

Int Poster J Dent Oral Med 2004, Vol 6 No 01, Poster 213

International Poster Journal

The effects of high temperatures on human teeth and dentures

IP

Conclusions regarding the degree on destruction and the influence of time

Language: English

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Date/Event/Venue:

September, 27-28th, 2001 XIème Congrès de l'A.F.I.O., l'Amphithéâtre du Musée des Beaux Arts d'Orleans Orleans/France

Introduction

The identification of burned bodies correlates with an adequate quality and quantity of traces. This needs every effort by the rescue teams, the investigators, i.e. police, fire-fighters, forensic medicines and dentists at the place of the event. Dental photography, radiography and morphological methods to stabilize and save the fragile human skull are described.

Objectives

The purpose of this study was to examine the resistance of teeth and restorative materials to high temperatures and for forensic identification purposes (Benthaus and Teige 1998, Grundmann and Rötzscher 2000, Günther and Schmidt 1953, Rötzscher 2000, Roussow et al. 1999, Yamamoto et al. 1990).

Material and Methods

Five samples of teeth and four samples of dental materials were heated at the following temperatures (Table 1a and b):

Time (in Tem; min)	perature Effects			
5 400		ongitudinally fissures in the crown of t etal shine".	he front teeth with partial loss of continuity	and black glowing
15 400		arcoal grey" of the extremely destroye lentinum splinter. Amalgam fillings blist	d front teeth. Enamel slack, though invisible ered, still in the cavity.	carbonization.
30 400		our. Molars show only some fissures. A	arbonized. Dentinum black coloured (carbon malgam still in the cavity. Rests of the pulp	
60 400		itudinally fissures in the root. Spongio at the collum dentis. Enamel "like thin	sa more dark than the compacta. Teeth not nble" removable.	more in the alveole
45-70 1000		ally carbonized. Cement fillings hard, v Igam: small bullets. Phosphat cement	risible in the ash. Amalgam amalgamize gold fillings dazzling white.	fillings. Silver and
Table 1a: Ti	me (in minutes), T	emperature (in °Celsius), Effects (Gün	ther and Schmidt 1953)	
Material	Time (in minutes)		
	8-10	13-16	20-25	45-75
Temporary fillings	fallen out of the front teeth	not to be found in general	-	-
Cemet filling	s constant	fallen out of the front teeth	in side teeth constant	white and hard in the ash
Amalgam	traces of mercur in front teeth	y Ag-, Au-amalgam constant in molars, Cu-amalgam yellow-brown	not to be found in general	-
Castin materials	loosening in the cavity	fallen out of the front teeth	fallen out in general	metal bullets in the ash
Metal crowns	-	Au red coloured, Ag-Pd yellow-red coloured	rest of enamel at the margin, solder separated, Ag-Pd rough and dark grey	Au "bullets", Ag-Pd intact
Ceramic- crowns	burst or displace	d burst, teeth intact	-	solid crowns resp. facettes intact
Acrylic restauration	front teeth s burned	teeth until praemolars burned, anterior parts of dentures burned	-	total burned

Table 1b: Effects by post-mortal temperatures on dentures (1000°-1100° Celsius) (Günther and Schmidt 1953).

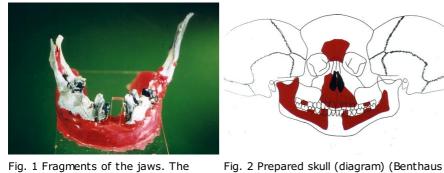
- 0 no damages
- 1 front teeth damaged (one or both jaws)
- 2 front and side teeth damaged, unilateral (one or both jaws)
- 3 front and side teeth damaged, bilateral (one or both jaws)
- 4 fragments of teh jaws, the teeth and/or roots included, remain

5 no teeth remain

Table 2. Degrees on destruction on human teeth by temperature (6 categories) (Andersen et al. 1995)

and Teige 1998).

