

BORUT GERŠAK [04768]

Personal bibliography for the period

1980-2010

ARTICLES AND OTHER COMPONENT PARTS

1.01 Original scientific article

1. BIGEC, Martin, GERŠAK, Borut, KLEMENC, Matjaž, PERHARIČ, Lucija, URBANČIČ-ROVAN, Vilma. Spremembe srčnega ritma pri podvodnem plavanju = Changes of the heart rhythm during underwater swimming. *Med. razgl. (Tisk. izd.)*. [Tiskana izd.], 1980, letn. 19, št. 4, str. 277-301. [COBISS.SI-ID [1327077](#)]

2. GERŠAK, Borut. Comparison between absorbable and nonabsorbable sutures in arterial anastomoses in growing dogs. *J. Cardiovasc. Surg.*, 1991, letn. 32, št. 6, str. 757-760.

Five dogs, 10 weeks old, underwent operation using ketamin-HCl anesthesia and end-to-end anastomoses of the femoral and brachial arteries were made using polyfilament nonabsorbable material (Ethibond), monofilament nonabsorbable material (Prolene), polyfilament absorbable material (Vicryl) and monofilament absorbable material (PDS). The arterial diameter using a micrometer and blood flow using an electromagnetic flow meter were determined. After six months another operation was performed and diameter and blood flow were measured again. No statistically significant differences were found between the different materials used with respect to growth related increases either in arterial diameter or blood flow. [COBISS.SI-ID [2605273](#)]

3. GERŠAK, Borut. Presence of calcium in the vessel walls after end-to-end arterial anastomoses with polydioxanone and polypropylene sutures in growing dogs. *J Thorac Cardiovasc Surg*, 1993, let. 106, št. 4, str. 587-591.

The presence of calcium in the vessel walls after end-to-end arterial anastomoses performed with polydioxanone and polypropylene interrupted sutures was studied in 140 anastomoses in 35 10-week-old German shepherd dogs. Histologic examination with hematoxylin and eosin, van Gieson, and von Kossa staining techniques was performed after the animals were killed 6 months after the operation. Ketamine hydrochloride was used as an anesthetic agent. At the start of the investigation the dogs weighed 14.5 +/- 2.6 kg (mean +/- standard deviation, n = 35), and after 6 months they weighed 45.3 +/- 3.1 kg (mean +/- standard deviation, n = 35). The diameter of the sutured arteries in the first operation was 2.6 +/- 0.5 mm

(mean +/- standard deviation, n = 140). With each dog, both brachial and both femoral arteries were used--one artery for each different type of suture. In different dogs, different arteries were used for the same type of suture. The prevalence of calcifications after 6 months was determined from the numeric density of calcifications with standard stereologic techniques. The sutured and sutureless parts taken from longitudinal sections from each artery were studied, and t test values were calculated as follows: In paired samples, statistically significant differences in numerical density of calcifications were seen between sutured and sutureless arterial parts for both materials (sutureless part versus part with polydioxanone sutures, p less th. 0.001, n =70; sutureless part versus part sutured with polypropylene sutures, p less th. 0.01, n = 70); however, in independent samples no statistically significant differences in numerical density of calcifications were seen between the polydioxanone and polypropylene groups for sutured (p more th. 0.05, n = 70) and sutureless parts (p more th. 0.05, n = 70). [COBISS.SI-ID [29145](#)]

4. GERŠAK, Borut, GABRIJELČIČ, Tone. Successful surgical removal of partially expanded Palmaz stent from external iliac artery. *Panminerva Med.*, 1995, let. 37, str. 92-94.

Insertion of intravascular stents into various arteries including coronary arteries has become an integral part of vascular interventions, particularly in the treatment of aortoiliac arteriosclerotic disease. The incidence of vascular complications remains relatively high despite the better stent design and inserting techniques. We report a case where successful removal of partially expanded Palmaz stent from external iliac artery was needed due to a rare complication: a balloon catheter burst resulting in an insufficient stent expansion in an improper position. [COBISS.SI-ID [49625](#)]

5. GERŠAK, Borut, TROBEC, Roman, KRISCH, Igor, PŠENIČNIK, Majda. Loss of endothelium-mediated vascular relaxation as a response to various clamping pressures. *Eur. j. cardio-thorac. surg.*. [Print ed.], 1996, let. 10, št. 8, str. 684-689.

The contraction/relaxation responses of thoracic aortal rings clamped with two clamping pressures to potassium chloride (KC1), noradrenaline and carbachol were studied using a scanning electron microscope (SEM) to ascertain endothelial lacerations. Clamp A had the tip pressure $PA = 0.60 \text{ N/mm}^2$ and clamp B $PB = 5.16 \text{ N/mm}^2$. In 15 Wistar albino rats, weighing $328 \pm 19 \text{ g}$ (mean +/- SD), the thoracic aorta was occluded for 15 min and then three vascular rings (2 mm wide) were excised. The proximal unclamped ring served as a control. The aorta diameter was calculated from the circumference of distal rings $1.61 \pm 0.01 \text{ mm}$ (n = 15, $d_{\text{min}} = 1.51 \text{ mm}$, $d_{\text{max}} = 1.70 \text{ mm}$). The rings were challenged with cumulative additions of KC1 (10-80 mmol/l) to measure the contraction. Then cumulative relaxation on the administration of carbachol (0.01-100 $\mu\text{mol/l}$) as a response to noradrenaline precontraction (0.1 $\mu\text{mol/l}$) was determined. A significant loss (P less th. 0.05) of vascular relaxation in all clamped rings (clamped with PA and PB clamping pressures) was seen. No significant differences (P more th. 0.05) were observed for contraction between clamped and control rings clamped with clamp A, however the rings clamped with clamp B showed significant reduction of contraction (P less th. 0.05). No significant differences were seen from control rings between groups A and B (P more th. 0.05), as well as from clamped rings between groups A and B (P more th. 0.05) for both the contraction and relaxation parts of the experiments. With SEM, great endothelial lacerations with complete disruption of the endothelial layer in the rings clamped with the clamp B were seen, but no disruption in rings clamped with clamp A. Therefore endothelial vascular layers are much more susceptible to pressure injuries than was previously believed. (trunc.) [COBISS.SI-ID [29657](#)]

6. GERŠAK, Borut, GABRIJELČIČ, T., TROBEC, Roman, SLIVNIK, Boštjan. Temperature distribution in human heart during hypothermic cardioplegic arrest. *Cor Eur.*, 1997, vol. 6, str. 172-176. [COBISS.SI-ID [12854823](#)]

7. TROBEC, Roman, GERŠAK, Borut. Direct measurement of clamping forces in cardiovascular surgery. *Med. biol. eng. comput.*. [Print ed.], 1997, let. 35, št. 1, str. 17-20.

Equipment for measuring the direct tip force of a clamp on the vessel wall designed as an adjustable surgical clamp with strain gauges applied and connected via an amplifier to a computer-based data

acquisition system. A mechanical model that incorporates the resistance of tissue against momentary deformations is developed to analyse and justify measured results. In in vivo experiments on rat thoracic aorta, the minimum occlusion force, stationary clamping force and the momentary peak clamping force are measured and observed as an important cause of damages in the endothelial layer of vascular walls. [COBISS.SI-ID [30169](#)]

8. TROBEC, Roman, SLIVNIK, Boštjan, GERŠAK, Borut, GABRIJELČIČ, Tone. Computer simulation and spatial modelling in heart surgery. *Comput. biol. med.*. [Print ed.], 1998, vol. 28, št. 4, str. 393-403.

In this work, three dimensional modelling and computer simulation of heat transfer on generally-shaped nonhomogenous bodies is proposed and described. The complexity of the calculation is estimated and the potential use of high performance parallel computers is discussed. The method is focused on applications in medicine. As an example, a numerical algorithm for the parallel computer simulation of heart cooling procedures during surgery is presented. On the basis of simulated results, two different methods of cooling are compared. [COBISS.SI-ID [13500711](#)]

9. GERŠAK, Borut, TROBEC, Roman, KRISCH, Igor. Loss of endothelium mediated vascular relaxation as a response to various clamping pressure : part I. A pharmacological study. *Panminerva Med.*, 1998, vol. 40, str. 280-285. [COBISS.SI-ID [13684775](#)]

10. GERŠAK, Borut, TROBEC, Roman. Loss of endothelium mediated vascular relaxation as a response to various clamping pressure : part II. Direct measurements of clamping pressures and scanning electron microscope study. *Panminerva Med.*, 1998, vol. 40, str. 288-293. [COBISS.SI-ID [13685031](#)]

11. GERŠAK, Borut, TROBEC, Roman, KRISCH, Igor. The effect of various clamping pressures on endothelium mediated vascular relaxation = Vpliv tlakov žilne prijemalke kontraktilno/relaksacijsko sposobnost obročkov torakalne aorte. *Zdrav Vestn (Tisk. izd.)*. [Tiskana izd.], 1998, vol. 67, št. 3, str. 133-137. [COBISS.SI-ID [13189927](#)]

12. GERŠAK, Borut, MIKEK, M..., SMRKOLJ, Vladimir, GABRIJELČIČ, Tone. Results of treatment of 17 patients with heart tumour. *Eur. j. surg. oncol.*, 1999, letn. 25, str. 302-305.

Background: Between 1989 and 1997, 17 patients underwent surgery for excision of primary cardiac tumour at the Department for Cardiovascular Surgery in Ljubljana. Patients and methods: There were 13 female (76.5%) and four male (23.5%) patients with an average age of 49+-14 years (mean+-SD). The study was retrospective. Special attention was paid to clinical presentation, method of diagnosis, elapsed time between the confirmed diagnosis and excision of the tumour, operatively determined location of tumour and post-operative course-diuresis in first 48 h, levels of CK and CK-MB, on first and on second day after operation and time of hospitalization. Results: Thirteen patients (76.5%) had cardiac symptoms at the time of presentation (dyspnoea, syncope, vertigo, palpitations) and four (23.5%) had embolic complications. In all the patients diagnosis was made by echocardiography. Average elapsed time between the confirmed diagnosis and the operation was 26+-40 (mean+-SD) days. Histological examination revealed myxoma in 15 patients (88.2%), one patient had lipoma and one malignant haemangiosarcoma. The most common location of tumour was in the left atrium (12 patients; 70.6%). Post-operative complications occurred in four patients (23.5%); 76.5% of patients had diuresis in the range between 0.8 and 2.0 ml/h/kg; there was no post-operative oligouric renal failure. Average levels of both CK and CK-MB were statistically significantly lower on the second day after operation, there was no case of peri-operative myocardial infarction and post-operative death did not occur. One patient with multiple myxoma had two recurrences. Conclusions: Symptoms in patients with heart tumours, especially at the beginning of illness, are often uncharacteristic. Due to the non-specific presentation of cardiac tumours, a high index of suspicion is needed. The diagnostic method of choice is echocardiography. (Abstract truncated at 2000 characters.) [COBISS.SI-ID [10197977](#)]

13. GERŠAK, Borut. Mitral valve repair or replacement on the beating heart. *The heart surgery forum*, 2000, letn. 3, št. 3, str. 232-237.

Background: Beating heart (off-pump) coronary artery bypass grafting (CABG) techniques have led us to consider the possibility of performing mitral valve repairs and replacements (with or without CABG) on the beating heart. Methods: If CABG had to be performed in addition to the valve procedure, CABG was done first on the beating heart without cardiopulmonary bypass, if possible. For the valve procedure, the aorta was cross-clamped and the beating-heart status was maintained throughout the whole procedure with continuous, warm, oxygenated blood coronary-sinus perfusion. Results: We used this technique in 23 patients with extremely low ejection fractions, 78%, of whom were in New York Heart Association (NYHA) class 4 and 77% of whom were in New York Heart Association (NYHA) class 3. The procedures were: mitral-tricuspid (11 patients), mitral-aortic (7 patients), mitral-tricuspid CABG (1 patient), and mitral-aortic CABG (4 patients). The total early mortality was 13% (3 of 23 patients). Two were in-hospital deaths. One patient with triple-vessel disease and acute mitral insufficiency (AMI) on intra aortic balloon pump had been operated on six days after AMI. The cause of death was systemic methicillin resistant staphylococcus aureus infection. The other death was a female patient who was operated on after previous multiple cerebrovascular infarctions (CVIs) (cause of the death was CVI). In addition, one patient died one month after the operation because of prosthetic valve endocarditis on aortic and mitral valves (silver-coated silzone aortic and mitral valves were implanted because of chronic latent asymptomatic tibial osteitis). None of these deaths were cardiac related. (Abstract truncated at 2000 characters) [COBISS.SI-ID [12713433](#)]

14. GORJUP, Vojka, JAZBEC, Anja, GERŠAK, Borut. Transtelephonic transmission of electrocardiograms in Slovenia. *J Telemed Telecare*, 2000, letn. 6, str. 205-208.

The transtelephonic transmission of electrocardiograms (ECGs) was introduced in Slovenia in 1996 and has been used regularly since September 1997 by health institutions and patients with cardiovascular diseases. Portable 12-channel ECG equipment weighing less than 200g is generally used. The diagnostic centre is located in the intensive-care unit at the University Medical Centre Ljubljana. In the first 12 months of regular operation we received 463 calls, 213 of which were diagnostic. The most common reasons for calling were: ischaemic chest pain, atypical chest pain, palpitations and dyspnoea. The most common diagnoses made on the basis of history and the ECG were: acute myocardial infarction, angina pectoris, paroxysmal tachycardias and atypical chest pain. In 40% of cases the cardiologist's advice sufficed; 38% of patients were referred to the emergency room, 29% immediately and 9% only if a suggested therapy did not prove successful; and in 21% of cases new medication or a change of dosage of current medication was suggested. Transtelephonic ECG transmission enables direct communication between general practitioner or patient and cardiologist. With its use, time from onset of symptoms to initiation of treatment is shortened, which reduces disability and mortality due to cardiovascular diseases and improves cost-benefit. [COBISS.SI-ID [12267737](#)]

15. GERŠAK, Borut, DREVENŠEK, Gorazd. Combining coronary revascularization and valvular surgery on a beating heart: an analysis. *The heart surgery forum*, 2002, letn. 5, št. 1, str. E1-4. [COBISS.SI-ID [14535129](#)]

16. TROBEC, Roman, GERŠAK, Borut, HREN, Rok. Body surface mapping after partial left ventriculotomy. *The heart surgery forum*, 2002, letn. 5, št. 2, str. 187-192.

Objective: To demonstrate cardiac electrophysiological changes in patients where partial left ventriculotomy was performed and multichannel electrocardiographical measurements and body surface potential mapping were used. Methods: Body surface ECG signals were recorded during sinus rhythm for one minute. Six patients who were operated on with partial left ventriculotomy were monitored. All patients had normal coronary angiography data. The data were acquired prior to the partial left ventriculotomy, and on the second, third, fourth, and fifth postoperative day using 32-body surface leads. The recorded data were analysed by determining ST-40 and QRS integral maps. The analysis was done on a set of selected beats during the sinus rhythm and on the averaged beats. Results: Before the operation, ST-40 maps typically showed an area of strong positive potentials (elevation) over the anterior aspect of the torso and a region of strong negative potentials (depression) over the lateral, and posterior aspects of the torso.

