors or missing information. All identifications should also be reviewed prior to notifying the family. Again, data verification and check for consistency within a case can prevent sample mix-ups and mistakes.

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## **FORENSIC ODONTOLOGIST IN COURT. QUALIFICATION, STANDARDS AND GUIDELINES UNDERLYING THE EXPERTISE**

### **Vilma Pinchi**

Inside a Symposium dedicated to personalized justice the session and the workshops of IOFOS were dedicated to expert testimony and reporting in Court. This is the moment when the expert risks to be concerned, our evidence to be put in discussion eventually our professionalism could be questioned. When the expert testimony of a forensic expert is under discussion, many issues should be examined, but the main issues in Court generally are: the education, training and experience in other words the qualification of expert is the most relevant in all legal systems and for different disciplines. In literature there is an active discussion about education, qualification, credentialing, but also sanctions to be imposed on poorly qualified experts and thereof scientific societies for not having checked lists or provide requirements,

standards or guidelines. When the qualification of an expert is under consideration the first node of discussion is the education. The results of the IOFOS survey on 34 Countries completed in 2014 show that education and curricula are very mixed nationally and internationally so we can expect that experts in Courts may have very dissimilar education and training. A second node is who practices as forensic odontologist. In some countries specific requirements are requested by law or regulations to be licensed or to be member of a Scientific Society (as for instance American Board of Forensic Odontologist). But from the same abovementioned IOFOS survey it emerges that in about 80% on Countries no specific requirements are enforced by law or special regulations for practicing as forensic odontologist. Luckily it seems that judges/institutions verify the qualification of enrolled odontologists, but of course it is a sort of fair praxis that can be adopted or not. To be noted the high percentages of non-dentists (47% of Countries) than can serve as expert in forensic odontology cases.

The third factor than can positively influence the qualification of expert and protect the forensic odontologists (FOs) in Court are the guidelines or standards, but guidelines, recommendations or standards are given by National Societies in less than 40% of countries.

Hence we have: mixed education, few requirements for practice and sparse national guidelines and the predictable result is that more than one third of Countries had forensic odontologists claimed for malpractice or sued in Court (35% of Countries).

One of the most puzzling result was the scarce awareness of medico-legal risks connected with the forensic odontology practice. Although most of answering people were Presidents of national association of Forensic Odontology or active forensic odontologists, more than 40% of them were not aware if their insurance policy covers negligence or malpractice when they act as forensic odontologist and not as dentist. It seems that in some Countries FOs are not aware of professional liability risks connected to their practice thus neglecting a wise check of the appropriateness of the insurance coverage.

Discussing some relevant cases of malpractice involving or possibly involving forensic odontologists provides relevant feedback about forensic odontology practice. Generally speaking the cases in which forensic odontologists were concerned or worse sued for negligence are very few, but incidence varies froma Courtny to another and in different areas of forensic odontology.

Considering expert witness in bitemark, we must highlight that research and scientific publication are active, some relevant guidelines are available for experts, literature and recommendations are quite consistent. Some issues emerged as possibly affecting the expertise on bitemark: issues raised about the uniqueness of human dentition or at least themark left by the human dentition, lack of quantitative criteria of evidence, the possibility for expert to cumulate meaningful experience given the sparse cases of bitemarks in some countries. Moreover sometime we have poor quality of marks – and evidence can be weak and expertise should be given in a rigorous way, otherwise forensic odontologist takes the risk to assist to the rebuttal of

his opinion or worse to mislead the Court sentence and negative effects can therefore infringe on forensic odontologist's professionalism. There are some sadly famous cases where forensic odontologists were concerned or sued for errors in cases implying bitemark analysis or some evidence based on bite-mark were reverted and rebutted based on DNA or other evidence and in some Countries the bitemark was eventually banned from the Court.