Sample 1



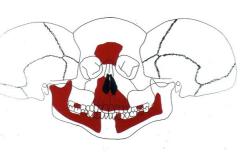


Fig. 1 Fragments of the jaws. The teeth and roots included, remain (degree 4). Front teeth are partial destroyed. Enamel broken, carbonized. Dentinum black coloured (carbonized), changing to white colour. Molars show only some fissures. Rests of the pulp. White ash in the cavum dentis (30 min, 400° Celsius).

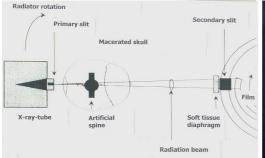


Fig. 3 The radiological technique (diagram) (Benthaus and Teige 1998).



Fig. 4 The dissected lower jaw (pantomography) (Benthaus and Teige 1998).

Sample 2



Fig. 5 The skull of a 40-years old man, (burned Fig. 6 View of the lower jaw after removal in his flat). The front teeth of both jaws are damaged (degree 1). Black "harcoal grey" of the extremely destroyed front teeth (15 min, 400° Celsius) (Grundmann and Rötzscher 2000).



(left side) (Grundmann and Rötzscher 2000).

Sample 3



Fig. 7 The lower jaw of a 40 years old man (burned in his car on a highway). After removal (Grundmann and Rötzscher 2000).

Fig. 8 The lower jaw. After maceration (Grundmann and Rötzscher 2000). No destruction on teeth by temperature (degree 0).

Results

The expertness leads to conclusions regarding the degree on destruction of teeth to the influence of temperature and time. Combinations of dental restorations are as unique as fingerprints and their radiographic morphology as well as the types of filling materials used are often the main features in identification. Gold, silver amalgam and silicate fillings have varying resistances to high temperatures and are often unaffected even after prolonged exposure to fire.

Discussion and Conclusions

Positive identification of burned bodies by dental radiological and morphological methods is possible after stabilizing and saving the fragile human skull. The degrees on destruction are transferred to the P-M-DVI-Form (pink) together with the information where the victim (house, car, boat, aeroplane, train etc.) was found at the time of the event.

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Abbreviations

 ${\sf P-M-DVI-Form} = {\sf Post-mortem-Disaster-Victim-Identification-Form}$

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Poster Faksimile:

Deutsche Gesellschaft für Zahn-, filund-und Kleferheilkunde Deutsche Gesellschaft für Rechtsmedizin 1800 ARBEITSKREIS FÜR FORENSISCHE ODONTO-STONATOLOGIE

BIDDERTO-STOTATOLOGIE Abstract Srigt stecht, fragments of the jaws, of the skull and resolute elements used in modern demail practice are important for identification purposes of deal bodies. These individual specific structures are free essistant and remain redepade. They shink significantly and are kiely to all out of the others possible to identify the white filling materials used to restore toeth by their radiopadity and morphology.

radioacols and morphology. **Enhanciancian** The strendscion of burned backs correlates with an acquiret quality and quality of traces. This needs every effects by the rescue baars, the investigations, i.e. pakes, firen-fighten, torensis medicines and dentibal at the pression geneticines and dentibal at the pression and the strend server relacipandry and morphological methods to stability and server the fisque human situal are described. The purpose of thesh sub ymas to examine the resistance of betch and testication endowed to the fig. when fictuation purposes. (Berchaus and Figure 1956, curves and Schmidt 1953, Rouscher 2000, Roussow et al. 1999, Yamanoto et al. 1990).

Proceedings Sample 1 Phy, 1 Programs of the jaws. The teeth and roces included, mmain (degrie 4), Earned building, canobiased, benform pace, coopured (carbonised), onlinging to halo aciduar. Mains show only some fissures, Rests of the pulse, White ashin the calvair derist (Jhm et, 400° Calisus) Restandation of the fragments using red certain and (Benmas and Tege 1956)



Fig. 2 Prepared skull (diagram) (Benthaus and Teige 1998)



Fig. 3 The radiological technique (diegram) (Benthaus and Teige 1998)



Fig. 4 The dissected lower Jaw (pantomography) (Benthaus and Toige (panto 1996) 1 generation 1



Sample 3 Fig. 7 The lower jaw of a 40 years old man (burned in his car on a highway). After removal (Grundmann and Rötscher 2000)

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Fig. 8 The lower jaw. After maceration (Grundmann and Rotzscher 2000)

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Xième Congrès de l'A.F.I.O., 27 et 28 Septembre 2001 à l'Amphithéêtre du Musée des Beaux Arts d'Orleans, France

A contribution of the German Association of Forensk Odonto-Stomatology

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THE EFFECTS OF HIGH TEMPERATURES ON HUMAN TEETH AND DENTURES. CONCLUSIONS REGARDING THE DEGREE ON DESTRUCTION AND THE INFLUENCE OF TIME.