After the operation, the ST elevation over the anterior, lateral and posterior aspects of the torso was reduced. An area of marked positive potentials remained in the precordial area (overlying the excised area of the heart), even during the postoperative monitoring interval (day two through day five). v.e. also noticed that the amplitude of cardiac signals decreased by approximately 30% after the partial left ventriculotomy. Qualitative map changes were substantiated by statistical parameters. Conclusions: Results of our study demonstrate that noninvasive acquisition of body-surface electrocardiographs may detect changes in the cardiac activity of patients undergoing partial left ventriculotomy. This finding suggests that body surface mapping may also be useful in assessing the arrhythmia vulnerability. [COBISS.SI-ID [15043289](#)]

17. GERŠAK, Borut. A technique for aortic valve replacement on the beating heart with continuous retrograde coronary sinus perfusion with warm oxygenated blood. *Ann. thorac. surg.* [Print ed.], 2003, letn. 76, str. 1312-1314.

The protection of ventricular myocardium in aortic valve operations is always an issue because those hearts do not tolerate global ischemia well. A technique of aortic valve replacement is described involving continuous retrograde coronary sinus perfusion with warm oxygenated blood used in 34 patients to date without any complications. This technique maintains a beating heart throughout the procedure. [COBISS.SI-ID [16549593](#)]

18. GERŠAK, Borut. Body surface mapping of cardiac activity after partial left ventriculectomy. *Comput. biol. med.* [Print ed.], 2003, letn. 33, št. 3, str. 239-250.

MECG measurements were performed using 35 electrodes in 10 patients operated with partial left ventriculectomy (PLV). Body surface ECG signals were recorded and five measurements were done: prior to PLV, second, third, fourth and fifth postoperative day. This work was concentrated on the following mapping methods: average isopotential ST segment maps (STM), QRS interval isointegral maps (QRM) and isochronal activation maps (IAM). STMs of the patients show a great positive area (elevation) over the anterior aspect of the heart and a great negative area (depression) over the lateral and posterior aspect of the heart before the operation. After the operation, the ST elevation over the anterior, lateral and posterior aspect of the heart was reduced. A substantial positive value over the excised area of the heart was present also on the end of the postoperative monitoring interval. Minimal and maximal values of the QRMs were smaller and also show some kind of normalisation. The area of the left ventricle, where PLV was performed, was carefully analysed for any changes of activation time for different heart regions. IAMs indicate that the start of the first activation was quite stable and in accordance with the position of the QRMs minimum. [COBISS.SI-ID [16239833](#)]

19. TRUNK, Primož, GERŠAK, Borut, TROBEC, Roman. Topical cardiac cooling - computer simulation of myocardial temperature changes. *Comput. biol. med.* [Print ed.], 2003, vol. 33, str. 203-214. [COBISS.SI-ID [17466151](#)]

20. AVBELJ, Viktor, KALIŠNIK, Jurij-Matija, TROBEC, Roman, GERŠAK, Borut. Breathing rates and heart rate spectrograms regarding body position in normal subjects. *Comput. biol. med.* [Print ed.], 2003, vol. 33, str. 259-266. [COBISS.SI-ID [17466663](#)]

21. FRLJAK, Sabina, AVBELJ, Viktor, TROBEC, Roman, MEGLIČ, Bernard, UJIJE, T., GERŠAK, Borut. Beat-to-beat QT interval variability before and after cardiac surgery. *Comput. biol. med.* [Print ed.], 2003, vol. 33, str. 267-276. [COBISS.SI-ID [17466407](#)]

22. GERŠAK, Borut, ŠOŠTARIČ, Maja, KALIŠNIK, Jurij-Matija. Endoscopic aortic valve replacement. *The heart surgery forum*, 2003, letn. 6, št. 6, str. 1-3.

During the last 8 years, many different approaches for minimally invasive aortic valve surgery have emerged. We have developed a technique that enables total endoscopic aortic valve replacement with port access, via a small right lateral thoracotomy with only soft tissue retraction and minimally invasive aortic

crossclamping. The operation is performed under video guidance, since no direct eye vision is possible. We believe this is the first such operation performed in cardiac surgery and that it makes possible broadening of indications for nonsternotomy-video-directed surgery in the future. [COBISS.SI-ID [17027801](#)]

23. TROBEC, Roman, PIPAN, Gregor, GERŠAK, Borut. Parallel simulation of topical heart cooling. *Inf. (Print)*, 2003, vol. 6, str. 337-348. [COBISS.SI-ID [17601831](#)]

24. AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Beat-to-beat repolarisation variability in body surface electrocardiograms. *Med. biol. eng. comput.*. [Print ed.], 2003, vol. 41, str. 556-560. [COBISS.SI-ID [17838119](#)]

25. SAMARIN LOVRIČ, Silvia, AVBELJ, Viktor, TROBEC, Roman, ZORMAN, Darko, RAKOVEC, Peter, HOJKER, Sergej, GERŠAK, Borut, MILČINSKI, Metka. Sympathetic reinnervation after heart transplantation, assessed by iodine-123 metaiodobenzylguanidine imaging, and heart rate variability. *Eur. j. cardio-thorac. surg.*. [Print ed.], 2004, vol. 26, str. 736-741. [COBISS.SI-ID [18593575](#)]

26. KUŽNER, Jernej, DREVENŠEK, Gorazd, GERŠAK, Borut, BUDIHNJA, Metka. Hypoxic and pharmacological preconditioning preserves vasomotor response of porcine coronary artery. *Pol. J. Pharmacol.*, 2004, vol. 56, str. 789-797. [COBISS.SI-ID [2224250](#)]

27. GERŠAK, Borut, ŠOŠTARIČ, Maja, DOLENC-STRAŽAR, Zvezdana, STARIČ, Feliks, KOŽELJ, Mirta. Cavernous hemangioma in the junction between the left atrium and the aorta: case report. *The heart surgery forum*, 2005, letn. 8, št. 1, str. E72-E74, doi: [10.1532/HSF98.20041124](https://doi.org/10.1532/HSF98.20041124).

We present a case of an asymptomatic cavernous hemangioma, located in the junction area between the left atrium and aorta, and our experience of diagnosis and surgical treatment of the tumor. [COBISS.SI-ID [19194841](#)]

28. GERŠAK, Borut, ŠOŠTARIČ, Maja, KALIŠNIK, Jurij-Matija, BLUMAUER, Robert. The preferable use of port access surgical technique for right and left atrial procedures. *The heart surgery forum*, 2005, letn. 8, št. 5, str. E354-E363, doi: [10.1532/HSF98.20041143](https://doi.org/10.1532/HSF98.20041143).

We analyzed the results of mitral valve operations, either alone or in any combination with the tricuspid valve surgeries in the period from January 2001 till June 2004. The period was divided into two parts, classical sternotomy part (C) (110 patients) and minimally invasive port access part (PA) (105 patients), later being used from December 2002 till now. Also, what we were interested in was the total hospital cost of both types of the procedures and if there are any advantages of port access over the classical sternotomy. The mean age was 61.2 +/- 10.2 and 60.3 +/- 12.4 (C versus PA) and mean additive Euroscore was 6.5 versus 4.8 (C versus PA). There were statistically significant differences ($P < .0001$) in cardiopulmonary bypass time (CPB) and aortic cross-clamp time (AXT) between both groups: CPB C versus PA: 98.3 +/- 33.5 minutes versus 149.2 +/- 44.2 minutes (mean sd), AXT C versus PA: 62.9 +/- 20.6 minutes versus 88.3 +/- 26.8 minutes (mean +/- sd). There were no statistically significant differences in mortality and stroke for both the groups (mortality $P = 1$, stroke $P = .53$). There were statistically significant differences in favor of the port access over the classical one for: intensive unit stay ($P = .004$), postoperative stay in days ($P < .0001$), blood transfusion ($P < .0001$), postoperative thoracic bleeding ($P < .0001$), and extubation time in hours ($P < .0001$). Furthermore, costs analyses showed that the average total patient cost was less for port access ($P < .0005$). The differences between endo and classical type suggested that the port access type of surgery is 20% cheaper than the classical one. We may conclude that port access surgery is an acceptable alternative to classical type of surgery, also in complex pathology of the mitral and tricuspid valve. [COBISS.SI-ID [20318425](#)]

29. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, IVAŠKOVIČ, Daroslav, VIDMAR, Gaj, TROISE, Giovanni, GERŠAK, Borut. Assessment of cardiac autonomic regulation and ventricular repolarization after off-pump coronary artery bypass grafting. *The heart surgery forum*, 2006, letn. 9, št.

Background. Altered autonomic regulation precipitates cardiac arrhythmias and increases the risk of sudden cardiac death. This risk is further increased by changes in ventricular repolarization. Autonomic regulation is deranged in patients after myocardial on-pump revascularization. We aimed to clarify how off-pump coronary artery bypass grafting (CABG) affects postoperative cardiac autonomic regulation and ventricular repolarization within 4 weeks after CABG. Methods. Forty-two patients (mean age, 61.9 ± 9.3 years; mean EURO score 2.6 ± 1.9) were electively admitted for off-pump CABG. The electrocardiographic and respiratory waveform recordings were performed in the afternoon in the supine position for 10 minutes. Autonomic modulation was assessed using heart rate variability analysis. Power spectra were computed from 5-minute stable RR intervals using Fourier Transform analysis. Total power of spectra was defined in the range of 0.01 to 0.40 Hz, high-frequency power within 0.15 to 0.40 Hz, and low-frequency power within 0.04 to 0.15 Hz. Normalized power was defined as a ratio of power in each band/total power. The high- and low frequency power as well as their normalized values indicated cardiac vagal and sympathetic modulation, respectively. Ventricular repolarization was assessed using QT interval, QT interval variability, and QT-RR interdependence analysis. QT intervals were determined from the beginning of the 5-minute segments. QT interval variability was evaluated by a T wave template-matching algorithm. Pearson correlation between length of RR and QT interval was applied to study QT-RR characteristics. The results were tested for significance using the Fisher exact test, nonpaired t test, and analysis of variance; a $P < .05$ was considered significant. (Abstract truncated at 2000 characters) [COBISS.SI-ID [21485273](#)]

30. GERŠAK, Borut, GRAČNER, Rajko, BRECELJ, Aleš, KIRBIŠ, Janez, JAKLIČ, Ladislav, KLOKOČOVNIK, Tomislav, KNEŽEVIČ, Ivan, LAKIČ, Nikola, KOVAČIČ, Nace, JELENC, Matija, GABRIJELČIČ, Tone. Primerjava rezultatov bolnikov, operiranih zaradi ishemične bolezni srca s sladkorno boleznijo in brez nje = Results of surgical treatment for ischemic heart disease in combination with diabetes. *Slov. kardiol.*, 2006, letn. 3, št. 1, str. 30-35.

A comparison of the results of surgical treatment for ischemic heart disease in patients with or without diabetes is presented, along with results for additional surgery on one or several heart valves. During the period between the years 1988 and 2005, 5,351 patients were operated on for ischemic heart disease with or without heart valve surgery. Isolated coronary bypass was performed in 4,091 patients (3,067 without diabetes and 1,024 with diabetes), and combined surgery involving the valves was done in 1,260 patients (898 patients without diabetes, 362 patients with diabetes). In the group of patients with diabetes, there were significantly more women (18.3% vs. 26.4%) and patients who have had a myocardial infarction (58.3% vs. 62.1%), and significantly fewer patients with PTCA (8.0% vs. 8.8%) and after complications of PTCA (0.1% vs. 1.1%). The percentage of operated women increased every year, and so did the percentage of patients with poor left ventricular function, diabetes and mitral valve repair. The average age of operated patients also increases every year, irrespective of their sex and other preoperative characteristics. In the group of patients with diabetes, there were significantly more complications: mediastinitis (1.4 vs. 0.4%), sternal dehiscences (2.7 vs. 1.3%) and heart rhythm disturbances (28.3 vs. 23.4%). The mortality of all patients who were operated on for isolated ischemic heart disease did not differ significantly between the groups with or without diabetes (with diabetes it was 5.4%, without it 4.8%; $p = 0.486$). The mortality of patients with concurrent heart valve surgery was borderline significant (16 vs. 11.9%, $p = 0.051$). The mortality of patients with isolated ischemic heart disease, stable angina pectoris and good left ventricular function was low in both groups of patients (with diabetes it was 2.2%, without it 1.9%). [COBISS.SI-ID [21311705](#)]

31. GERŠAK, Borut, FRLJAK, Sabina, POHAR PERME, Maja, STARE, Janez. Chronic ischemic mitral regurgitation - short and long-term results of various surgical interventions = Kronična ishemična mitralna insuficienca - kratkoročni in dolgoročni rezultati različnih kirurških intervencij. *Slov. kardiol.*, 2006, letn. 3, št. 2, str. 102-105.

The survival rates of 301 patients operated for chronic ischemic mitral valve insufficiency (Chronic IMR) in combination with surgical revascularization (CABG) at our center between the years 1990 and 2002

were analyzed. Early mortality was 11.2% (34 patients), while late mortality was 20.5% (62 patients). Three different surgical techniques were used: CABG without any mitral valve intervention (CABG - MI), No. = 93, CABG with mitral valve repair (CABG - PVM), No. = 117 and CABG with mitral valve replacement (CABG - MVR), No. = 91. In the CABG - MI group there were more patients with good LVEF, whereas in the CABG - PVM group there were more patients with poor LVEF, and in the group CABG - MVR the distribution of good, intermediate and poor LVEF was almost equal - the results are statistically significant ($p = 0.0086$). The association with the type of operation and early mortality is statistically significant ($p = 0.0124$): CABG - MI = 3%, CABG - MVR = 15% and CABG - PVM = 15%. The association with LIMA use and early mortality has borderline significance, going in favour of LIMA use ($p = 0.0513$). The Cox proportional hazards model showed association with the type of operation and LIMA use for late mortality. The CABG - MI group had the better long-term outcome, whereas the CABG - MVR and CABG - PVM groups had significantly higher risk. The hazard ratio for CABG - MVR compared to CABG - MI is 2.55 (95% confidence interval) and 2.77 compared to CABG - PVM (95% confidence interval). The LIMA group had a statistically significant lower risk; the hazard ratio was 0.48% (95% confidence interval). In conclusion, the results show the need for LIMA use as an important factor for long-term survival in patients with chronic IMR. (Abstract truncated at 2000 characters) [COBISS.SI-ID [21963481](#)]

32. JAGRIČ, Tomaž, MARŠ, Tomaž, GRUBIČ, Zoran, JAGRIČ, Timotej, GERŠAK, Borut. Kulture človeških endotelnih celic, izoliranih iz arterije mamarije interne = Human endothelial cell cultures isolated from internal mammary artery. *Zdrav Vestn (Tisk. izd.)*. [Tiskana izd.], 2006, letn. 75, št. 10, str. 621-628.