Another relevant area of forensic odontology is the age estimation, for which we assist to an increasing demand (irregular immigration, asylum seekers, etc.), plenty of scientific publications. Some relevant guidelines (AGFAD, IOFOS, ABFO, etc.) are available, but also mixed guidelines or recommended approaches (physical examination, wrist and/or dental X-rays, Collar bone, psychological and/or social evaluation) and mixed expert are called to "estimate" such as physicians, pediatricians, forensic odontologists, radiologists, etc. Hence there are many risks of concerns for FOD due to not uniform laws, ethical issues (radiological exposition, physical and genital examination, consent for procedure, etc.). Many dental methods and different opinions in literature and the core question is when our results fulfill the legal requirements, especially when the legal rule is "beyond any reasonable doubts". In any case errors rate and false classifications over the threshold of age should be accurately reported to court or administrations. Despite different scientific opinions and recommendations, mixed approaches and legal framework, expert witnesses who served for age estimation cases resulted very rarely questioned in Court. Probably because most age estimations are requested for asylum seekers or adolescents involved in crimes that seldom can defend themselves in an effective way. Moreover some errors are reported in literature also in criminal cases and the heavy consequences endured by the minor claimed in Court. Hence expert must be qualified in age estimation procedures, highly familiar with different legal requirements for age assessment (administrative, criminal, e.g.) and act strictly in accordance with the national legal regulations or judicial dispositions to avoid risks of concerns.

Last but not the least the daily activity for most Forensic odontologists: body identification. Dental data are primary identifier and consistent literature and practical report have demonstrated the high reliability of dental identification of body both for single case than in mass disaster. So what issues? In my opinion the greatest issue is that dental data and forensic odontologist are too many times disregarded respect to other primary or secondary identifiers. Anyway there are some meaningful cases of bodies wrongly identified or exchanged. In Milan a man is identified and buried in Jewish cemetery, but really he is alive and imprisoned. The family sued the City Hall asking a compensation of 200 thousand euros. I hope an odontologist was not enrolled, but surely a dentist served in some critical cases, as the DVI team that was sentenced to have improperly identified Spanish Soldiers dead in a flight crash in Turkey (YAK 42- 2003- Tabronz).

Dental data are quite excellent identifier, forensic odontologists are qualified and familiar, have lots of consistent and sound recommendations, so we cannot make

mistakes otherwise a burden of negligence would be almost sure and the consequences very heavy.

Expertise in forensic odontology can be challenging in some cases or areas for several reasons and odontologists can be questioned. It is inadmissible for Odontologists to ignore medico-legal risks connected with “forensic” activity and the related insurance coverage.

About Education and training we can conclude that who serves as forensic odontologist must be first and foremost a dentist and should seek education, training and experience in forensic and legal-medicine. Moreover we need more requirements for licensing and standards of practicing FODs and requirements and standards will put many bricks in the wall of the quality assurance process. Scientific societies should establish and update guidelines and standards for different areas of forensic odontology, thus protecting odontologists when they serve as expert.

In this sense IOFOS is launching the initiative to update recommendations for quality assurance that everybody here knows. I hope the process will start soon with the help of dedicated groups of active and experienced forensic odontologists inside IOFOS and after an official revision by national society members of IOFOS, these new guidelines can be presented at the Triennial International conference that will be held in Leuven, September 2017.

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## **EVIDENCE IN MASS GRAVE EXHUMATIONS DENTAL ANTHROPOLOGY IN COURT**

### **Hrvoje Brkić**

Wars, alongside with traffic accidents, terrorist attacks and natural disasters are one of the forms of mass calamities. What they all have in common is the missing bodies that need to be found and identified. One of the main forensic procedures of identification, which is also the cheapest, the quickest and the most accurate one, is dental identification.

Available data reveals that dental identification was one of the methods used for identification of victims from the World War II (1), the Vietnamese War (2) and the Gulf War (3).

The breakdown of Yugoslavia situated in the western Balkans, led to a war which at first hit Croatia and soon after Bosnia and Herzegovina. During and after this War of

Independence 14.000 people went missing only in Croatia. Many of them were murdered and buried in mass graves.

One of the main missions of the government of the Republic of Croatia was to find the missing bodies and identify them. The mass graves were found with the help of surviving witnesses. Bodies were exhumed and transported to Zagreb to the Department of Forensic Medicine for post-mortem analysis and possible identification. The national team for identification of the victims was formed. It consisted of pathologists, anthropologists odontologist, biologists and supporting staff. Their mission was to use all classical forensic procedures for identification of the said human remains, including dental identification.