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Sample 2 Fig. 5 The skell of a 40-years old men, (surred in his fact). The finat tech of both javs are damaged (logice 1), of the action dy Both, and floor tech (15 min, 40¹⁰ Celasis) (Grundmann and Rottscher 2000)

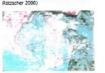


Fig. 6 View of the lower jaw after removal (left side) (Grundmann and Rotzscher 2000)



Table 2

Degrees on destruction on human teeth by temperature (6 categories) (Andersen et al. 1995):

0	no damagità
	front teeth damaged (one or both jaws)
,	front and side teeth damaged, unilateral (one or both jaws)
3	front and side teeth damaged, bilateral (one or both jaws)
4	fragments of the jaws, the teeth and/or roots included, remain
5	no teeth remain

Abbreviations P-M-QVI-Form = Post-mortem-Disaster-Victim-Identification-Form

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Materials and Nethods Fire samples of texth and four samples of dental materials were heated at the following temperatures: Tratie II and bit

Table 1a

Time (in min)	Temperature	Effects
5	400	Extreme longitudinally fissures in the crown of the front teeth with partial loss of continuity and black glowing plague "metal shine".
15	400	Black "charcoal grey" of the extremely destroyed front techt. Dremel slack, though invisible carbonication. Exposed dentinum splinter. Amargam fillings bistered, still in the conty.
30	400	Front toeth totally destroyed. Enamel broken, carbonized. Deminum black colourid (carbonized), changing to white colour. Molars show only some fissures. Amalgam shill in the carbo, Rests of the pulp. White ash in the carum dentils.
60	400	Deep longitudinally fissures in the root. Sponglosa more dark than the compacta. Teeth not more in the alveole or broken at the colum dentis. Ename! "like thimble" removable.
45-70	1000-1100	Teeth totally carbonized, Cement fillings hand, visible in the ash. Amalgam amalgamize gold fillings. Silver and silver amalgam; small bullets. Phosphat cement fillings dazzling white.

Table 1b

Effects by post-mortal temperatures on dentures (1000*-1100* Gelsus) (Günther and Schmidt 1953):

Material	1	ime (in minutes)		
	6-10	13-16	20-25	45-75
Temporary fillings	fallen out of the front seeth	not to be found in general		
Centert. fillings	constant	fallen out of the front teeth	in side teeth constant	white and hard in the ash
Amaigam	traces of mercury in front teeth	Ag-, Au-amaigam constant in molars, Cu-amaigam yellow-brown	not to be found in general	
Casting materials	loosening in the cavity	fallen out of the front teeth	fallen out in general	metal bullets in the ash
Metal crowns	-	Au red caloured, Ag-Pd yellow-red coloured	rests of oramel at the margin, solder separated, Ag- Pd rough and dark grey	Au "bulets", Ag-Pd intact
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Acrylic restaurations	front teeth burned	teeth until praemolars burned, anterior parts of dentures burned	•	total burned

Results and Conclusions The experimes leads to conclusions regarding the degree on destruction of levelh is the influence of temporature and into. Confinations of demail restantions are as unique as fregorismits and their radiographic interplations and use in the filling makenda and de do the time main leadures in destructure. Organizations and the influence of the interplation of the influence of the interplation interplation of the interplation is during and indeplation of the influence institutions of the interplation by during the fragile human skull. The degree interplation is possible after statisticity and saving the fragile human skull. The degree information where the vision (bouce, car, book, beneficience) and the information where the vision (bouce, car, book, beneficience), that etc.) was found at the stree of the event. -----

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