Background The aim of our study was to prepare homogenic and long term cultures of endothelial cells (EC) from a human internal mammary artery (IMA) obtained during a cardiac bypass graft operation (CABG). In this way we would be able to assess the conditions suitable for the preparation of sufficient number of autologous arterial ECs and their use in a population mostly affected with cardiovascular diseases. **Methods** Seven 52-76 years old male patients diagnosed with ischemic heart disease were included in our study. Samples of internal mammary artery were collected during CABG performed on these patients. EC cells were prepared from these samples using two approaches. *in situ* digestion with proteolytical enzymes and proteolytic digestion from the previously resected IMA vessels. Cell morphology and growth kinetics were studied in 3 weeks old cultures. EC cell specificity was determined by immunohistochemical staining for von Willebrand's factor. **Results** Cell growth could be observed only in cultures prepared with the *in situ* proteolytic digestion. Cells showed the typical EC morphology and were positive for von Willebrand's factor. The maximal cell number in colonies (11 in average, 51 at the most) was reached after 6 days in culture. The average cell doubling time of the five cultures was 82±43 hours. **Conclusions** The study proved that our method of isolation is specific for ECs. Using a small IMA sample we were able to collect a number of colonies and sustain them in long term cultures, but the end numbers of cells is still too small for their application in tissue engineering (TE). Our further efforts will be focused on the optimization of the conditions which would allow sufficient proliferation of EC so that small IMA sample would be enough for the TE. [COBISS.SI-ID [8913180](#)]

33. TRUNK, Primož, MOČNIK, Jaka, TROBEC, Roman, GERŠAK, Borut. 3D heart model for computer simulations in cardiac surgery. *Comput. biol. med.*. [Print ed.], 2007, vol. 37, no. 10, str. 1398-1403. [COBISS.SI-ID [20981031](#)]

34. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Position-dependent changes in vagal modulation after coronary artery bypass grafting. *Comput. biol. med.*. [Print ed.], 2007, vol. 37, no. 10, str. 1404-1408. [COBISS.SI-ID [20980775](#)]

35. ŠOŠTARIČ, Maja, GERŠAK, Borut, KALIŠNIK, Jurij-Matija, BLUMAUER, Robert, NOVAK-JANKOVIČ, Vesna. Lajšanje pooperativne bolečine po endoskopskih operacijah na srcu = Postoperative pain relief after endoscopic cardiac surgery. *Endosk. rev.*, november 2007, letn. 12, št. 28, str. 115-120.

Background. Endoscopic mitral and tricuspid valve repair, endoscopic surgery for atrial septum defect,

and endoscopic removal of cardiac tumours are performed through a 3 - 4-cm incision in the left hemithorax. In addition, smaller incisions of only 0.5 cm are used for inserting catheters and canulas into the superior and inferior caval veins and aorta. In these surgical procedures postoperative pain relief can be provided by administering a local anaesthetic through a catheter placed in the surgical wound. Patients and methods. Out of the 104 patients undergoing endoscopic cardiac surgery, 78 operating room-extubated patients were enrolled into the study. At the end of the procedure, a multihole epidural catheter was placed between the muscle fascia and subcutaneous tissues all along the wound for administration of either ropivacaine (R group) or bupivacaine (B group). The intensity of pain was assessed immediately upon extubation and over the next 24 hours in 4-hour intervals using the visual analogue scale (VAS). If the VAS pain score was greater than 3, a bolus of local anaesthetic was given through the catheter, or a bolus of the opioid analgetic piritramide was administered into the vein. We compared the mean VAS scores at extubation and in the first 24 hours, and the mean number of local anaesthetic and opioid boluses in the first 24 hours in groups R and B. Possible catheter-induced complications were recorded. [COBISS.SI-ID [23459033](#)]

36. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, IVASKOVIC, D., VIDMAR, Gaj, TROISE, Giovanni, GERŠAK, Borut. Effects of beating- versus arrested-heart revascularization on cardiac autonomic regulation and arrhythmias. *The heart surgery forum*, 2007, letn. 10, št. 4, str. E279-E287.

Background: Altered autonomic regulation after cardiac operations precipitates cardiac arrhythmias, affects repolarization, and increases the risk of sudden cardiac death. We sought to clarify how the 2 different techniques of coronary artery bypass grafting (CABG), namely conventional CABG using cardiopulmonary bypass (on-pump) and beating-heart CABG without cardiopulmonary bypass (off-pump), affect cardiac autonomic regulation and arrhythmic disturbances postoperatively. Methods: We included 57 consecutive patients, 28 in the on-pump group and 29 in the off-pump group. The electrocardiographic recordings were performed on the preoperative day and the fourth, seventh, and twenty-eighth day after operation. Fifteen-minute digital recordings were taken; one channel was used to record electrocardiogram and the other breathing. Detailed analyses of arrhythmia, heart rate, and heart rate variability indices were performed on respective days to assess sympathetic and parasympathetic modulation of the heart and relate it to detected arrhythmic disturbances. Results: Total power, low-frequency power, which indicates baroreceptor-mediated sympathetic modulation, and high-frequency power, indicating parasympathetic vagal modulation, declined significantly in both groups after CABG ($P < .001$); however, 7 days after CABG, total and high-frequency power were better preserved in the off-pump group. Mean RR interval was longer in the off-pump group at 7 ($P = .006$) and 28 days ($P = .008$) after surgery. The total incidence of arrhythmic events was higher in the on-pump group on the seventh day ($P = .017$, adjusted odds ratio = 8.6, 95% confidence interval 1.4-80.3). Conclusions: The results show profound impairment of cardiac autonomic regulation after CABG, showing better preserved cardiac autonomic modulation 7 days after beating-heart revascularization. (Abstract truncated at 2000 characters) [COBISS.SI-ID [22940121](#)]

37. ANTONIČ, Miha, GERŠAK, Borut. Renal function after port access and median sternotomy mitral valve surgery. *The heart surgery forum*, 2007, letn. 10, št. 5, str. E401-E407, doi: [10.1532/HSF98.20071084](#).

Background: Acute renal injury is an important postoperative complication of mitral valve surgery. We tested the hypothesis that minimally invasive port access (PA) surgery is linked to a smaller postoperative renal injury compared to the standard median Sternotomy (MS) technique. Methods: Ninety-six patients in the PA group and 102 patients in the MS group were compared regarding postoperative renal dysfunction. Preoperative and maximal postoperative serum creatinine levels were used to calculate creatinine clearance which was implemented for the renal function assessment. Additionally, the new RIFLE classification for acute renal injury was used for the comparison of the postoperative kidney function. This classification is divided into 3 levels and in addition to the glomerular filtration rate, it is also based on urine output. Results: The analysis of preoperative renal function did not demonstrate any significant differences between the two groups in any of the creatinine-based renal function markers. However, the

comparison of the minimal postoperative creatinine clearance showed significantly lower values in the median sternotomy group. The conventional MSA approach was confirmed as an independent renal risk factor in the multivariate analysis. The postoperative RIFLE classification comparison also showed higher postoperative renal impairment in the MS group. Conclusion: With the limitations of a retrospective study, our results suggest that for mitral valve surgery the minimally invasive PA approach might be associated with lower postoperative renal injury compared to the conventional surgical technique. [COBISS.SI-ID [24119001](#)]

38. GERŠAK, Borut, KALIŠNIK, Jurij-Matija, BRECELJ, Aleš, GABRIJELČIČ, Tone, GRAČNER, Rajko, KLOKOČOVNIK, Tomislav, JAKLIČ, Ladislav, KNEŽEVIČ, Ivan, LAKIČ, Nikola, SOJAK, Vladimir. Kirurško zdravljenje atrijske fibrilacije = Surgical treatment of atrial fibrillation. *Slov. kardiol.*, 2007, letn. 3, št. 1, str. 28-33.

Substantial proportion of the present population worldwide is threatened by cardiac arrhythmias. Despite improved recognition and diagnostic tools, better knowledge of the underlying mechanisms, identification of risk factors and more efficient medical treatment it still contributes significantly to overall morbidity and mortality. Recent progress in understanding of underlying electrophysiology with concomitant development of newer technologies and techniques enables us to target cardiac arrhythmias by causal approach. Consequently, the role of surgical ablative treatment of atrial fibrillation accompanying structural heart disease is gaining importance. There has been a profound advancement achieved in the cardiac surgery field over the past years resulting in new and less invasive treatment modalities. Anticipating every surgical procedure poses a certain risk to the patient it is mandatory to define and recognize every possible preoperative factor and mechanism that might affect the postoperative course or even result in suboptimal and undesired outcome. The surgical therapy of atrial fibrillation is directed to those patients with atrial fibrillation, who are operated for mitral (and tricuspid) valve disease, also in combination with coronary artery bypass grafting (CABG), or in some centres even wider: to those with aortic valve surgery and off-pump CABG. [COBISS.SI-ID [23103193](#)]

39. KRNJAK, Ljuba, TRUNK, Primož, GERŠAK, Borut, OSREDKAR, Joško. Correlation of serum S100B concentration with hospital stay in patients undergoing CABG = Korelacija serumske koncentracije S100B i trajanja hospitalizacije u bolesnika podvrgnutih ugradnji prenosnice koronarne arterije. *Acta clin. Croat.*, 2008, vol. 47, no. 4, str. 221-226. <http://www.acta-clinica.kbsm.hr/arhiva/Acta2008/Acta4/04.pdf>.

S100B protein has been proposed to be a serum marker of cerebral injury in patients undergoing cardiac surgery. The question to be answered in the present study was whether an increase in serum S100B concentration after the surgery correlated with the length of hospital stay in patients undergoing coronary artery bypass grafting. To answer this question we measured serum S100B concentration preoperatively, at the end of the operation, and on day 1 and day 5 of the surgery in 32 patients undergoing coronary artery bypass grafting. The median (min; max) hospital stay was 7 days (5; 34), and serum S100B concentration was 0.075 mg/L (0.050; 0.095) preoperatively, 0.840 mg/L (0.390; 1.500) immediately after the operation, 0.180 mg/L (0.150; 0.280) on day 1 and 0.100 mg/L (0.080; 0.120) on day 5 of the operation. None of the patients had clinical signs of cerebral injury. Multivariate linear regression analysis indicated serum S100B concentration on day 1 ($p = 0.0296$) and day 5 ($p = 0.0021$) of the operation to correlate with the length of hospital stay independently of the type of operation (with or without the use of cardiopulmonary bypass) and patient clinical characteristics. Our data suggest that serum S100B concentration on day 1 and day 5 of the operation may have prognostic value in patients without clinical signs of cerebral injury. However, this pilot study should be extended to a larger group of patients to confirm this observation. [COBISS.SI-ID [2547825](#)]

40. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, VIDMAR, Gaj, TROISE, Giovanni, GERŠAK, Borut. Ventricular repolarization dynamicity and arrhythmic disturbances after beating-heart and arrested-heart revascularization. *The heart surgery forum*, 2008, letn. 11, št. 4, str. E194-E201, doi: [10.1532/HSF98.20081025](https://doi.org/10.1532/HSF98.20081025).

Background: Arrhythmias attributable to altered autonomic modulation of the heart, with elevated sympathetic and depressed vagal modulation, occur to a similar extent after surgery performed on beating or arrested hearts. Coronary artery bypass grafting (CABG) with cardiopulmonary bypass has been associated with more frequent occurrence of arrhythmic events than surgery performed without CABG, even with comparable levels of postoperative cardiac autonomic (dis) regulation after arrested- and beating-heart revascularization. We explored the effects of arrested- and beating-heart revascularization procedures on the dynamics of ventricular repolarization and on increased postoperative arrhythmic events. Methods: Study participants included 57 CABG patients; 28 underwent on-pump and 29 underwent off-pump procedures. The 2 groups were comparable regarding clinical and postoperative characteristics. With high-quality 15-minute digital electrocardiograms, we assessed ventricular repolarization dynamics using RR and QT intervals and analyzed QT variability (QTV) and QT-RR interdependence. RR and QT intervals were determined from stationary 5-minute segments. QT-interval variability was determined by a T-wave template-matching algorithm. We used linear regression to compute the slope/correlation of the QT/RR interval. The Fisher exact test, nonpaired t-test, and ANOVA were applied to test the results; $P < .05$ was considered significant. Results: Postoperative arrhythmic events were significantly more frequent in both groups. One week postoperatively these events were significantly more frequent in the on-pump group. In both groups, the RR interval was shorter after CABG ($P < .001$). The QT variability index increased from -1.2 ± 0.6 to -0.8 ± 0.4 after off-pump CABG and from -1.3 ± 0.5 to -0.5 ± 0.6 on day 4 after surgery ($P < .05$), further deteriorating to -0.2 ± 0.6 one week after CABG in the on-pump group only ($P < .05$). (Abstract trunc [COBISS.SI-ID [24802521](#)])

41. SUWALSKI, Grzegorz, SUWALSKI, Piotr, KALIŠNIK, Jurij-Matija, SLEDZ, Mariusz, SWITAJ, Julita, CZACHOR, Marcin, GERŠAK, Borut, SUWALSKI, Kazimierz B. How does successful off-pump pulmonary vein isolation for paroxysmal atrial fibrillation influence heart rate variability and autonomic activity?. *Innovations*, 2008, letn. 3, št. 1, str. 1-6.

Objective: Surgical pulmonary vein isolation (PVI) for paroxysmal atrial fibrillation (PAF) blocks trigger stimulation from PVs and partially disconnects the atria from sympathetic and parasympathetic neural stimulation. This study describes long-term changes in heart rate variability (HRV) and autonomic activity (AA) after successful bipolar radiofrequency PVI. Methods: Twenty-seven patients who underwent coronary artery bypass grafting and successful (defined as stable sinus rhythm for 1 year) off-pump bipolar radiofrequency PVI for PAF were prospectively followed 3, 6, and 12 months after surgery including 24 hours Holter electrocardiogram. The following HRV and AA parameters were calculated: mean NN-interval, SO of NN-intervals, SO of averaged NN-intervals, root mean square of successive differences, low frequency (LF) power (0.04-0.15 Hz; a parameter specific for sympathetic activity), high frequency (HF) power (0.15-0.4 Hz; a parameter specific for parasympathetic activity), and the LF:HF ratio. Results: Preoperatively, high HRV and AA parameters were recorded. In 3-, 6-, and 12-month time, a progressive reduction of HRV and AA was observed, reaching significance after 12 months. Respective rates before surgery and 12 months after it were: for SO of averaged NN-intervals (122.4 ± 113 ; 80.5 ± 42 milliseconds; $P = 0.046$), for root mean square of successive differences (79.2 ± 93 ; 45 ± 20 milliseconds; $P = 0.04$). The LF:HF ratios were 1.22 and 0.73 before and 12 months after surgery, respectively. The statistically significant continuous reduction in LF:HF ratio ($P = 0.02$) is suggestive of a progressive parasympathetic dominance 12 months after surgery. Conclusions: Successful PVI for PAF results in HRV and sympathetic activity reduction with preoperative sympathetic dominance and oncoming vagal dominance after 1 year from surgery. Despite preoperative sympathetic dominance, successful PVI for PAF results in HRV and a [COBISS.SI-ID [26411225](#)]

42. MÜLLER-PREMRU, Manica, GABRIJELČIČ, Tone, GERŠAK, Borut, KOLMAN, Jana, ŠVENT-KUČINA, Nataša, ŠPIK, Vesna, LEJKO-ZUPANC, Tatjana. Cluster of *Stenotrophomonas maltophilia* endocarditis after prosthetic valve replacement. *Wien. Klin. Wochenschr.*, 2008, letn. 120, št. 17/18, str. 566-570, doi: [10.1007/s00508-008-0994-5](https://doi.org/10.1007/s00508-008-0994-5).