Forensic dentist used the AFBO procedure to analyze the dentition and all of the p.m. data were transferred to computer program CAMPI 4.0 for quick identification. A specially-educated team of volunteers collected the antemortem (a.m.) data of the victims. At the time of releasing the identity of the deceased, 89% of the exhumed bodies had been identified using a combination of forensic procedures.

Positive dental identification was accomplished in only 25% of the cases in which a.m. characteristics were available (dental cards, x-rays, gypsum models, photographs). In 65% percent of the cases the teeth were used to form dental profiles because there was no a.m. data. Those dental profiles contributed a great deal to the successful of the identification. In only 10% of the cases, the teeth were not used in identification because they were not found or because the jaws were toothless. For the assessment of the dental age Haaviko, Kvaal and Johanson's (4) methods were used.

The teeth were also the best medium for isolation of genome and mtDNA. As the bodies were in the ground for a long time, because of the decomposition of the soft tissues, only the skeleton (teeth and bones), the clothes and some personal items were persevered. Hard dental tissues allowed the preservation of the DNA inside the dental pulp and the dentin, and the DNA was successfully isolated from the odontoblasts.

The most common p.m. dental features were crowns and bridges (30%), metal and non-metal fillings (20%) and p.m. missing teeth (25%). Anthropological characteristics such as color and shape of the teeth and the position of the teeth helped in the identification (15%).

## **Conclusion**

During wars, most of the victims are civilians. This was also the case in the Homeland War in Croatia where mostly the old farmers died.

Many of the a.m. medical and dental data were destroyed, which also made the identification process more complicated. During exhumations the presence of a forensic dentist is recommended to supervise careful and correct procedures for exhumation of the jaw and teeth. Hereditary and environmental dental findings are very important in identification of human remains. All forms of identification carried by the victims are double checked to avoid any possible error in identification.

**Key words:** Forensic dentistry, Dental identification, Mass graves, Croatia

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## **THE ROLE OF THE EXPERT WITNESS IN DIFFERENT LEGAL SYSTEMS. CIVIL LAW VERSUS COMMON LAW**

### **Yvo Vermylen**

#### **United Kingdom - Adversarial system**

In the UK legal system laws are passed by Parliament, but also by Court decisions (precedents). This system has always been the case in civil cases and since the 18th century also in criminal cases.

In the adversarial system, the two sides are contesting about:

- Each side must decide whether to institute or defend proceedings
- What points are in issue
- Which arguments to rely upon
- What evidence should be presented

Parties call the witnesses and gather their evidence, including statements of witnesses, and decide which of them will appear in court. They also prepare oral evidence presentations. The parties run the case.

The Judge is independent, impartial and neutral. He is not very active (besides objections)

Possible defects of the system

- Both parties want to win even by tricky means, tactics that distort or suppress the truth.
- The wealth effect is felt – rich people can afford to hire very skilled trial counsel
- The system is too expensive and too complex

Duties of the expert witness

- Experts act independently/ not influenced by any party
- Experts give opinion evidence that is honest, scientifically based and unbiased
- Experts act only within their field of speciality

#### Testimony of the expert witness

- Oral testimony only in few cases (depending on the importance of the case)
- Most testimonies are brought in written form, with a statement of truth
- Testimony is accepted if the expert is a specialist in his field by knowledge, skill and experience
- Testimony must be based on a reliable methodology, understandable for the Jury and Judge.

Problem: Maintenance of independence from the instructing party – not all experts testify with scientific standards and ethical guidelines

#### Reforms

- Single experts in simple cases
- Education, prevention, peer reviews and sanctioning – guidelines issued by GMC for experts

### **Inquisitorial systems**

Almost universally written laws are passed by parliament. Experts are appointed by the Judge – expert-witness of the Court. All witnesses are heard. All parties are convoked to follow the entire expertise. They can express their point of view. Each party can send his medical expert (medical/dental advisor) to follow the investigation. Experts give advise to the Court in writing. The preliminary report of the Court expert is send to the parties, who can make their remarks. The expert witness has to answer these remarks in a motivated way and delivers the final report to the Court, signed and with the solemn oath that he did the investigation in a honest and conscientious way.

The Judge is active and follows closely the procedures. He sets a mission for the Court expert. He decides problems and gives legal advice that may arise during the investigation.

