lasse	lelting egime hx°C	SiO_2	ZrO_2	SrO	ZnO	BaO	Al_2O_3	CaO	Na_2O	CaF_2	B_2O_3	P_2O_5
G1	0x125	30	-	-	15	0.4	30	10	5	9.6	-	-
G2	0x115	43	-	-	5	-	10	11	9	15	-	7
G3	0x140	50	20	-	-	-	10	5	10	5	-	-
G4	0x135	40	-	-	30	-	5	10	5	-	10	-
G5	0x130	40	8	30	-	-	5	12	-	5	-	-
G6	5x125	40	-	-	-	30	10	5	-	5	5	5

TABLE 1. The chemical composition [wt %] and the melting regime (time x temperature) of glasses

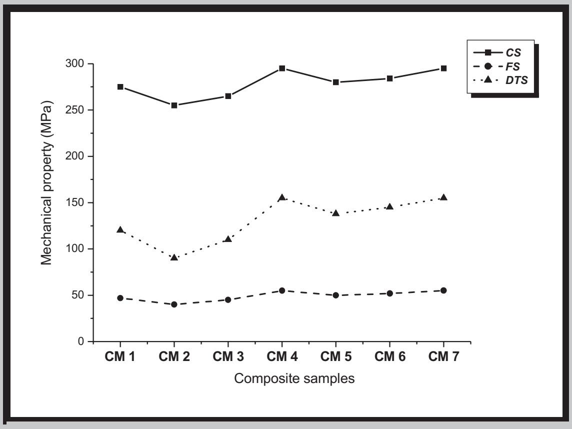

FIG. 1. The compressive strength (CS), diametral tensile strenght (DTS) and flexural strenght (FS) values for the composites samples.

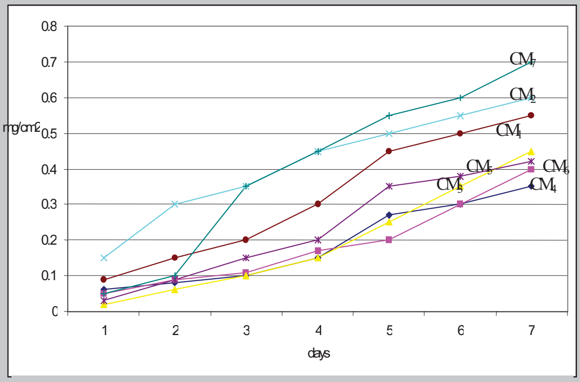

FIG. 2. The water absorption values for composites samples.

Conclusions

The results of the determinations for the physiognomic component of the mixed crowns were analysed in comparison with the control sample, hardened only through photochemical initiation (CM7). The highest mechanical strength values (CS, FS, DTS) were obtained for the baro-thermo-photopolymerized CM4 composite. The water sorption test indirectly illustrates that the interfacial bonds of the organic filler are not damaged; the water sorption values are situated between 0.3 and 0.7 mg/cm^2 for CM4 and CM7 composites. The results of the metal-composite adhesion using Silicoater MD as conditioning system show that the CM4 composite is recommended for the mixed crowns with optimal strenght in time. Taking into consideration the mechanical properties and the water sorption value of the postcured composite CM4, this one was proposed for further investigations such as toxicological and clinical tests in order to be used as physiognomic component of the metallo-polymeric prostheses.

Paste	G1	G2	G3	G4	G5	G6	Quartz
CM1	60						40
CM2		60					40
CM3			60				40
CM4				60			40
CM5					60		40
CM6						60	40
CM7		50					50

TABLE 2. The composition of the inorganic filler for light-curing composite resins [wt%].

Conditioning system	Composites						
	CM1	CM2	CM3	CM4	CM5	CM6	CM7
Silicoater MD	20 %	18 %	10 %	0 %	10 %	14 %	40 %

TABLE 3. Adhesion through thermal treatment alternative.

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BIOMATERILAS BASED ON POLYSILOXANES AND GLASS FIBERS

T.Suchy*,K.Balik**, M. Sochor*, M.Cerny**, R.Sedlacek*, V.Pesakova***, H.Hulejova*****

*CTU in Prague, Faculty of Mechanical Engineering, Department of Mechanics, Czech Republic
**Institute of Rock Structure and Mechanics, Academy of Sciences of the Czech Republic, Prague, CR
***Institute of Rheumatism, Prague, CR
Laboratory of Human Biomechanics, CTU in Prague, Fac. of Mechanical Eng. Dept. of Mechanics, Technicka 4, 166 07, Prague 6, Czech Republic
suchyt@biomed.fsid.cvut.cz

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Introduction

The aim of our study is to design and to produce biomaterial with mechanical and biocompatibile properties that should approach as much as possible the properties of the human bone, the strength characteristics should be at least the same and the modulus of elasticity should be close to the value characterizing the human bone. It should have a sufficient porosity, to enhance a bone growth. However, by the biocompatibility is meant now not only a passive biocompatibility or an inertness that is the facilitation of the growth of the tissue around the implant without any signs of toxicity but especially the bioactivity, i. e. the assurance of a specific biological response on the interface of the material, resulting in the formation of a solid bond between the material and the tissue. In this respect we have designed methodology for composite surface modification (see FIG.1), prepared samples with different open porosity and studied its biological response on the interface between implants and bone tissue [1,2].