Early postoperative prosthetic valve endocarditis due to *Stenotrophomonas maltophilia* was diagnosed in seven patients (two men) aged from 68 to 84 years (mean age 78.1 years) over a three-year period. All patients had undergone aortic valve replacement. *S. maltophilia* was isolated from at least two blood

cultures per patient. Four patients experienced CNS embolic complications. Three patients died. All patients were treated with ceftazidime, one in combination with amikacin, one with ciprofloxacin and one with levofloxacin. Because a common source of infection in the operating theater was suspected, 24 environmental samples were taken, of which two contained *S. maltophilia*. Six of the seven clinical isolates from the patients and two isolates from the environment were analyzed using molecular typing by pulsed-field gel electrophoresis (PFGE). The patients' isolates were resistant to gentamicin, ciprofloxacin, trimethoprim/sulfamethoxazole and, except in one case, to amikacin and piperacillin/tazobactam and susceptible to ceftazidime and levofloxacin. In contrast, the environmental isolates were resistant to ceftazidime, showed intermediate susceptibility to ciprofloxacin, and were susceptible to trimethoprim/sulfamethoxazole. PFGE demonstrated indistinguishable or closely related (1-3 band difference) PFGE patterns in isolates from the patients, but a different pattern in the environmental isolates. No common source of infection was found despite intensive investigation. Extensive cleaning and other measures of infection control were carried out and no new cases were recorded in the two year follow-up period. [COBISS.SI-ID [26093273](#)]

43. KŠELA, Juš, KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Piotr, SUWALSKI, Grzegorz, SUWALSKI, Kazimierz B., GERŠAK, Borut. Short- versus long-term ECG recordings for the assessment of non-linear heart rate variability parameters after beating heart myocardial revascularization. *Comput. biol. med.*. [Print ed.], 2009, vol. 39, no. 1, str. 79-87. [COBISS.SI-ID [22496807](#)]

44. KŠELA, Juš, SUWALSKI, Piotr, KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, SUWALSKI, Grzegorz, GERŠAK, Borut. Assessment of nonlinear heart rate dynamics after beating-heart revascularization. *Heart surg. forum*, [in press] 2009, 7 str., doi: [10.1532/HSF98.20081116](#). [COBISS.SI-ID [22497063](#)]

45. POGLAJEN, Gregor, HARLANDER, Matevž, GERŠAK, Borut. Regurgitant flow in ischemic and dilative mitral regurgitation. *J. heart valve dis.*, 2009, letn. 18, št. 6, str. 598-606.

Background and aim of the study: It is well established that there are geometric differences between ischemic and dilative mitral regurgitation (MR), yet data on the hemodynamic consequences of these differences are scarce. The study aim was to determine whether mitral regurgitant flows in ischemic MR differ from those in dilative MR. Methods: A left heart simulator was developed to evaluate possible differences in regurgitant flows between two pathological mitral valve configurations, ischemic and dilative. Ischemic MR was simulated by increasing the baseline intercommissural diameter (CC) by 10%, the baseline septolateral (SL) diameter by 30%, and by displacing the posteromedial papillary muscle (PM) to the apical posterolateral position. Dilative MR was simulated by increasing the baseline SL and CC diameters by 30%, and by a symmetrical displacement of both PMs. Mitral regurgitant flow measurements were carried out under transmitral pressures ranging from 40 to 140 mmHg (increments of 15 mmHg). Camera snapshots of the mitral annulus were used to accurately determine mitral annular Results: A total of 24 measurements was made on four porcine mitral valves; 14 to evaluate ischemic MR, and 10 to evaluate dilative MR. In ischemic MR, a constant regurgitant flow was observed throughout the pressure range tested. In dilative MR, increasing the transmitral pressure caused the regurgitant flows to decrease exponentially. The mitral annulus snapshot analysis showed that displacement of the posteromedial PM in ischemic MR caused the regurgitation orifice to appear at the tented side of the valve. An additional regurgitation orifice was formed through bulging (prolapse) of the leaflets at the contralateral commissure. (Abstract truncated at 2000 characters) [COBISS.SI-ID [26437337](#)]

46. KŠELA, Juš, KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, SUWALSKI, Piotr, SUWALSKI, Grzegorz, GERŠAK, Borut. Ventricular arrhythmic disturbances and autonomic modulation after beating-heart revascularization in patients with pulmonary normotension. *Wien. Klin. Wochenschr.*, 2009, jg. 121, hft. 9-10, str. 324-329, doi: [10.1007/s00508-009-1183-x](#).

BACKGROUND: De-novo ventricular arrhythmias are potentially life-threatening complications after beating-heart revascularization (off-pump CABG). Whether pulmonary hypertension can influence initiation of ventricular arrhythmias through increased sympathetic activity is controversial. In order to

determine the influence of pulmonary hypertension on its relative contribution to ventricular arrhythmia, we first had to define the role of cardiac autonomic modulation in patients with pulmonary normotension. We aimed to observe how parameters of linear and nonlinear heart rate variability are changed pre- and postoperatively in patients with pulmonary normotension undergoing off-pump CABG. **METHODS:** Fifteen-minute ECG recordings were collected before and after off-pump CABG in 54 patients with multivessel coronary artery disease and pulmonary normotension to determine linear (TP, HF, LF, LF:HF ratio) and nonlinear detrended fluctuation analysis (α_1 , α_2) and fractal dimension (average, high and low) parameters of heart rate variability. Arrhythmia was monitored preoperatively in 24-hour Holter recordings and postoperatively by continuous monitoring and clinical assessment. **RESULTS:** Deterioration from simple (Lown I-II) to complex (Lown III-V) ventricular arrhythmia was observed in 19 patients, and improvement from complex to simple arrhythmia in five patients ($P = 0.022$). Patients with postoperative deterioration of ventricular arrhythmia had preoperatively significantly lower values of TP, HF and LF ($P = 0.024-0.043$) and postoperatively significantly higher values on the low fractal dimension index ($P = 0.031$) than patients with postoperative improvement of arrhythmia. **CONCLUSION:** Patients experiencing postoperative deterioration of ventricular arrhythmia already have impaired autonomic regulation before surgery. (Abstract truncated at 2000 characters) [COBISS.SI-ID [25698265](#)]

47. BENETTI, Federico, KLOKOČOVNIK, Tomislav, KNEŽEVIČ, Ivan, GERŠAK, Borut. Xiphoid lower-sternotomy approach for multivessel revascularization of the left internal mammary artery to the left anterior descending artery and right internal mammary artery inflow to the other vessels. *The heart surgery forum*, 2010, letn. 13, št. 1, str. E36-E39, doi: [10.1532/HSF98.20091131](#).

Background: We describe the technical details and the preliminary results of a new surgical approach for multivessel disease that involves using a lower T sternotomy, grafting of the left internal mammary artery (LIMA) to the left anterior descending coronary artery (LAD) and use of the right internal mammary artery (RIMA) as inflow to the other vessels. **Operative technique:** The sternotomy was made from the xiphoid up to the fourth intercostal space and then was continued transversally (T incision). The LIMA was harvested for a length of approximately 8 cm, with preservation of the distal part. The vein was simultaneously taken from the leg. The RIMA was dissected for a length of approximately 5 cm, and the distal part was occluded. Then, 3 mg/kg heparin was given. The anastomosis between the vein and the RIMA was performed. The distal venous anastomoses were done either singly or sequentially. The anterior or posterior route was chosen according to the patient's anatomy. The LIMA was then anastomosed to the LAD. One drain was placed. The sternum was closed with 4 wires, 2 for the T incision and 2 for the sternum. **Results:** Between September and December 2008, 9 patients underwent their operations with this technique. The mean age was 60 years (range, 55-68 years). The mean number of grafts was 2.8. The mean hospital stay was 5.2 days. Operative mortality was 0%. All patients were reevaluated with 16-slice multislice computed tomography, and all grafts were patent. At the 3-month follow-up, all patients were alive and free of symptoms. **Conclusion:** This minimally invasive technique is a useful alternative for complete revascularization. The sternal mammary supply and the upper part of the sternum are preserved. [COBISS.SI-ID [26683609](#)]

48. PINHEIRO, Bruno Botelho, FIORELLI, Alfredo Inácio, GOMES, Otoni Moreira, GERŠAK, Borut. Cardiac effects of postconditioning depend critically on the duration of reperfusion and reocclusion episodes. *The heart surgery forum*, 2010, letn. 13, št. 1, str. E52-E56, doi: [10.1532/HSF98.20091135](#).

Objective: The objective of the present study was to evaluate the effects of ischemic postconditioning on left ventricular function in isolated rat hearts. **Methods:** The hearts of 24 Wistar rats were isolated, perfused immediately, and distributed into 3 groups: GI, control ($n = 8$); GII, three 10-second cycles of postconditioning ($n = 8$); and GIII, three 30-second cycles of postconditioning ($n = 8$). After a 15-minute stabilization period, all hearts underwent 20 minutes of global ischemia following 20 minutes of reperfusion. At times t_0 (control), t_5 , t_{10} , t_{15} , and t_{20} (0, 5, 10, 15, and 20 minutes of reperfusion, respectively), we recorded the heart rate, coronary flow, systolic pressure, $+(dP/dt)_{max}$ (maximum speed of increase in the left ventricular pressure), and $-(dP/dt)_{max}$ (maximum speed of decrease in the left ventricular pressure). Data were analyzed by a 1-way analysis of variance, followed by the Tukey test; a P value $< .05$ was considered statistically significant. **Results:** There were no significant differences among

the analyzed groups with respect to heart rate, coronary flow, systolic pressure, and $-(dp/dt)_{max}$ ($P > .05$); however, statistically significant differences in $+(dp/dt)_{max}$ between GII and GI and between GII and GIII occurred at t20 (GI, 1409.0 +/- 415.1 mm Hg/s; GII, 1917.3 +/- 403.0 mm Hg/s; GIII, 1344.8 +/- 355.8 mm Hg/s) (GII versus GI, $P = .04$; GII versus GIII, $P = .02$). Conclusion: Ischemic postconditioning with three 10-second cycles of reperfusion/reocclusion was demonstrated effective for preserving $+(dp/dt)_{max}$ in isolated rat hearts that underwent 20 minutes of ischemia following 20 minutes of reperfusion. [COBISS.SI-ID [26683097](#)]

49. POKUSHALOV, Evgueny, ROMANOV, Alexander, PROHOROVA, Darya, CHERNIAVSKY, Alexander, KARASKOV, Alexander, GERŠAK, Borut. Coronary artery bypass grafting with and without concomitant epicardial cardiac resynchronization therapy in patients with ischemic cardiomyopathy : a randomized study. *The heart surgery forum*, 2010, doi: [10.1532/HSF98.20091149](#).

Background: Epicardial implantation of a cardiac resynchronization therapy (CRT) system during coronary artery bypass grafting (CABG) may be an additional treatment method for improving left ventricle (LV) systolic function and dyssynchrony in patients with ischemic heart failure. Objective: The objective was to compare the long-term results in patients with severe ischemic heart failure who underwent CABG alone or CABG combined with concomitant epicardial implantation of a CRT system. Methods: One hundred sixty-four consecutive patients with severe ischemic heart failure and LV dyssynchrony were enrolled into 2 groups: CABG alone ($n = 80$) and epicardial CRT implantation during CABG (CABG + CRT) ($n = 84$). This prospective, randomized, and single-blind study was designed to compare clinical and echocardiography data after 6, 12, and 18 months of follow-up. Results: In the CABG group, LV systolic function, dyssynchrony signs, and quality of life did not change postoperatively, compared with preoperative data. In contrast, these parameters significantly improved in the CABG + CRT group. The 2 treatment groups did not differ with respect to postoperative improvement in Canadian Cardiovascular Society class ($P = .68$). The improvement in the New York Heart Association functional class was much more pronounced in the CABG + CRT group than in the CABG group ($P = .029$). In the CABG group, 21 patients (26.2%) had died by the 18-month follow-up, compared with 9 patients (10.7%) in the CABG + CRT group ($P = .012$, log-rank test). Conclusion: Epicardial implantation of a CRT system concomitantly with CABG facilitates the early postoperative period, improves LV systolic function, improves the quality of life, and decreases LV dyssynchrony. Moreover, mortality in the CABG + CRT group was significantly lower than in the CABG group. [COBISS.SI-ID [26682841](#)]

1.02 Review article

50. KOSIN, Miro, JEZERNIK-LESKOVŠEK, Jolanda, GERŠAK, Borut. Hirurška korekcija koarktacije aorte - rani i kasni rezultati = [Surgical repair of coarctation of the aorta: early and late results]. *Kardiologija (Beogr.)*, 1989, letn. 10, št. 1, str. 57-62. [COBISS.SI-ID [8636930](#)]

51. GERŠAK, Borut. Operacije na delujočem srcu - z zunajtelesnim obtokom ali brez njega = Cardiac surgery on the beating heart - with or without cardiopulmonary bypass. *Zdrav Vestn (Tisk. izd.)*. [Tiskana izd.], maj 1999, letn. 68, št. 5, str. 291-296.

Background. Cardiopulmonary bypass (CPB) is a standard procedure used in cardiac surgery. Despite the widespread use some deleterious effects are the consequence of its use: activation of leucocytes, activation of complement, damaging effects on platelets and effects on complex brain function. Influence of minimally and less invasive cardiac surgery in the last few years with the operations on the beating heart raised the thoughts on off-pump cardiac surgery and cardiac surgery on the beating heart. Conclusions. Today cardiac surgeons are in the possibility to provide complete revascularization of myocardium on the beating heart without the use of CPB. Open heart procedures can be made on CPB with the heart beating with retrograde coronary sinus perfusion. [COBISS.SI-ID [9826777](#)]

52. KRNJAK, Ljuba, TRUNK, Primož, GERŠAK, Borut, OSREDKAR, Joško. Biokemični in klinični

pomen koncentracije proteina S100B pri bolnikih, operiranih na srcu = Biochemical and clinical significance of protein S100B concentration at patients undergoing coronary artery bypass grafting. *Farm. vestn.*, 2002, let. 53, št. 4, str. 383-387. [COBISS.SI-ID [1221745](#)]

53. GERŠAK, Borut, SUTLIČ, Željko. Aortic and mitral valve surgery on the beating heart is lowering cardiopulmonary bypass and aortic cross clamp time. *The heart surgery forum*, 2002, letn. 5, št. 2, str. 182-186.