The court expert acts independently and impartially in a scientific way. He will rely on evidence based, unbiased publications. The report of the Court expert is only advice and the Judge can decide not to use it. His report is scientifically motivated and includes an answer to the remarks of the parties.

#### Possible problems

- The expert is not neutral (seldom)
- The expert is not qualified for the job
  - o Everyone with a dental degree can be appointed as an expert (in theory)
  - o Experts are not asked if they are qualified for the job
  - o There is no examination or cross examination of the experts
  - o Only very seldom will an expert be invited to present his report in Court and dental advisors are almost never heard (even if it is possible)

#### Reforms - Recommendation

Official lists of accepted Court experts

Education

Accreditation

Peer reviews

Review of the reports of the expert by an independent body

Sanctioning

## Defects of the system

- Wealth effect : rich people can pay the better lawyers, although today many persons have a Legal Aid Insurance
- Manipulation of the evidence
  - o Dental records are adjusted, rewritten afterwards
  - o Dental programs do not have systems to prevent this
  - o We suspect some fraud with dental dossiers but it is not easy to prove

## Scandinavia

Comprehensive social benefit scheme. Social services are normally free or subsidized. Quality of highest standard.

Injuries will not be tried under the rules of fault liability – all personal injuries (traffic accidents, work related patient, pharmaceutical) should be compensated. The Nordic model is based on insurance coverage (patient insurance system).

Health care is financed by the taxpayers, but there are also private insurances. In case of injuries the level of compensation is based on this basic health care.

The licensing system for professionals is operated by Public Health Care Authorities. They can control the system and sanction professionals in case of malpractice.

### Compensation for injured persons

- Fault liability: Under the rules of tort law – fault, damage, causation -> for non-covered treatments (seldom)
- No Fault Liability: most cases
  - Under patient insurance scheme
  - Under private insurance
- Compensation is according to the provisions foreseen in the Patient Insurance Scheme

### Compensation if:

- Experienced specialist standard is not achieved
- Failure of apparatus = strict liability
- Alternative treatment rule (When patient was injured and a equal good alternative exists avoiding the injuries)
- Reasonableness Rule: if the complications or injuries are more extensive than a patient should reasonably have to bear

### Causation:

- DK, SW, N – preponderance of the evidence
- SW – *conditio sine qua non* rule (but for test)

### Damages:

- lower than level of compensation in other countries
- Minor injuries not compensable – SW 300 E, DK 1300 E, N 1000 Euro

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### Herman Bernitz

#### Introduction

This talk covered important aspects of court preparation and presentation in an adversarial legal system. It addressed issues of double blind examination, macroscopic and microscopic analysis and understanding the differences between presenting evidence in skin bite mark cases and bite marks found in inanimate objects. Court reports were discussed highlighting the need to address warping, shrinkage and distortion, pattern association analysis, prevalence of dental features in the respective populations and lastly the importance of quality and quantity of evidence examined. The uniqueness of the human dentition was addressed: the inability of the substrate being bitten to reproduce the macroscopic and microscopic detail is the reason for not being able to recognise concordant features, and not the questioned uniqueness of the human dentition. The talk also addressed the difficulties in being cross examined by the defence in a globalised community where anti-bite mark literature is found both in the scientific and lay press. Real case studies were used to illustrate core principals.

#### South African law and the legal system

South African Law is composed of five layers namely: Roman-Dutch Law as common law; Roman Dutch Law as civil law; Tribal Law; Islamic Law and English Law<sup>1</sup>. South Africa uses the adversarial legal system based primarily on common law but augmented by statutory law. A common law system is the system of jurisprudence that is based on the doctrine of judicial precedent, the principle under which the lower courts must follow the decisions of the higher courts, rather than on statutory laws. Civil law is a legal system whereof the most prevalent feature is that its core principles are codified into a system which serves as the primary source of law. The South African adversarial system is a legal system used where the two advocates represent their parties' positions before a judge, who attempts to determine the truth of the case.