Materials and methods

The LUKOSIL 901 (L901) siloxane precursors and LUKOSIL M130 (M130) resins (commercial products of Lucebni zavody Kolín, Czech Republic) were used. The composites were prepared from plain-woven cloth V240 (E-glass, VETROTEX, Litomysl, Czech Republic), and from satin-woven fabric 21055 (R-glass, VETROTEX, Saint Gobain, France). The soaked prepregs were stacked, cured at 250°C, then cut to pieces of the required size, and cured/ pyrolyzed at 200-350°C in nitrogen. The analysis of the properties of the glass composites tested represented the testing of three types of samples in the production of which various combinations of the basic precursors were used.

Mechanical properties

Mechanical properties of glass composites were obtained by three methods. Young's modulus (Eres.) and shear modulus (Gres.) in elasticity were measured by using the electrodynamic resonant frequency tester ERUDITE. By a four-point bending arrangement on the material tester INSPEKT were determined Young's modulus (E4p.b.) and the flexural strength (R_m). Young's modulus (Estr.) and limit stress values (Rstr.) were also determined on the material tester Mini Bionix (MTS Syst. Corp.), while applying compressive loading force and using strain gauges (HBM Wägetechnik, GMBH). See TABLE 1.

Biological properties

Materials	Vf	Rm	Eres.	E4p.b.	Estr.	Gres.	Rstr.
	[%]	[MPa]	[GPa]	[GPa]	[GPa]	[GPa]	[MPa]
E-glass + M130	51	200.81	25.38	23.70	32.26	2.39	80.39
E-glass + L901	52	195.75	27.70	25.70	27.3	2.77	119.9
R-glass + M130	65	97.9	16.20	12.22	14.54	5.79	52.95

TABLE 1. Mechanical properties of glass. composites.

Biological properties were observed in tests - adherence, proliferation and metabolic activity of cells growing on the tested materials, and levels of inflammatory cytokines exprimed during the cultivation into the cell medium. The medium of this cultivation experiment was performed for cytokines TNF-α, IL-1β detection using immuno-chemiluminescence method of the analyzer Immulite (DCP, Los Angeles, USA).

Analysis of surface structure influence

Based on previous tests we've chosen the composite material with a sufficient compromise between both mechanical and biological properties, R-glass+M130, and prepared samples with three different pores size, namely 250-500μm, 500-750μm, <750μm. Tests of interfacial bonding strength have been performed (Pull-off tests). These tests based on Nakamura's Method [3] (see FIG.2) have been performed to compare composite materials with different surface structure. The aim is to determine material with best "bone-friendly" surface and material with surface which is inert for bone ingrowth, i.e. to determine an influence of pore size and bone ingrowth. Another tests were performed by wettability testing of samples with different surface structure.

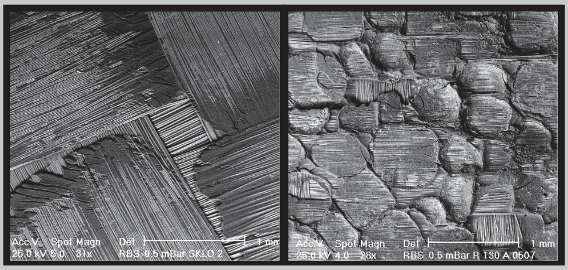

FIG. 1. Untreated /left/ and treated surface with pores dimension app. 500-750 mm.

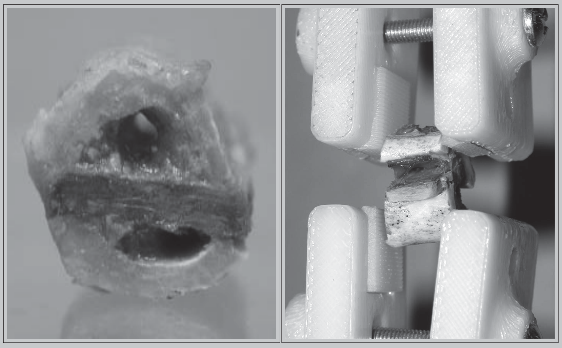

FIG. 2. A sample for Pull-off tests (rabbit bone with composite sample, 8 weeks after implantation).

Results

Based on these analyses we're able to select a material with sufficient mechanical and biological properties and inert surface for applications in the form of connective elements (e.g. bone plates for treatment of long bones) or material with sufficient mechanical and biological properties and open surface contributing to solid bond between implant and bone tissue for applications in the form of substitutive elements.

Conclusions and discussion

Composites based on glass fibers and siloxane resins promise to achieve good biomechanical properties while requiring a significantly lower cost. Pore-size dependence they can be potentially used in the form of connective, substitutive or filling elements.