Objective: The concept of cardiac surgery on the beating heart is acceptable rationale for the cardiac surgery in the next millenium. Beating heart (off-pump) coronary artery bypass grafting (CABG) techniques have led us to consider the possibility for performing the aortic and mitral valve surgery (mitral valve repairs and replacements - with or without CABG) on the beating heart with the technique of retrograde oxygenated coronary sinus perfusion. Methods: We used the technique of retrograde oxygenated blood coronary sinus perfusion in 78 patients (Group All) (36 patients were with extremely low ejection fraction (Group X) - 62 % of whom were in New York Heart Association (NYHA) class 4 and 34% of whom were in NYHP. class 3). The procedures for the patients were: aortic, mitral and tricuspid valve surgery, in combination with CABG in ischemic patients. CABG was done in all the cases off-pump. In addition, we performed a case match study for 37 patients with good ejection fraction (51.65 +- 11.88) (Beating Heart Group) operated on the beating heart with most appropriate group of patients (No. 37) operated in our institutions on arrested heart (ejection fraction 51.07 +- 12.93) (Arrested Heart Group). The case match selection criteria were: gender, left ventricular ejection fraction, atrial fibrillation, hypertension, pulmonary hypertension, and diabetes. The selected beating heart group and selected arrested heart groups were without statistically significant differences for the mentioned criteria. Results: There were statistically significant differences between Beating Heart Group and Arrested Heart Group in the duration of Cardiopulmonary Bypass Time (69.35 +- 13.52 min. versus 93.59 +- 28.54 min.), $p < 0.001$, and statistically significant differences in Aortic Cross Clamp Time (46.5 +- 8.95 min. versus 61.5 +- 18.34 min.), $p < 0.001$. (Abstract truncated at 2000 characters). [COBISS.SI-ID [15048921](#)]

54. FREUDENTHAL, Adinda, SAMSET, Eigil, GERŠAK, Borut, DECLERCK, Jerome, SCHMALSTIEG, Dieter, CASCIARO, Sergio, RIDENG, Oyvind, VANDER SLOTEN, Jos. Augmented reality in surgery ARIS*ER, research training network for minimally invasive therapy technologies = Navidezna resničnost v kirurgiji (ARIS*ER), mreža za raziskave in razvoj minimalno invazivnih načinov zdravljenja. *Endosk. rev.*, 2005, letn. 10, št. 23, str. 5-10.

Augmented Reality in Surgery (ARIS*ER), a Marie Curie Research Training network, is presented. ARIS*ER aims at exploring and developing for Augmented Reality and haptics, based on radiological imaging. This will be combined with robotics, opening up new possibilities in endoscopy and other minimally invasive therapies, as well as improving the information support for current applications. Surgeons, radiologists, engineers and human factor specialists will work in close cooperation to establish a user centered research and development approach. Various interactive research and design steps are planned, including testing of prototypes with patients. [COBISS.SI-ID [19260633](#)]

55. ZUPAN, Anja, BRECELJ, Aleš, GERŠAK, Borut. Srčni spodbujevalniki - kaj, kdaj in kako = Implantable pacemakers - what, when and how. *Med. razgl. (Tisk. izd.)*. [Tiskana izd.], 2005, letn. 44, št. 1, str. 43-53.

The digital world of computer technologies is becoming increasingly important in all fields of science, including medicine. Many new approaches that seemed to be pure fantasy decades ago are now being realised, in both diagnostics and treatment. One of these incredible advances in modern medicine are implantable pacemakers, which have undergone tremendous development since first implantation in 1958 by Senning in Sweden. A pacemaker is a small computer that is implanted into the human body and from then on tracks every heartbeat, triggering a pulse when the heart fails to make a contraction. This is a device which has thoroughly changed the quality and duration of life of people suffering from cardiac rhythm disturbances: such children are now able to grow up and develop normally into adults and many still active adults do not need to give up their sports activities. The following article discusses some basic

issues related to implantable pacemakers, from principles of their functioning and indications for their implantation to the essentials of treating patients with this device. [COBISS.SI-ID [19278553](#)]

56. GERŠAK, Borut, ŠOŠTARIČ, Maja, TRUNK, Primož. Srčna kirurgija pri starostniku = Cardiac surgery in the elderly. *Slov. kardiol.*, 2005, letn. 2, št. 1, str. 46-49. [COBISS.SI-ID [19235289](#)]

57. GERŠAK, Borut, KUŽNER, Jernej, DREVENŠEK, Gorazd. Myocardial protection strategies during cardiac surgery = Strategije za zaščito miokarda med srčno kirurgijo. *Slov. kardiol.*, 2005, letn. 2, št. 2, str. 148-158.

The techniques involving various protective measures during heart surgery (heart, brain and body protection) can improve the outcome of surgery if properly used. Heart protection can be invoked by ischemic/hypoxic or by [COBISS.SI-ID [20132057](#)]

58. ZUPAN, Igor, RAKOVEC, Peter, TASIČ, Jerneja, GERŠAK, Borut, GABRIJELČIČ, Tone. Vsadni kardioverter-defibrilator v KC Ljubljana. Pregled rezultatov v letih 1989-2005 = Implantable cardioverter defibrilator in MC Ljubljana. An overview from 1989-2005. *Zdrav Vestn (Tisk. izd.)*. [Tiskana izd.], 2005, letn. 74, suppl. 1, str. I-27 - I-30.

It is now a scientifically proven fact that implantable cardioverter defibrillator (ICD) therapy is the therapy of first choice for patients at high risk of life-threatening ventricular tachyarrhythmias. A significant contribution to the accelerating acceptance of ICD therapy comes from the technological advances, which have reduced the morbidity and enhanced programming and diagnostics very similar to pacemaker therapy. In Medical Centre Ljubljana ICDs have been implanted since 1989, altogether 207 pieces in 153 patients. We evaluated the indications, pacing mode, ejection fraction, number of shocks and the concomitant pharmacological treatment. [COBISS.SI-ID [19266009](#)]

59. DOLENC, Jure, GERŠAK, Borut. Moderna obravnava anevrizem poplitealne arterije = Modern approach to popliteal artery aneurysms. *Slov. kardiol.*, 2007, letn. 4, št. 2, str. 108-111.

Popliteal artery aneurysms are rare, although they are the commonest amongst peripheral aneurysms. They are more common in elderly men. Usually their etiology is atherosclerotic. Rarely they are associated with trauma or medical procedures. Often they are associated with abdominal aortic aneurysm and connective tissue disorders. Although they can be asymptomatic, they usually manifest themselves with thrombosis or distal emboli. Rarely they show signs of local compression or rupture. The diagnosis is established with clinical and ultrasound examination. Before the onset of treatment arteriography and rarely computed tomography or magnetic resonance imaging is performed. Most of the authors recommend elective operation before the onset of complications. The standard procedure is medial approach with proximal and distal ligation of the aneurysm and reconstruction of bypass. Better yet technically more complexed is posterior approach where the aneurysm can be removed as a whole. This approach is not suitable for all popliteal artery aneurysms. Recently, endovascular treatment with percutaneously insertion of a stent graft through the aneurysm is becoming an important alternative to surgical treatment. [COBISS.SI-ID [23496153](#)]

60. CVIJIČ, Marta, GERŠAK, Borut. Endoskopska srčna kirurgija = Endoscopic heart surgery. *Med. razgl. (Tisk. izd.)*. [Tiskana izd.], 2008, letn. 47, št. 2, str. 161-167. [COBISS.SI-ID [25143769](#)]

61. ŠOŠTARIČ, Maja, GERŠAK, Borut, PRELOŽNIK-ZUPAN, Irena. Srčna operacija pri bolniku s heparinom povzročeno trombocitopenijo = Heparin induced thrombocytopenia and cardiac surgery. *Zdrav Vestn (Tisk. izd.)*. [Tiskana izd.], 2008, letn. 77, št. 3, str. 247-253.

Background Heparin induced thrombocytopenia (HIT) is a serious complication related to the heparin treatment and might lead to the life-threatening consequences such as arterial and venous thrombosis. The patient with HIT scheduled for cardiac surgery represents serious problem because heparin, most common used anticoagulation drug during cardiac surgery, must be avoided. Conclusions From the results of the

recent clinical studies it seems that direct thrombin inhibitors, especially bivalirudin represent an acceptable alternative to the heparin anticoagulation during the cardiac surgery. [COBISS.SI-ID [24203993](#)]

62. ŠAVLI, Tomaž, GERŠAK, Borut. TEA v primerjavi s PTA pri zdravljenju stenoze karotidnih arterij = TEA in comparison to PTA in carotid artery stenosis. *Med. razgl. (Tisk. izd.)*. [Tiskana izd.], 2009, letn. 48, št. 3, str. 251-256.

In the beginning of the century a new percutaneous method has evolved in treatment of carotid artery stenosis as an alternative to the carotid endarterectomy. First trials showed promising results and inspired the "percutaneous enthusiasts even more. During the last years many trials comparing these two methods have been completed. Findings were controversial and the most important, they were all missing results over a longer period. These are now becoming more abundant, therefore so on it will be possible to make new conclusions, abstract guidelines in treatment of carotid artery occlusive disease etc. In this article we reviewed mostly meta-analyses and review articles addressing this issue. We can conclude that the described two methods are equally efficient, but also that the carotid endarterectomy still remains first-line treatment, mainly because of lower incidence of stroke and death in 30 days after procedure. Both methods have different characteristics, which we think, can be used in favor of the patients. [COBISS.SI-ID [26024153](#)]

1.03 Short scientific article

63. GERŠAK, Borut, TROBEC, Roman. Human heart in the focus of computer power : editorial. *Comput. biol. med.*. [Print ed.], 2003, vol. 33, no. 3, str. 183-184. [COBISS.SI-ID [17465639](#)]

64. ROZMAN, Janez, PEČLIN, Polona, KNEŽEVIČ, Ivan, MIRKOVIČ, Tihomir, GERŠAK, Borut, PODBREGAR, Matej. Heart function influenced by selective mid-cervical left vagus nerve stimulation in a human case study. *Hypertens. res.*, 2009, letn. 32, št. 11, str. 1041-1043, doi: [10.1038/hr.2009.140](https://doi.org/10.1038/hr.2009.140). [COBISS.SI-ID [26042329](#)]

1.04 Professional article

65. PIRC, Borut, GERŠAK, Borut, RUŽIČ-MEDVEŠČEK, Nadja. Cor triatriatum sinistrum, aortic coarctation and bicuspid aortic stenosis in an adult. *Eur. j. cardio-thorac. surg.*. [Print ed.], 1996, let. 10, str. 1139-1140.

Cardiac anomalies are usually diagnosed early in life, which is particularly true for their various combinations. The diagnosis in adulthood is rare. Here we report the case of a young man with an aortic coarctation corrected at the age of 16, however the associated stenotic bicuspid aortic valve and cor triatriatum sinistrum were corrected after Streptococcus viridans endocarditis 7 years later. [COBISS.SI-ID [29913](#)]

66. GERŠAK, Borut, TROBEC, Roman. Neinvazivna metoda diagnosticiranja miokardnega ishemičnega področja s 64-kanalnim EKG sistemom = Non-invasive diagnostic method of ishemical miocard by 64-channel ECG system. *Raziskovalec*, 1996, let. 26, št. 3, str. 30-32. [COBISS.SI-ID [13311527](#)]

67. GERŠAK, Borut, SMRKOLJ, Vladimir, GABRIJELČIČ, Tone. Erfolgreiche chirurgische Revaskularisation nach 18stündiger Ischaemie unterhalb des Knies infolge eines vollstaendigen Abrisses der A. poplitea = Successful surgical revascularization after 18-h ischemia below the knee as a result of complete abruptio of the popliteal artery. *Unfallchirurg*, 1997, letn. 100, št. 7, str. 591-592.

We report the case of a 33-year-old man after knee luxation and disrupction of a popliteal artery, which was missed after repositioning at the first clinic. Eighteen hours later complete discontinuity of the popliteal artery was confirmed by arteriography and an immediate reversed, end-to-end auto-venous graft was interposed under general anesthesia with anterior and posterior fasciotomy prior to blood flow restoration. Forced diuresis with a diuretic mixture and balanced fluid intake were used, and the patient was discharged from the intensive care unit on the 10th postoperative day in good condition with normal diuresis. [COBISS.SI-ID [8400601](#)]

68. GERŠAK, Borut, LAKIĆ, Nikola, GORJUP, Vojka, GOLOB-GULIČ, Tatjana, BERDEN, Pavel, ČERNIČ ŠULIGOJ, Nataša. Right ventricular metastatic choriocarcinoma obstructing inflow and outflow tract. *Ann. thorac. surg.*. [Print ed.], 2002, vol. 73, no. 5, str. 1631-1633.

We operated on a 34-year-old man with a metastatic tumor that extended from the tricuspid valve to the pulmonary valve and obstructed the right ventricle inflow and outflow tracts. The tumor was removed with preservation of the tricuspid valve. Additional chemotherapy was carried out according to the BEPO (etoposid, cisplatin, bleomycin, vincristin) scheme. Histology revealed metastasis of a choriocarcinoma originating from the right testis. Computed tomography performed after 6 months detected no metastases in the lungs. Magnetic resonance imaging showed a thickened right ventricle free wall and apex. The patient is doing well 18 months postoperatively. [COBISS.SI-ID [14799577](#)]

69. GERŠAK, Borut, BRECELJ, Aleš, ŠOŠTARIČ, Maja, RUŽIČ-MEDVEŠČEK, Nadja, ZUPAN, Igor. Zdravljenje kroničnega srčnega popuščanja z resinhronizacijskim spodbujevalnikom = Treatment of chronic heart failure by the use of resynchronization therapy. *Zdrav Vestn (Tisk. izd.)*. [Tiskana izd.], 2005, letn. 74, suppl. 1, str. I-41 - I-43.

Chronic heart failure due to systolic dysfunction has been treated pharmacologically by the extensive use of ACE inhibitors, beta blockers, spironolactone and digoxin improving morbidity, mortality and the quality of life as well as decreasing hospitalisation rate in the last decade. However, despite all the endeavors to optimize pharmacological treatment the mortality of the described syndrome remains unreasonably high and many patients suffer from expressed symptoms that considerably affect their quality of life. Thus, novel treatment modalities are being sought continuously and there is one, namely cardiac resynchronisation therapy which has gained increasing interest in the last couple of years. [COBISS.SI-ID [19267033](#)]

70. ŠERVICL-KUCHLER, Darja, ZUPAN, Igor, GERŠAK, Borut. Kirurška obravnava bolnikov z vstavljenimi srčnimi spodbujevalniki in vsadnimi defibrilatorji = Surgery management of patients with implanted pacemakers and cardioverter defibrillators. *Zdrav Vestn (Tisk. izd.)*. [Tiskana izd.], 2009, letn. 78, št. 4, str. 175-179.