#### The expert witness

Bite mark evidence, irrespective of the local legal requirements, should be based on the "Daubert standards". The talk explained how bite mark preparation and presentation in South Africa followed these principals except for the last which required general acceptance within the relevant scientific community. Differing reasons for non-acceptance was discussed. The questionable uniqueness of the human dentition lies at the core of the problem. The talk expounded on the fact that the first fundamental rule for practicing forensic comparative science was the generalised law that, "Every natural pattern is unique" or "Nature never repeats exactly"<sup>2</sup> and that "At a certain level of magnification, all natural patterns will be different."<sup>3</sup> Quoting Pretty<sup>4</sup> "Studies are required to determine not that the human dentition is unique, but how this asserted uniqueness is represented on human skin and other substances".

The human dentition is unique but this uniqueness cannot necessarily be transferred to the skin or inanimate objects during the biting process. It is thus important to understand that the core issue in bite mark analysis remains the number of recognisable features present in the bite mark, the quality of the mark produced and the quantity of evidence for the analysis.<sup>5</sup>

The next point which was addressed was the fact that irresponsible publications, both lay and scientific had a profound effect on giving evidence across the globe. It was difficult to understand how bite mark analysis could be overturned by re-examining DNA evidence, when DNA analysis should be an integral part of any bite mark analysis in the first place. The double swab technique, described by Sweet *et al* in 1997, has been regarded by informed bite mark experts as part and parcel of any bite mark analysis. So to read that convictions are being overturned by fresh DNA analysis is a reflection of poor training and not scientific method.

The talk then went into detail regarding the presentation of evidence before the courts. The importance of collecting the evidence according to recognised protocols, taking DNA swabs, analysing the evidence according to "Best International Practice", and having the evidence re-evaluated by a second expert was stressed. The author highlighted the three fundamental pillars of bitemark analysis namely: the presence of recognisable dental features within the bite mark, the quality thereof and the quantity of evidence. It was also highlighted that the primary ethical responsibility of forensic scientists is to communicate their findings and expert opinions clearly and correctly to audiences that typically do not have any scientific training the field of forensic odontology.<sup>8</sup>

## Conclusion

The forensic Odontologist gives a scientific evaluation of the facts at hand, and the judge hands down judgement and the sentence based on your scientific analysis. **We do not pronounce guilt!!**<sup>7</sup>

***"Injustice anywhere is a threat to justice everywhere." Martin Luther King, Jr.***

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## **INTERPOL DVI FORENSIC ODONTOLOGY SUB WORKING GROUP**

### **Musings of the immediate past Chairman**

I stepped down from the position of Chair of the group in May this year (2016), after 6 years, to allow some 'fresh blood' to stamp its influence, on the group.

It has been an interesting time with the inevitable ups and downs. It was certainly a great honor and exciting. Like so many such groups the work load inevitably falls into the laps of a few, so leading up to the (now) 'conference' or previous 'standing committee' meeting in May each year, it was usually a struggle to get everything in order, whilst working one's regular 'day job'.

The reward was paid out every May at the annual gathering. It was a rare, probably unique occasion when Forensic Odontologists met under the auspices of the INTERPOL DVI Working Group (previously Standing Committee).

The Odontology Group is small enough to enable us to all sit around a table (albeit an ever larger table), enjoying an open relaxed atmosphere of learning, discussion and development. Development not only of individuals' expertise, but also that of the field of Forensic Odontology. These odontology experiences within the larger INTERPOL DVI community also provide a unique opportunity to rub shoulders with not only international odontology colleagues but colleagues in the other areas of DVI associated disciplines such as pathologists, anthropologists, and geneticists, the counseling and family liaison practitioners, political, jurisdictional and diplomatic exigencies and finally all encapsulated within the multiple aspects of police activity wound into a DVI incident. The latter ranging from investigative, organisational, logistical, scene management and safety, just to name a few and of courses most importantly all for the identification of the victims.

The INTERPOL DVI philosophy is the internationally recognized gold standard, even in regions where the resources are not always available, and or the processes not used routinely. INTERPOL has developed not only a **standard** but also a **process** for achieving the standard and finally the **systems** to enable the process to be enacted.

The annual meeting sets out to discuss events, advances and to learn from our peers' experiences – what worked but more importantly what didn't and why, what's new and why it is better, and all in an open non-judgmental, non-commercial atmosphere.

