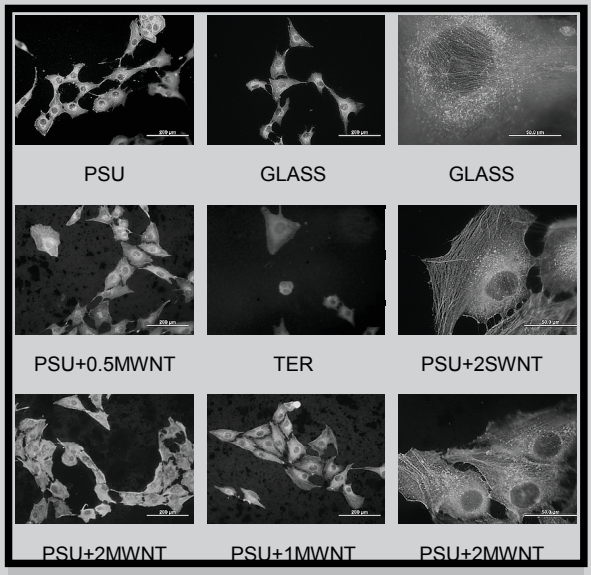

FIG.3. Immunoflurescence staining of β-actin in MG 63 cells grown for 3 days on microscopic glass coverslips (Glass), polysulphone (PSU), PSU mixed with 2 wt% of single-walled carbon nanotubes (PSU + 2 SWNT), terpolymer of polytetrafluorethylene-polyvinyldifluoride-polypropylene (TER), and PSU mixed with 0.5, 1 or 2 wt% of multi-walled carbon nanotubes (PSU + 0.5 MWNT, PSU + 1 MWNT and PSU + 2 MWNT, respectively). Fluorescence microscope Olympus IX 50, digital camera DP 70.

after seeding, it was at least 85% and 90%, respectively, in all tested samples.

Conclusion

Polysulfone supplemented with single-walled or multi-walled carbon nanotubes supported the adhesion, spreading and subsequent growth of human osteoblast-like MG 63 cells.

Acknowledgement

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THE STUDY OF THE SURFACE PROPERTIES OF C/C COMPOSITES

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Introduction

2D carbon-carbon composites (C-C) without or with the surface layer of pyrolytic carbon (graphite) is very prospective material due to its exclusive properties. This material system is often used in biomedical applications (bone and joint implants), machinery (friction-bearing parts) and in the aircraft industry (parts of the braking system). The aim of this work was to define the coefficient of friction and wear resistance of composite and of PyG layer.

Samples preparation

The investigated composites (IRSM AS CR, Prague, CR) were prepared from commercially available plain-weave carbon fabric made of the general purpose ex-PAN carbon fibre Toray T800. A stack of 8 layers of the fabric, soaked in an ethanol solution of phenol-formaldehyde resin Umaform LE (SYNPO Ltd., Pardubice, CR), was cured at 120°C. During its carbonization at 1000°C in nitrogen, conversion of the resin matrix to glass-like carbon took place; it was followed by high-temperature treatment of the samples at 2200°C in an argon environment. Pyrolytic carbon (graphite) (PyG) forms as result of pyrolysis, a chemical process where the bonds among the atoms of hydrocarbon molecules are broken due to high temperature. Partially crystalline pyrolytic carbon (pyrolytic graphite) layer of thickness about 0.5 mm was produced at process temperature 1900°C and partial pressure p=4Pa of butan+H_2 mixture. We studied the samples both with native ("as prepared") surfaces and also with surfaces prepared by grinding using metallographic paper of 4000 grade, to obtain samples with various roughnesses and chemistry. By this way, we have prepared 4 types of samples (I – IV) with 2 types of surface chemistry (C-C and PyG) and with various roughness – unground and ground.

Results and discussion

The measurements were realized using conventional tribometer in natural atmosphere (dry wear). The measurements demonstrate the excellent tribological properties of the surfaces, especially the very low friction coefficient and the very good wear resistance of the surface of the pyrolytic carbon layer on the polished 2D C-C composite.

To explain these measurements we also measured the surface roughness, microhardnes and surface energy of both the composite and the layer. The roughness and heterogeneity are common features of all real surfaces even if they were prepared very carefully. We have found, that both the type of surface and its roughness have the influence on the time dependence of friction and, moreover, the roughness has relatively low influence on the wear. Thus, the properties influencing the wear should be the hardness

and surface energy (wettability) of the actual surface. The hardness is different comparing the C-C (matrix and fibre, respectively) and PyG layer. The problem of wettability is in fact the measurement can be influenced directly by roughness. Every scratch on the surface can play the role of a capillary in which a liquid rises up. This happens if the contact angle θ is acute. At the other side the liquid decreases in the capillary for obtuse contact angles θ. In other words the rough surface has usually a good wettability in comparison with smooth surface, if we presume use of liquid with good wetting ability. We will get opposite results by use of liquids with bad wetting ability. Both of these factors are proved in the magnitude of the contact angle – wetting angle θ. We have found the very pronounced dependence of the surface wetting angle on the surface type.