Background The number of patients with implanted pacemakers (PM) and implantable cardioverter/defibrillators (ICD) is constantly increasing. If these patients need surgery, we have to adapt the procedures during the surgery to prevent complications. The pacemaker may be disturbed by individual sources of electromagnetic field (EMI). This can present as asynchronous pacing, inhibition, stimulation on the upper limit, ventricular fibrillation, burns in the endocardium and pacemaker damage. Implantable cardioverter/defibrillator can be switched off or it can deliver countershocks under the influence of EMI. **Recommendations** The cardiologist or cardiovascular surgeon must check these patients a short time prior to surgery. During the surgery a bipolar electrocauter or ultrasonic scalpel should be used. The use of a unipolar electrocauter is not recommended for surgery above the waist. If the surgeon uses it anyway, there are some directions that have to be followed, and are described in this article. The function R (R is responsible for physiological rate adaptation) of the pacemaker and the implanted cardioverter defibrillator have to be switched off just prior to surgery. In the operating room, an external defibrillator, external pacemaker, a programming device and a magnet should always be present. The patient also has to be checked after the surgery, because failure of the device may not be apparent for up to 48 hours after surgery. **Conclusions** Pacemakers and cardioverter/defibrillators may be disturbed by individual sources of electromagnetic field. If we consider all the recommendations, the surgery will be

much safer for this cohort of patients. [COBISS.SI-ID [25602521](#)]

1.05 Popular article

71. GERŠAK, Borut. Endoskopske operacije na srcu. *Za srce (Ljubl.)*, 2003, letn. 12, št. 7, str. 7. [COBISS.SI-ID [19872985](#)]

1.08 Published scientific conference contribution

72. GERŠAK, Borut, TROBEC, Roman, GABRIJELČIČ, Tone, SLIVNIK, Boštjan. The model of topical heart cooling during induced hypothermic cardiac arrest in open heart surgery : a parallel computer simulation. V: *Computers in cardiology 1995 : September 10-13, 1995, Vienna, Austria*, (Computers in cardiology). Los Alamitos (California): IEEE Computer Society Press, 1995, str.597-600. [COBISS.SI-ID [13311783](#)]

73. TROBEC, Roman, SLIVNIK, Boštjan, GERŠAK, Borut, GABRIJELČIČ, Tone. Computer simulation and spatial modelling in heart surgery. V: MIKLAVČIČ, Damijan (ur.), BAJD, Tadej (ur.), STANIČ, Uroš (ur.), MUNIH, Marko (ur.). 9th International Conference on Mechanics in Medicine and Biology, Ljubljana, Slovenia, June 30 - July 4, 1996. *Proceedings*. 1. izd. Ljubljana: Fakulteta za elektrotehniko, 1996, 1996, str. 519-522.

A three dimensional modelling and heat transfer computer simulation of generally-shaped, non-homogenous bodies, is proposed and described in this work. The complexity of the calculation is estimated and the potential use of high performance parallel computers is discussed. The method is focused for applications in medicine. As an example, a numerical algorithm for the parallel computer simulation of heart cooling procedures during surgery is presented, and, on the basis of simulated results, different methods of cooling are compared. [COBISS.SI-ID [185305](#)]

74. AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut, VOKAČ, Damijan. Multichannel ECG measurement system. V: KOKOL, Peter, STIGLIC, Bruno, KANCLER, Kurt, MALČIČ, Ivan, ZAVRŠNIK, Jernej, BIGEC, Martin, KANCLER, Borut, WELZER-DRUŽOVEC, Tatjana, BREST, Janez. *The 10th IEEE Symposium on Computer-Based Medical Systems, June, 11th - 13th 1997, Maribor, Slovenia, Europe*. 1997, str. 81-84.

Multichannel ECG is an important instrumentation for experimental and clinical electrophysiology. Both the software and the front-end design issues are described for a 128 channel system which can record the signals up to 100 seconds. The basic analysis and presentation of the acquired ECG signals are also given with examples of body surface potential maps. Thanks to the frequency response of the front-end down to 0.05 Hz, the system can show high resolution isointegral maps of ST segment shift. The system is modular and can be modified for different number of channels, sample-rate, bandwidth, and quantization resolution. [COBISS.SI-ID [12536615](#)]

75. GERŠAK, Borut, GABRIJELČIČ, Tone, TROBEC, Roman, AVBELJ, Viktor. Comparison of the ST-40ms isointegral maps prior to and after aortocoronary revascularisation. V: *Computers in cardiology 1997 : September 7-10, 1997, Lund, Sweden*, (Computers in cardiology, Vol. 24). Piscataway (NJ): IEEE, 1997, str. 505-507. [COBISS.SI-ID [13143079](#)]

76. GERŠAK, Borut. Oskrba žilnih poškodb spodnjega uda. V: GERŠAK, Borut (ur.). *Kirurgija arterij femoropoplitealne predela : zbornik simpozija, Ljubljana 1997*. Ljubljana: Klinični center, Kirurške klinike, Kirurška šola: Društvo slovenskih kardiokirurgov, 1997, str. 33-45. [COBISS.SI-ID [185817](#)]

77. GERŠAK, Borut. Patogeneza in klinična slika žilnih poškodb spodnjega uda. V: GERŠAK, Borut (ur.). *Kirurgija arterij femoroplitealnega predela : zbornik simpozija, Ljubljana 1997*. Ljubljana: Klinični center, Kirurške klinike, Kirurška šola: Društvo slovenskih kardiokirurgov, 1997, 1997, str. 46-49. [COBISS.SI-ID [186073](#)]

78. GERŠAK, Borut, BOCCHINO, Lise, BATISTA, Randas J. V. Aspects of volume reduction surgery - partial left ventriculectomy. V: PAJER, Zdenka (ur.), ŠTIBLAR-MARTINČIČ, Draga (ur.). *International Symposium on Cardiovascular Diseases held at Ljubljana, Slovenia, December 3 - 5, 1998 : proceedings of the 29th Memorial Meeting devoted to prof. dr. Janez Plečnik*. Ljubljana: Medical Faculty, Institute of Histology and Embryology, 1998, str. 337-341.

Partial left ventriculectomy is based on Laplace's law; reducing the left ventricular diameter should result in decrement of myocardial wall - stress. The early postoperative echocardiographic changes are showing immediate increase in ejection fraction with little alteration of stroke volume. On the basis of original surgical technique, some modifications are emerging, including different approaches to the mitral valve repair. The anatomicosurgical basis for segmental reduction of left ventricle was made by experimental marginal artery ligation, corresponding myocardial infarction and its excision. [COBISS.SI-ID [8854489](#)]

79. GORJUP, Vojka, JAZBEC, Anja, GERŠAK, Borut, HORVAT, Matija. Transtelefonška elektrokardiografija v Sloveniji. V: MREVLJE, Franc (ur.), MOŽINA, Hugon (ur.), KOCIJANČIČ, Andreja (ur.). 40. Tavčarjevi dnevi. *Zbornik predavanj in povzetkov posterjev*. V Ljubljani: Medicinska fakulteta, Katedra za interno medicino: Klinični center, 1998, str. 9-13. [COBISS.SI-ID [9051353](#)]

80. GORJUP, Vojka, JAZBEC, Anja, GERŠAK, Borut. Transtelephonic ECG in Slovenia. V: KOKOL, Peter (ur.), ZUPAN, Blaž (ur.), STARE, Janez (ur.), PREMIK, Marjan (ur.), ENGELBRECHT, Rolf (ur.). *Medical Informatics Europe '99*, (Studies in health technology and informatics, vol. 68). Amsterdam [etc.]: IOS Press; Tokyo: Ohmsha, cop. 1999, str. 217-222.

Transtelephonic ECG has been introduced in Slovenia in 1996. It has been operating on a regular basis since September 1997. Users of the system are health institutions and patients with CV diseases. They use portable 12- channel ECG weighing less than 200 grams. Diagnostic center is located in medical ICU in Clinical Center Ljubljana. In the first 20 months of regular operation we have received 852 calls, 450 of them being diagnostic. The most common reasons for calling were: ischaemic chest pain, atypical chest pain, palpitations and dyspnoea. Most common diagnoses made on the basis of history and ECG were: AMI, angina pectoris, paroxysmal tachycardias and atypical chestpain. In 186 cases the cardiologists' advice sufficed, 171 patients were referred to the ER, 142 immediately and 29 only if suggested therapy hadn't been successful. To 82 patients new medication or changed dosage of previous medication was suggested. With the intent to evaluate accuracy of the diagnoses made on the basis of history and transtelephonic ECG evaluation we followed up the patients who were sent to ER in Ljubljana upon our cardiologists' advice. On the basis of preliminary results we can conclude that TTE is as diagnostic as the conventional ECG and its use shortens time from onset of symptoms to initiation of treatment, it lowers disability and mortality due to CV diseases and improves cost benefit. [COBISS.SI-ID [10293465](#)]

81. GERŠAK, Borut, GORJUP, Vojka, JAZBEC, Anja. The telemedicine and second medical opinion. V: KOKOL, Peter (ur.), ZUPAN, Blaž (ur.), STARE, Janez (ur.), PREMIK, Marjan (ur.), ENGELBRECHT, Rolf (ur.). *Medical Informatics Europe '99*, (Studies in health technology and informatics, vol. 68). Amsterdam [etc.]: IOS Press; Tokyo: Ohmsha, cop. 1999, str. 245-246.

Telemedicine is declared as delivery of care to patients anywhere in the world by combining communications technology, with medical expertise. The well established applications of telemedicine are in the field of teleradiology, pathology, cardiology. In some cases video-conferencing (VC) may be applied. Second medical opinion is an important additional viewpoint on the patient diagnosis and treatment. The established network of consultant hospitals and worldwide Second opinion centers enable a fast (24 - 72 hours response) second medical opinion consultation service with the telemedicine application. The consultant hospitals at present time are: UCSF - San Francisco, Stanford Medical Center,

Bowman Gray School of Medicine, The Brigham Radiology Foundation , Emory University Hospital, University of Pennsylvania Medical Center. The second opinion centers are located worldwide, just to mention some of them: London, Budapest, Ljubljana, Tel Aviv, Bombay, Athens, Milano, Seoul. [COBISS.SI-ID [10293977](#)]

82. GERŠAK, Borut, TROBEC, Roman, AVBELJ, Viktor. Conduction changes after partial left ventriculectomy. V: KAWAGUCHI, Akira T. (ur.), LINDE, Leonard M. (ur.). *Partial left ventriculectomy: recent evolution for safe and effective application : proceedings of the 2nd International Symposium on Partial Left Ventriculectomy, Tokyo, Japan, 12 December 1998*, (Excerpta medica, Cardiology, 1190). 1st ed. Amsterdam [etc.]: Elsevier, 1999, str. 99-111. [COBISS.SI-ID [14733351](#)]

83. GERŠAK, Borut. Cardiovascular procedures in shock. V: CEROVIĆ, Ognjen (ur.), ŠTAJER, Dušan (ur.). *Symposium book*. Ljubljana: Slovenian Society of Intensive Medicine, 1999, str. 107-109. [COBISS.SI-ID [11039961](#)]

84. GERŠAK, Borut. Anatomija prekrvitve spodnjih udov. V: SMRKOLJ, Vladimir (ur.). *Zbornik predavanj XXXV. podiplomskega tečaja kirurgije za zdravnike splošne medicine, od 4. - 6. februarja 1999*. Ljubljana: Kirurška klinika, Klinični center: Katedra za kirurgijo, Medicinska fakulteta, 1999, str. 9-12. [COBISS.SI-ID [9311705](#)]

85. GERŠAK, Borut. Ambulantno spremljanje bolnikov po operacijski revaskularizaciji spodnjih udov. V: SMRKOLJ, Vladimir (ur.). *Zbornik predavanj XXXV. podiplomskega tečaja kirurgije za zdravnike splošne medicine, od 4. - 6. februarja 1999*. Ljubljana: Kirurška klinika, Klinični center: Katedra za kirurgijo, Medicinska fakulteta, 1999, str. 58-60. [COBISS.SI-ID [9314009](#)]

86. TRUNK, Primož, PIPAN, Gregor, MOČNIK, Jaka, TROBEC, Roman, GERŠAK, Borut. Simulation of heart temperature changes during cardiac surgery. V: OKŠA, G. (ur.), TROBEC, Roman (ur.). *Parallel numerics, ParNum 2000 : proceedings of the International Workshop, Bratislava Slovakia, September 18-20, 2000*. Salzburg: Department of Informatics, Mathematical Institute, Slovak Academy of Sciences: Institute of Scientific Computing, University of Salzburg Jakob Haringer, 2000, str. 202-208. [COBISS.SI-ID [15358503](#)]

87. SAMARIN LOVRIČ, Silvia, HREN, Rok, TROBEC, Roman, AVBELJ, Viktor, GERŠAK, Borut. Spatial resolution of epicardial pace mapping using body surface potentials. *Pflügers Arch*, 2000, letn. 440, št. 5, suppl., str. R123-R125.

Body surface potential maps (BSPMs) recorded during pace mapping provide an important non-invasive means for identifying local cardiac events; recent clinical studies demonstrated that endocardial pacing sites can be resolved within less than 10 mm. We sought to determine whether similar spatial resolution could be achieved during epicardial pacing. four patients who were undergoing either heart valve replacement (one), aortocoronary bypass graft (one), or both (two) were studied. In each patient a pair of epicardial electrodes was placed intraoperatively at the middle aspect of the right ventricular free wall. The distance between the neighbouring electrodes was 10mm. Five days after the surgery, ECGs were acquired from 35 leads during pacing from each epicardial electrode. We determined the distributions of QRS integrals (the net area under the ECG signal) and compared integrals corresponding to pacing from each of the adjacent electrodes using statistical indices. Student's t-test was applied to these indices and in all the patients revealed that differences in distributions of QRS integral maps were statistically significant ($p < 0.01$). Results of our study indicate that the non-invasive acquisition of body surface ECGs could resolve epicardial breakthrough sites within 10 mm, which may be useful in facilitating therapeutic ablations in patients with ventricular tachycardias. [COBISS.SI-ID [11904985](#)]

88. TRUNK, Primož, TROBEC, Roman, GERŠAK, Borut. Measurement of porcine heart temperatures. *Pflügers Arch*, 2000, letn. 440, št. 5, suppl., str. R132-R133.