Acknowledgements

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METHOD MODIFICATION FOR STUDYING OF ORAL FLUID MICRO-CRYSTALLIZATION FOR PATIENTS WITH PURULENT-INFLAMMATORY DISEASES IN CRANIO-MAXILLOFACIAL AREA

I.O. Pohodenko-Chudakova, Y.M. Kazakova

Belarussian State Medical University, Belarussian Collaborating Center of EACMFS

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The test of oral fluid microcrystalization is well known and is widely used as additional method for diseases in cranio-maxillofacial area testing [1,3]. Many authors underlined its simplicity, objective character, reliability, repeatability and absolute innocence. The fact that this test has no recurrent, physiological or other restrictions is very important [2]. Oral fluid is one of the liquid mediums of human body. It provides homeostasis of organs characteristics and there compositions, tissues of the oral cavity [3]. In many literature sources it is mentioned that tissues of the oral cavity and oral fluid are in dynamic balance. So, pathological processes arising and developing in cranio-maxillofacial area can influence on the quantitative and qualitative data of the oral fluid. Many authors told about changes of that physical index of the natural biological medium of the oral cavity while diseases in cranio-maxillofacial area. But till now changes of the oral fluid microcrystalization while arising and developing of purulent and inflammatory diseases in cranio-maxillofacial area are not practically studied. In fact, there are no manuscripts about different morphological characteristics of crystalline rete of a drop of the oral fluid depending on nosology. Last time, the nature of purulent-inflammatory processes is changed. Hard forms of the purulent infections when it is sweeping on some anatomic areas are often met in very day practice, for example, complications as septicaemia, mediastinitis, septic, asphyksia and other [4]. During examination of the oral fluid microcrystallization for patients with purulent-inflammatory diseases in cranio-maxillofacial area and of changes of that physical index while treatment course, in the frame of the same samples of the oral fluid we have mentioned two types, in some cases - three types of the microcrystallization. Taking into consideration that this fact can have negative effects on the prognostics, diagnostics and finally on the treatment course, we had necessity to modify that test for patients testing with purulent-inflammatory diseases in cranio-maxillofacial area.

Aim of this work

is to modify the method of studying of the oral fluid microcrystalization and its application for patients with purulent inflammatory diseases in cranio-maxillofacial area.

Materials and methods

We have examined 43 patients at the age of 16-36 years old with purulent-inflammatory diseases in cranio-maxillofacial area which passed the treatment course in the 2nd department of cranio-maxillofacial surgery in the hospital ? 9 of Minsk at the period from 1999 to 2005 years. According to the nosology and localization of the purulent-inflammatory processes, all patients were divided into two groups. I-st group (22 patients) was represented by patients with ptherygoideus mabdibularis. II-nd group (21 patients) was composed of patients with mylohyoideus area abscess. Group of control composed of 24 practically healthy people. While examination we have paid attention on the fact that total status of the patient and some aspects of the oral cavity could influence on the composition and properties of the oral fluid. All patients had no systemic diseases, injuries, operations which demand rehabilitation course in the past history. Pathology of the mucous tunic of the oral cavity was excluded. There was not found teeth anomalous position and jaw development, false teeth, amalgam temporary stopping were lacking. All patients had middle and high level of caries intensity. These patients correlation was equal. Methods by P.A.Leus (1977) [5] have been used to study prepared samples for microcrystalization examination of the oral fluid. Oral fluid was gathered in oral cavity by sterile pipette. After that three drops of the oral fluid have been put on a glass. Made samples of the oral fluid were dried with standard room temperature. After, they were examined under microscope with magnification of 10 which let see the content of the whole drop. Type of microcrystallization was established according to the indexes by L.A.Dubrovina (1988) [3]. As a result we have taken the pictures of the drops which we have met twice on the same glass. First type of microcrystallization was represented by long, prismatic, radial form crystals. Second type crystals were as isothermal ones, without clear orientation. Third type - separated, small, alone, non oriented crystals. In order to appreciate the received results we have divided every drop in four sectarians (I, II, III, IV). Also, we have determined the type of microcrystalization of the oral fluid for every sectarian and have calculated the arithmetic mean of the microcrystallization of every drop of the oral fluid by formula:
where:

$$M = \frac{a1 + a2 + a3 + a4}{4}$$

M - arithmetic mean of the microcrystallization of a drop of the oral fluid; a1, a2, a3, a4 - microcrystallization index of a sectarian of the oral fluid drop; 4 - quantity of the examined sectarians.
Arithmetic mean was calculated for three indexes in every sample. All data received while the experiment have been worked up on the PC "Pentium 4" in "Microsoft Excel".

Results and discussions

Examination results data received by method of microcrystalization study of the oral fluid by P.A.Leus showed all patients have three types of microcrystallization of the oral fluid. First type of microcrystalization have been determined for three persons (7% from the total number of examined patients), second type - for 11 persons (26%), third type - for 29 persons (67%). Microcrystallization types of the oral fluid are classified in the patients groups according