Conclusions

- the lowest friction coefficient was observed in the ground samples without a PyG layer
- the highest friction coefficient was observed in the unground samples with a PyG layer
- the best wear resistance was observed in the samples covered by PyG layers, almost independently on the substrate grinding (under the layer)
- the lowest contact angels was observed in the samples with a PyG layer

Acknowledgement

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LASERACUPUNCTURE WITH NEW ACUPUNCTURE NEEDLE AS ESSENTIAL PART OF COMPLEX TREATMENT AFTER ALLOGENIC RHINOPLASTY

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Introduction

Aesthetic surgery of innate and acquired nose pathology takes 58,9% of the total amount of aesthetic operations made in cranio-maxillofacial area [2]. It makes to look for new methods of complications prophylaxis, complex treatment and rehabilitation procedures of pathology mentioned above after the operation. Last time great attention of specialists is paid to the treatment with laser which is introduced into the practice and is used in different fields of medicine with success. But till our days there is no information about expediency and effectiveness of acupuncture treatment application (acupuncture, laseracupuncture) for patient's rehabilitation after rhinoplasty.

Aim

Study of effectiveness of laser acupuncture application as a part of complex allogenic rhinoplasty postoperative treatment (experimental and clinical cases).

Methods

Experimental study was performed on 28 rabbits of the same stock and weight. Line slit of nasal bone, sterilized cut allogenic transplant moving under periosteum were performed under intravenous anesthesia of natria thiopental and local infiltration anesthesia (Novocaini 1%). The wound was closed in layers with atraumatic needle and materials (vicrilum). Animals were divided into two groups. Laser acupuncture treatment was applied for the animals of 1-st group (14 animals). The following acupoints were irritated with special acupuncture needle with optical glass fiber: Li4 (hegu), Li19 (hejiao), GV26 (shuigou). Treatment course consisted of 10 sessions. Power density of the light flow was not more than 5mW/cm^2 to one AP.

Laseracupuncture treatment was carried out with acupuncture needle (patent № 924). This needle contains

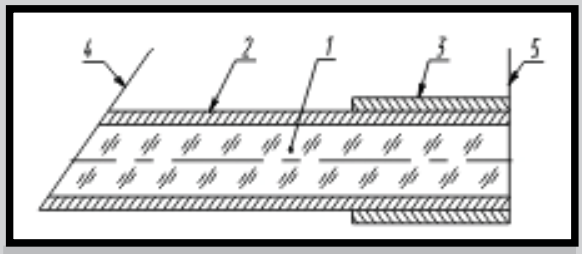

FIG.1. Acupuncture needle (Patent of Republic of Belarus N 924), 1-cylinder made from transparent material appropriated for laser emission; 2-steel covering; 3- steel bush on surface of which thread for needle insertion is located; 4-first end of the light pipe ignited into an oblique cut of the needle; 5-second end of the light pipe is fixed into the butt of the needle and shaft.

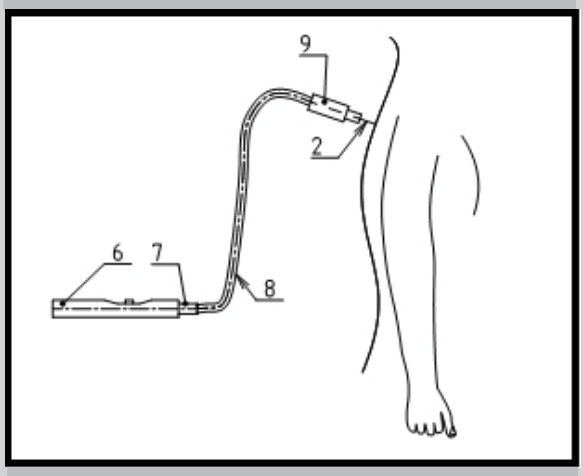

FIG.2. Scheme acupuncture needle application (Patent of Republic of Belarus No 924): 2-pointed end of the needle with steel covering for insertion into the acupuncture point; 6-body of laser; 7-special point of the flexible light pipe; 8-laser stop; 9-acupuncture needle with light pipe.