During cardiac surgery local hypothermia of the heart is used to slow down cellular metabolism. It has been shown by computer simulation that heart muscle is not uniformly cooled to the desired temperatures. The aim of our work was to find out a way for measuring the temperatures of the ventricular wall and the septum with ± 1 degrees C accuracy. The measurement protocol should be applicable during operations on the human heart, during which disturbing factors should be minimized. We have tested the protocol and the equipment on porcine hearts. Two types of probes were tested, the contact-probe, which can be attached to the heart-wall surface, and the needle- probe, which can be inserted into the heart tissue. Before experiments the probes were calibrated and their heat transfer characteristics determined. We conclude that the probes and the protocol are suitable for studying the effects of cardioplegia, and for checking the results previously obtained by computer simulation. [COBISS.SI-ID [11905241](#)]

89. RAKOVEC, Peter, GABRIJELČIČ, Tone, BRECELJ, Aleš, GERŠAK, Borut, ŠINKOVEC, Matjaž, SAMARIN LOVRIČ, Silvia. Kirurško zdravljenje atrijske fibrilacije pri operaciji mitralne zaklopke = Surgical treatment of atrial fibrillation during mitral valve surgery. V: KENDA, Miran F. (ur.), RAKOVEC, Peter (ur.). *Sodobna obravnava motenj srčnega ritma*. Ljubljana: Združenje kardiologov Slovenije: Delovna skupina za aritmologijo in elektrostimulacijo srca, 2000, str. 149-150.

During mitral valve surgery, chronic atrial fibrillation can be cured by a major additional surgical procedure (maze procedure). Intraoperative radiofrequency pulmonary veins isolation represents a less complicated surgical technique, which may be of help for a substantial proportion of patients with both chronic atrial fibrillation and mitral valvular disease. [COBISS.SI-ID [12077529](#)]

90. GERŠAK, Borut. Travmatske poškodbe velikih žil aortnega loka. V: SMRKOLJ, Vladimir (ur.). *Zbornik predavanj XXXVI. podiplomskega tečaja kirurgije za zdravnike družinske medicine, od 3. - 5. februarja 2000*. Ljubljana: Kirurška klinika, Klinični center: Katedra za kirurgijo, Medicinska fakulteta, 2000, str. 127-130. [COBISS.SI-ID [11330009](#)]

91. GERŠAK, Borut, LAKIČ, Nikola. Poškodbe žilja kolenskega območja. V: SMRKOLJ, Vladimir (ur.). *Zbornik predavanj XXXVI. podiplomskega tečaja kirurgije za zdravnike družinske medicine, od 3. - 5. februarja 2000*. Ljubljana: Kirurška klinika, Klinični center: Katedra za kirurgijo, Medicinska fakulteta, 2000, str. 248-251. [COBISS.SI-ID [11335897](#)]

92. GERŠAK, Borut. Body surface mapping after partial left ventriculectomy. V: ŠTRANCAR, Janez (ur.). *International Conference on Life Sciences 2001, Gozd Martuljek, Slovenia, September 22-26, 2001. Book of abstract[!] with programme*. Ljubljana: Slovenian Biophysical Society, 2001, str. 91. [COBISS.SI-ID [13765081](#)]

93. KNAP, Bojan, BREN, Andrej, JUŽNIČ, Gojmir, GERŠAK, Borut, NOORDERGRAAF, A.... Comparison between a computer simulation of left ventricular shape and ejection fraction. V: ŠTRANCAR, Janez (ur.). *International Conference on Life Sciences 2001, Gozd Martuljek, Slovenia, September 22-26, 2001. Book of abstract[!] with programme*. Ljubljana: Slovenian Biophysical Society, 2001, str. 104. [COBISS.SI-ID [13767385](#)]

94. GERŠAK, Borut. Beating heart valve surgery assisted by retrograde coronary sinus perfusion with oxygenation warm blood. V: KIMCHI, Asher (ur.). *Heart disease : new trends in research, diagnosis and treatment*. Englewood: Medimond, 2001, str. 689-693.

The concept of cardiac surgery on the beating heart is acceptable rationale for the cardiac surgery in the next millenium. With the retrograde oxigenated coronary sinus perfusion it is possible to perform open cardiac surgery. Good exposure of the mural and aortic valve during this type of surgery is necessary. A surgical technique is described, that allows complex surgical operations, such as double valve operations with/without coronary artery bypass grafting, on the beating heart, giving details of mural and aortic valve exposure, retrograde coronary sinus perfusion, and timing of each procedure. [COBISS.SI-ID [14590937](#)]

95. TRUNK, Primož, MOČNIK, Jaka, PIPAN, Gregor, TROBEC, Roman, GERŠAK, Borut. Visualization

of computer simulated heart temperature during topical cooling. *Pflügers Arch*, 2001, letn. 442, št. 6, suppl. 1, str. R139-141.

A local hypothermia is often used during cardiac operations to slow down the tissue metabolism. The heart is cooled down with cold cardioplegic solution. Sometimes even the topical cooling with or without ice slush is used. Different heart models have been used earlier to simulate heart temperature distribution, but the resolution of the model has always been limited by the speed of the computer. We used the computer heart model derived from Visible Human Dataset with the spatial resolution of 1mm. In this article, the step-by-step generation of 3D computer heart model is described. The heat transfer was modeled by a diffusion equation that was discretised in space and time and solved by a parallel algorithm. Finally, the cooling of heart during an operation, with and without topical ice slush, was simulated on a cluster of 9 PC-based computers, which assured sufficient computing power. These simulated results are presented as images of cross sections in different planes with temperatures shown by different colors. [COBISS.SI-ID [13648089](#)]

96. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Imaging of power spectral heart rate variability regarding subject position. *Pflügers Arch*, 2001, letn. 442, št. 6, suppl. 1, str. R142-144.

Heart rate variability (HRV) and its assessment using power spectral analysis revealed a possibility to quantify the characteristics of autonomic nervous system, related cardiovascular status and sympathovagal interaction. This study was designed to assess vagal tone in supine and right recumbent position in normal healthy subjects as many maneuvers that potentially increase vagal tone have been sought both in normal subjects and in patients with heart disease. Seven subjects, four male and three female, aged 20 - 27 years were enrolled in the study. To evaluate the time-dependent stability of short term ECG recordings, every subject participated in six ECG recording sessions (three successive morning and three successive afternoon measurements). Heart rate power spectra were obtained by off line Fast Fourier Transform analysis. The frequency domain measures, namely very low frequency power (VLF), low frequency power (LF), high frequency power (HF) and total power were determined, and their normalized correlates used in the comparison between supine and right recumbent position. Normalized high frequency (nHF) indicated cardiac vagal activity, normalized low frequency power indexed sympathetic modulated activity, low frequency power / high frequency power ratio (LF/HF) represented sympathovagal balance. The results showed remarkable variation among successive day measurements as well as among study subjects. However, several types of response to adopting right recumbent position could be identified. In the first, in right recumbent position the values of nHF, indicator of vagal activity did not differ appreciably from the values measured in supine position. Secondly, there was a tendency towards higher nHF values and lower LF/HF power ratio in supine position. We were not able to notice any appreciable difference among morning and afternoon short-term measurements. Finally, our results do not suggest higher vagal modulation when lying in right recumbent position [COBISS.SI-ID [13648345](#)]

97. GERŠAK, Borut. Drugo mišljenje - nova mogućnost za bolesnike i liječnike = Second opinion - a new opportunity for patients and doctors. V: KURJAK, Asim (ur.), RICHTER, Branimir (ur.). *Telemedicina u Hrvatskoj : dostignuća i daljnji razvitak*. Zagreb: Akademija medicinskih znanosti Hrvatske, 2001, str. 105-108.

Telemedicine is one of the youngest branches in medicine. It stands for transmitting and exchanging medical knowledge by distance using high technology telecommunication devices. The usage of telemedicine exists in almost all branches of medicine. It is most often used in teleradiology, which is the queen of telemedicine, followed by cardiology, dermatology, psychology, urgent medicine, pathology and oncology. Teleradiology along with telenuclear medicine is currently the most specialized form of telemedicine. The task of the telemedicine network, established in 196 is to ensure acquisition of a second medical opinion with the assistance of specialists from the leading Health Care Centers in the USA, Europe and finally all over the world. The project is called Second Opinion and with it, a second opinion from top specialists is attainable to patients from all over the world. The Project uses the latest achievements of telemedicine and is organized as a telemedicine network with the Second Opinion Centers in: San Francisco, New York,

Mexico, Caracas, Buenos Aires, Sao-Paulo, Paris, Ljubljana, London, Milano, Madrid, Varšava, Prag, Budimpešta, Bukarešt, Tel-Aviv, Alma-Ata, Nairobi, Casablanca, Johannesburg, Bombay, Seoul, Hong Kong, Tokio, Manila, Sydney. [COBISS.SI-ID [14565593](#)]

98. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Comparison of sequential changes in heart rate variability after on-pump and off-pump coronary artery bypass grafting. *The heart surgery forum*, 2002, letn. 5, suppl. 1, str. S88-96.

Background: Cardiac vagal modulation is reduced in patients with coronary artery disease or previous myocardial infarction. The propensity to lethal arrhythmias and oxygen consumption is thus increased. The objective of the present study was to assess the effect of different techniques used in coronary artery bypass grafting (CABG), namely on-pump versus off-pump, on the level of vagal modulation in the immediate postoperative period. Methods: Thirty-three patients, aged 34-76 years were enrolled in the study. Six patients undergone off-pump CABG; the rest were operated on-pump. The electrocardiograms (ECG) and respiratory waveform signals were recorded in the afternoons in supine position. Power spectra of the heart rate variability (HRV) were computed using Fast Fourier Transform analysis (FFT). The following HRV indexes were calculated: total power (TP) of spectra was defined in the range of 0.01-0.40 Hz, high frequency (HF) power within 0.15-0.40 Hz, low frequency (LF) power within 0.04-0.15 Hz. Normalized power (n) was defined as the ratio of power in each band / total power. The nHF power indicated cardiac vagal modulation; nLF power indexed sympathetic baroreflex modulated activity. The LF/HF ratio represented sympathovagal balance. Kolmogorov-Smirnov test, paired t-test or Wilcoxon signed rank and Mann-Whitney U test have been applied in statistical analysis, a value of $p < 0.05$ was considered significant. Results: The HRV indexes were diminished markedly after CABG regardless of the technique applied. TP, HF, LF, LF/HF ratio changed by 40 - 70%, the differences were significant on fourth and seventh postoperative day. Comparing off-pump versus on-pump group, the HF power was significantly higher by factor 2 in off-pump patients on the fourth and seventh day after CABG. (Abstract truncated at 2000 characters). [COBISS.SI-ID [14596569](#)]

99. GERŠAK, Borut, ŠOŠTARIČ, Maja, KALIŠNIK, Jurij-Matija, BLUMAUER, Robert. Operacije na odprtem srcu s pomočjo videoasistirane tehnologije. V: REPŠE, Stanislav (ur.), TRŠINAR, Bojan (ur.). *Zbornik predavanj XXXIX. podiplomskega tečaja kirurgije, od 17.-18. oktobra 2003*. Ljubljana: Kirurška klinika, Klinični center, 2003, str. 85-87. [COBISS.SI-ID [17066713](#)]

100. KRNJAK, Ljuba, TRUNK, Primož, GERŠAK, Borut, OSREDKAR, Joško. Merjenje koncentracije proteina S100B v serumu z metodo imunoluminiscence = Determination of protein S100B serum concentration using immunoluminescence assay. V: TIVADAR, Andrijana (ur.). *Zbornik razširjenih povzetkov*, (Farmacevtski vestnik, letn. 55, posebna št.). Ljubljana: Slovensko farmacevtsko društvo, 2004, str. 341-342. [COBISS.SI-ID [1607025](#)]

101. SOJAK, Vladimir, BLUMAUER, Robert, KALAN, Gorazd, PODNAR, Tomaž, GERŠAK, Borut. Current status of congenital heart surgery in Slovenia. V: SMRKOLJ, Vladimir (ur.). *Kirurgija v starostnem obdobju : zbornik povzetkov*. [S. l.: Združenje kirurgov Slovenije], 2006, str. 107-108. [COBISS.SI-ID [21373657](#)]

102. LEJKO-ZUPANC, Tatjana, GERŠAK, Borut, GABRIJELČIČ, Tone, BRECELJ, Aleš, SOK, Mihael, PLANINC STRUNJAŠ, Natalija. Kirurške okužbe srca in prsnega koša = Cardiothoracic surgical infections. V: BEOVIČ, Bojana (ur.), STRLE, Franc (ur.), ČIŽMAN, Milan (ur.). *Novosti. Okužbe, ki potrebujejo kirurško zdravljenje*. Ljubljana: Sekcija za kemoterapijo SZD: Klinični center, Klinika za infekcijske bolezni in vročinska stanja: Univerza v Ljubljani, Medicinska fakulteta, Katedra za infekcijske bolezni in epidemiologijo, 2007, str. 143-160. [COBISS.SI-ID [23113433](#)]

103. PEČLIN, Polona, KNEŽEVIČ, Ivan, MIRKOVIČ, Tihomir, GERŠAK, Borut, RADAN, I., PODBREGAR, Matej, ROZMAN, Janez. Selective stimulation of the vagus nerve in a man. V: *ECIFMBE 2008*, (IFMBE proceedings, vol. 22). [Berlin]: Springer, cop. 2008, 2008, letn. 22, str. 1628-1631. [COBISS.SI-ID [25293529](#)]

104. GERŠAK, Borut, JELENC, Matija. Kirurško zdravljenje bolnikov s kronično koronarno boleznijo in pridruženo hibo srčnih zaklopk. V: BUNC, Matjaž (ur.), GRADECKI, Iztok (ur.). *Tretji posvet o kronični koronarni bolezni, Novo mesto, 5. april 2008*. Novo mesto: Zdravniško društvo, 2008, str. 32-37.

[COBISS.SI-ID [24194009](#)]

105. GERŠAK, Borut, KERIN, Viktorija. Biološke srčne zaklopke = Biological heart valves. V: TONIN, Martin (ur.), REPŠE, Stanislav (ur.), TOMAŽIČ, Aleš (ur.), KRISTAN, Anže (ur.). *Zbornik predavanj XLIII. podiplomskega tečaja kirurgije, 16.-17. maj 2008*. Ljubljana: Združenje kirurgov Slovenije, Slovensko zdravniško društvo, 2008, str. 79-90. [COBISS.SI-ID [24393689](#)]

1.09 Published professional conference contribution

106. MIRTič, Aleksandra, GERŠAK, Borut. Žilna kirurgija na Univerzitetni kliniki za kirurgijo srca in ožilja. V: *Žilna kirurgija : zbornik : Kostanjevica na Krki, 29. maja 1992, Zdravilišče Šmarješke Toplice, 30. maja 1992*. [Ljubljana]: Slovensko zdravniško društvo, Angiološka sekcija, 1992, str. 11-12.