I assumed the chairmanship as the recommendations arising from the largest and longest sustained international DVI event (Indian Ocean Tsunami of December 2004) were being implemented and activated. This was exciting because INTERPOL was projecting the INTERPOL DVI systems into the 21<sup>st</sup> century with the refining of a robust standardised and computerised program that could be dependably used internationally. Much of this program matching capacity is based on odontology. The standard and process are reviewed every 3-4 years but the 2013/2014 review was particularly 'in depth' to account for the increasing international nature of DVI events and increasing use of the INTERPOL DVI process. Recognition of social, religious, and legal sensitivities internationally was also given far greater attention, as was the rapidly evolving technology. All of this in the wake of lessons learnt and experiences arising from the largest international DVI response ever. The Odontology Sub Working Group played an important part in this process. Odontology continues to play a significant role in the identification process in spite of new technologies.

The low point was the badly implemented and unfortunate decision to reorganise the structure of the steering group of the INTERPOL DVI committee. Not only were the changes implemented without common politeness but were inappropriate and this after several years is becoming obvious to those now in the steering or management group. Prior to the changes the Sciences (Pathology/Genetics, and Odontology) had a far more elevated position within the steering/management group. Without any discussion and in a coup like manner the Sciences were relegated to a much less significant position within the steering group. What was pointed out by the Sciences at the time is now becoming evident with a disconnect between the policing and scientific sides of management of the DVI group. One can only hope that future (Police) management will realise the fractured input pathway for the Sciences at management level. Time will tell.

I do not want to conclude on a negative comment, but the 'I' in DVI is the 'collective sciences' of identification

Much has been learned, and every DVI event should be used as a learning tool, that societies subsequently afflicted by disaster events benefit from the experiences and lessons of the past. INTERPOL and the Odontology sub working group are in a unique and privileged position to provide the services of highly trained and experienced experts and the resources to help overcome the disruption from the individual through to international perspective, when groups of humans no matter where on earth are affected by disaster. Identity is one of the basic rights of each and every person living or deceased, on this planet.

We odontologists, are privileged to play an important part in helping attain this basic right.

**Dr. Alain Middleton**

**Immediate past Chair INTERPOL DVI Forensic Odontology working group**



## Forensic Meetings and Courses

Course in Forensic Odontology

### Disaster Victim Identification

With the patronage of IOFOS

Organised by  
*Department of Forensic Medicine*  
Aarhus University



October 17<sup>th</sup> to October 21<sup>st</sup>, 2016

**Aim of the course:**

- To enable the dentist to participate in/perform a post-mortem dental examination
- To enable the dentist to structure ante-mortem dental records according to the needs in relation to an identification
- To enable the dentist to participate in the comparison of ante- and post-mortem dental data and in the establishment of a dental identity.
- To provide insight into the role of the forensic odontologist in a DVI (disaster victim identification) team
- To provide an introduction to software used for information registration, search and comparisons of data following disasters with a large number of victims.

**Course structure:**

Interaction between lectures covering the theoretical background, and hands-on exercises including PM-examination and registrations, AM-registrations, and a mock-accident providing introduction to data entry and search strategies in DVI software system.

**Special topics:** PM-examination; PM radiology, clinical photography, special investigations  
AM-registrations  
Aspects of age estimation  
Anthropological aspects of identification  
Introduction to other primary identifiers (fingerprints, DNA)  
DVI principles; reconciliation and conclusion  
DVI, major accidents, mass graves  
Occupational aspects of forensic odontology  
Short introduction to entomology in forensic sciences

**Participants:** Dentists with special interest in Forensic Odontology, with or without previous knowledge and/or experience

**Language:** English



For more information and updates on conference planning, check out their website at [www.iafstoronto2017.com](http://www.iafstoronto2017.com) and follow them on Facebook (International Association of Forensic Sciences) and Twitter (@IAFS2017)

# Triennial IOFOS Conference

## Forensic Odontology

September 14th-15th 2017 / Workshops September 13th and 16th 2017  
*Leuven, Belgium*

*Call for abstracts*  
*oral/poster presentation, papers*  
*Submission deadline*  
*December 15th 2016*

*Local organizer:*  
**Oral Health Sciences, unit Forensic Dentistry,**  
**KU Leuven, Belgium**

*Patronage:*  
**Vlaamse Vereniging Tandheelkundige Experten**

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