

USE OF ORGANOSILICON COLD-SETTING COMPOUNDS FOR COATING TRANSDUCERS IMPLANTED ON THE CORONARY ARTERY OF THE DOG'S HEART

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The nontoxicity, the biological inertness, the excellent molding properties, and the high elasticity of organosilicon cold-setting compounds justify their use as surface sealers for transducers implanted on the coronary artery of the dog's heart. Taking advantage of the selectively high adhesion of the coating to silicate materials, the authors developed a transducer of original design with elastic fixation to the vessel. The use of this coating minimizes harmful chemical and mechanical effects of the implanted transducer. There are good grounds for the wide use of organosilicon compounds in physiology for coating implanted devices.

KEY WORDS: implantable transducers; surface sealing.

The implantation of transducers of various types on the blood vessels of the animal's heart (for recording the velocity of the blood flow, the arterial pulse volume, etc.) as a rule is followed by local reactive proliferation of connective tissue leading in some cases to total occlusion of the vessel. The intensity of the connective tissue response is determined by the combined chemical and mechanical effects of the implanted device.

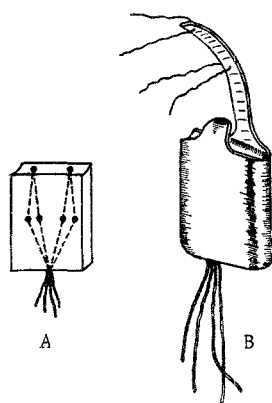


Fig. 1. Construction of the implantable transducer. A) plastic block with mounted elements and recording leads; B) transducer ready for implantation with ligatures securing it to the vessel.

The transducer with universal flexible attachment to the vessel and elastic coating devised by the writers minimizes these effects. As Fig. 1 shows, the working elements of the transducer are mounted in a plastic block, and this is fixed to the vessel by means of a short piece of silicone-treated tube wrapped over the block. By coating the entire surface of the transducer with cold-setting organosilicon compounds of the KLT-30 type, distinguished by their nontoxicity, their biological inertness, and their high adhesion to silicate materials, a monolithic construction is secured. The coating contains low-molecular-weight siloxane rubbers as the base and nontoxic titanium dioxide as the filler. The KLT-30 preparation is a self-vulcanizing single-component product including a setting agent (methyltriacetoxysilane). Setting of the composition takes place under the influence of the moisture of the air at a temperature of 20-40°C. The high dielectric properties of the coating (tangent of the angle of dielectric losses 0.01, volume resistivity $10^{13} \Omega \cdot \text{cm}$, dielectric permeability 3.4) and its water-repellent properties ensure reliable insulation of the transducer elements and its considerable elasticity (85%) provides for damping unfavorable mechanical disturbances.

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This design makes the procedure of implanting the transducer of the vessel very much easier, ensures reliable fixation to vessels of different diameters, and avoids the necessity for preparing a set of transducers for the operation.

The results of trials of these transducers during implantation of the coronary artery of the dog's heart (for periods of between 2 and 12 months) have demonstrated the high level of biological inertness of the coating, minimizing harmful chemical and mechanical effects of the implanted transducer (absence of complications in the postoperative period, a very low-grade local tissue reaction, maintenance of complete patency of the lumen of the vessel).