[COBISS.SI-ID [51485696](#)]

107. GERŠAK, Borut, PIRC, Borut, PIKELJ, Franjo. Uporaba antibiotikov v kardiovaskularni kirurgiji. V: SMRKOLJ, Vladimir (ur.). *Zbornik predavanj XXX. podiplomskega tečaja kirurgije za zdravnike splošne medicine, od 09. do 11. februarja 1994*. Ljubljana: Klinični center: Medicinska fakulteta, 1994, str. 65-70.

[COBISS.SI-ID [45818880](#)]

108. GERŠAK, Borut, PIRC, Borut. Operacija na srcu - zahteven problem. V: SMRKOLJ, Vladimir (ur.). *Zbornik predavanj XXXII. podiplomskega tečaja kirurgije za zdravnike splošne medicine, od 1. - 3. februarja 1996*. Ljubljana: Klinični center: Medicinska fakulteta, 1996, str. 76-82. [COBISS.SI-ID

[63093504](#)]

109. GERŠAK, Borut. ECG changes after partial left Ventriculectomy. V: PAJER, Zdenka (ur.), ŠTIBLAR-MARTINČIČ, Draga (ur.). *International Symposium on Cardiovascular Diseases held at Ljubljana, Slovenia, December 3 - 5, 1998 : proceedings of the 29th Memorial Meeting devoted to prof. dr. Janez Plečnik*. Ljubljana: Medical Faculty, Institute of Histology and Embryology, 1998, str. 343-350, ilustr. [COBISS.SI-ID [2924852](#)]

110. RUŽIČ-MEDVEŠČEK, Nadja, KLANČAR, Nada, BERDEN, Pavel, PIRC, Borut, GERŠAK, Borut, GABRIJELČIČ, Tone, DOLENC-STRAŽAR, Zvezdana. Mase v arkusu aorte - redek vir perifernih embolij = Masses in aortic arch - a rare source of peripheral embolisms. V: BRUČAN, Andrej (ur.), GRIČAR, Marko (ur.), KLANČAR, Slavica (ur.), FINK, Andrej (ur.). *Urgentna medicina : izbrana poglavja 4 : zbornik : selected topics 4 : proceedings*. Ljubljana: Slovensko združenje za urgentno medicino: = Slovenian Society for Emergency Medicine, 1998, str. 249-252.

Atherosclerotic lesions of the aortic arch are potential sources of cerebral and peripheral arterial embolism. Recently, mobile thrombi in the aortic arch in young patients without diffuse atherosclerosis have been reported. We describe three patients with peripheral embolic events, manifested with severe ischaemia of limbs, which in two of them, despite repeated thrombectomies, led to partial loss of extremities. In search of possible origin of emboli, large mobile masses were found in aortic arch in all 3 patients by transesophageal echocardiography, confirmed later by some other techniques. The first patient was a young healthy woman a few weeks after childbirth with no obvious underlying disease. In other two patients the underlying diseases were probably wide spread malignancy and colitis ulcerosa in an exacerbated state. The cases illustrate the crucial role of TEE in the assessment of patients with systemic embolizations. [COBISS.SI-ID [7766489](#)]

111. GERŠAK, Borut. Žilna stena in kirurška travma. V: GERŠAK, Borut (ur.), SMRKOLJ, Vladimir (ur.). *Žilne anastomoze*. Ljubljana: Medicinska fakulteta, Katedra za kirurgijo, Podiplomska šola kirurških

tehnika, 1999, str. 17-27. [COBISS.SI-ID [11196121](#)]

112. GERŠAK, Borut. Poškodbe srca in velikih žil = Cardiovascular procedures in shock. V: BALAŽIC, Jože (ur.), ŠTEFANIČ, Borut (ur.). 10. spominsko srečanje akademika Janeza Milčinskega [tudi] Medicinsko izvedenstvo 2000, Ljubljana, 5.-6. december 2000. *Travmatizem v cestnem prometu*. Ljubljana: Inštitut za sodno medicino, 2001, str. 307-310.

The article with the most common traumatic events including heart and great vessels with declaration of emergency of treatment. The operative procedures and possibilities are briefly and schematically described. [COBISS.SI-ID [13622489](#)]

113. KOSIN, Miro, GERŠAK, Borut, HOLLAN, Jiri. Poškodba srca z izvijačem pri poskusu samomora - prikaz primera = Heart injury with a screw-driver in an attempt of suicide - a case report. V: BRUČAN, Andrej (ur.), GRIČAR, Marko (ur.), KLANČAR, Slavica (ur.), FINK, Andrej (ur.). *Urgentna medicina : izbrana poglavja 6 : zbornik : selected topics 6 : proceedings*. Ljubljana: Slovensko združenje za urgentno medicino: = Slovenian Society for Emergency Medicine, 2000, str. 453-456.

There are various sequelae of stab chest wounds, more or less dramatic, and the right ventricle is the most commonly injured heart chamber. Clinical recognition of this life threatening condition may be difficult, despite well described physical signs, and the adequate help often still too late. We describe a case of 34 years old psychiatric patient, who attempted suicide, stabbing his left chest with a screw-driver and injuring his heart. Half an hour later, he was brought to the emergency department of the Medical Center of Ljubljana. In his fourth intercostal space on the left sternal border there was a screw-driver, stabbed into the chest up to its handle. Because the patient was conscious and hemodynamically stable, and there was no bleeding from the wound, we decided to make some preoperative evaluations. Chest roentgenogram showed a long, narrow foreign body with a density of metal, deep inside the left chest and pericardial cavity. Ultrasound of the heart revealed 1 cm thick layer of pericardial effusion without the signs of cardiac tamponade. A median sternotomy was performed, the screw-driver removed and the wound in the anterior wall of the right ventricle closed. The postoperative course was completely uneventful, and on the day seven post op., the patient was transferred to a psychiatric institution for further care. [COBISS.SI-ID [11659481](#)]

114. GERŠAK, Borut, KALIŠNIK, Jurij-Matija. Kirurško zdravljenje motenj arterijske prekrvitve. V: URBANČIČ-ROVAN, Vilma (ur.). *Oskrba diabetičnega stopala : [priročnik za medicinske sestre]*. 2. izd. V Ljubljani: Klinični center, Klinični oddelek za endokrinologijo, diabetes in bolezni presnove, 2003, str. 109-114. [COBISS.SI-ID [17072601](#)]

115. GERŠAK, Borut, KALIŠNIK, Jurij-Matija. Indikacije za kirurško zdravljenje periferne arterijske okluzivne bolezni = Indications for surgical treatment of peripheral arterial occlusive disease. V: REPŠE, Stanislav (ur.). *Zbornik predavanj XL. podiplomskega tečaja kirurgije, 11.-12. februar 2005*. Ljubljana: Kirurška klinika, Klinični center, 2005, str. 17-23.

Background. Peripheral arterial occlusive disease (PAOD) has high prevalence in normal adult population and significant mortality and therefore presents important therapeutical challenge. Methods. Arterial insufficiency is primarily solved by endarterectomy, vascular plasty, bypassing of the segment concerned or the combination of the above. Results. Surgical revascularization has a better long-term results. However, it should be indicated only when the risk of perioperative complications does not outweigh the benefits of the procedure. Conclusions. Preoperative planning for treatment of the diseased carotid arteries includes evaluation of the severity of stenosis, clinical manifestation and progress of the diseases and perioperative risk. Surgical treatment of lower extremity PAOD is based on Fonten classification: surgical revascularization is treatment of choice in critical limb ischemia. [COBISS.SI-ID [19633625](#)]

116. GERŠAK, Borut, SOJAR, Valentin, ŠOŠTARIČ, Maja, MIHELIČ, Miro. Operativno zdravljenje zapor vene kave zaradi malignih procesov v trebuhu. V: KOZAK, Matija (ur.), BLINC, Aleš (ur.), ŠABOVIČ, Mišo (ur.). *Žilne bolezni in rak*. Ljubljana: Združenje za žilne bolezni Slovenskega

zdravniškega društva, 2006, str. 141-147.

Treating the malignant process of the kidney, spreading into the inferior venacaval sistem, and sometimes into the right heart, includes multidisciplinary approach of urologist, abdominal surgeon, cardiovascular surgeon, cardiovascular anesthesiologist and intensive postoperative care. The patient is connected to the cardiopulmonary bypass, the tumor removed from the abdominal vena cava and from the right heart. Till now we successfully treated seven such patients. [COBISS.SI-ID [21015257](#)]

117. BRECELJ, Aleš, KALIŠNIK, Matija Jurij, GERŠAK, Borut, GABRIJELČIČ, Tone, GRAČNER, Rajko, KNEŽEVIČ, Ivan, KLOKOČOVNIK, Tomislav, JAKLIČ, Vlado. Kirurško zdravljenje atrijske fibrilacije. V: ZUPAN, Igor (ur.), PERNAT, Andrej (ur.). *Aritmije : strokovno srečanje : atrijska fibrilacija, pacemakerji, vsadni kardioverter defibrilator (ICD), prekatne aritmije : zbornik predavanj, Brdo pri Kranju, 21. 4. 2007.* Ljubljana: Društvo za napredek kardiologije, 2007, str. 22-26. [COBISS.SI-ID [22859225](#)]

118. GERŠAK, Borut. Kirurške tehnike implantacije srčnih spodbujevalnikov. V: ZUPAN, Igor (ur.), PERNAT, Andrej (ur.). *Aritmije : strokovno srečanje : atrijska fibrilacija, pacemakerji, vsadni kardioverter defibrilator (ICD), prekatne aritmije : zbornik predavanj, Brdo pri Kranju, 21. 4. 2007.* Ljubljana: Društvo za napredek kardiologije, 2007, str. 39-45. [COBISS.SI-ID [22859993](#)]

119. KLOKOČOVNIK, Tomislav, KNEŽEVIČ, Ivan, GERŠAK, Borut, POGLAJEN, Gregor, VODIŠKAR, Janez. Kirurška ravaskularizacija miokarda brez uporabe zunajtelesnega krvnega obtoka. V: TONIN, Martin (ur.). *Zbornik predavanj XLII. podiplomskega tečaja kirurgije, 2.-3. februar 2007.* Ljubljana: Združenje kirurgov Slovenije, Slovensko zdravniško društvo, 2007, str. 169-176. [COBISS.SI-ID [22356441](#)]

120. GERŠAK, Borut. Cardiovascular procedures in the state of emergency. V: Podiplomska šola kirurških tehnik, Portorož, 6.-8. marec 2008. *Šola kirurških tehnik.* Celje: Splošna in učna bolnišnica, 2008, str. 63-65. [COBISS.SI-ID [24216025](#)]

121. BLUMAUER, Robert, MISHALY, D., GERŠAK, Borut. Novosti v kirurškem zdravljenju prirojenih srčnih napak v Sloveniji. V: PRIMOŽIČ, Janez (ur.), GROSEK, Štefan (ur.). XIII. izobraževalni seminar Kritično bolan in poškodovan otrok - razpoznavna, zdravljenje in prevoz, Ljubljana, November 2009. *Knjiga predavanj.* Ljubljana: Klinični oddelek za otroško kirurgijo in intenzivno terapijo, Kirurška klinika, Univerzitetni klinični center, 2009, str. 1-4. [COBISS.SI-ID [26245337](#)]

1.12 Published scientific conference contribution abstract

122. GERŠAK, Borut, TROBEC, Roman. Measurements of direct tip force of a clamp arm on the vessel wall : invited talk presented at 3rd International Meeting in ARGE Alps-Adria, Graz, 1996, Abstracts. *J. Kardiol.*, 1996, vol. 3, str. 9. [COBISS.SI-ID [12245799](#)]

123. GERŠAK, Borut, TROBEC, Roman, GABRIJELČIČ, T. Comparison of the ST-40ms isointegral maps prior to and after aortocoronary revascularisation. V: *Computers in cardiology 1997 : September 7-10, 1997, Lund, Sweden*, (Computers in cardiology, Vol. 24). Piscataway (NJ): IEEE, 1997, str. 142. [COBISS.SI-ID [12855335](#)]

124. TRUNK, Primož, TROBEC, Roman, GERŠAK, Borut. Measurement of heart wall temperature during open heart surgery. V: FERJAN, Ilonka (ur.), KRŽAN, Mojca (ur.), STANOVNIK, Lovro (ur.), ČARMAN-KRŽAN, Marija (ur.). Life Sciences Conference 1999 and Congress of Slovenian Pharmacological Society, Gozd Martuljek, Slovenia, September 18 - 22, 1999. *Book of abstracts and programme.* Ljubljana: Slovenian Pharmacological Society, 1999, str. 116. [COBISS.SI-ID [10139097](#)]

125. SAMARIN LOVRIČ, Silvia, HREN, Rok, TROBEC, Roman, GERŠAK, Borut. Spatial resolution of

epicardial pace mapping using body surface potentials clinical and modelling study. V: FERJAN, Ilonka (ur.), KRŽAN, Mojca (ur.), STANOVNIK, Lovro (ur.), ČARMAN-KRŽAN, Marija (ur.). Life Sciences Conference 1999 and Congress of Slovenian Pharmacological Society, Gozd Martuljek, Slovenia, September 18 - 22, 1999. *Book of abstracts and programme*. Ljubljana: Slovenian Pharmacological Society, 1999, str. 164. [COBISS.SI-ID [10149337](#)]

126. GERŠAK, Borut. Aortic and mitral valve surgery on the beating heart. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 8th Alpe Adria Cardiology Meeting, May 24-27, 2000, Portorož, Slovenia. *Abstract book*. Ljubljana: Slovenian Society of Cardiology, 2000, str. 14. [COBISS.SI-ID [11423705](#)]

127. GERŠAK, Borut, RUŽIČ-MEDVEŠČEK, Nadja, BERDEN, Peter, BUFFOLO, E..., NOORDERGRAAF, A..., LUNKENHEIMER, P... P. Ventricular remodelling after mitral valve replacement in patients with end stage heart disease. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 8th Alpe Adria Cardiology Meeting, May 24-27, 2000, Portorož, Slovenia. *Abstract book*. Ljubljana: Slovenian Society of Cardiology, 2000, str. 74. [COBISS.SI-ID [11432665](#)]

128. RAKOVEC, Peter, SAMARIN, S., TROBEC, Roman, AVBELJ, Viktor, ŠINKOVEC, M., GERŠAK, Borut. Electrocardiography and arrhythmias. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 8th Alpe Adria Cardiology Meeting, May 24-27, 2000, Portorož, Slovenia. *Abstract book*. Ljubljana: Slovenian Society of Cardiology, 2000, str. 75. [COBISS.SI-ID [15052839](#)]

129. RAKOVEC, Peter, SAMARIN LOVRIČ, Silvia, TROBEC, Roman, AVBELJ, Viktor, ŠINKOVEC, Matjaž, GERŠAK, Borut. Improved interpretation of multipolar endocardial mapping. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 8th Alpe Adria Cardiology Meeting, May 24-27, 2000, Portorož, Slovenia. *Abstract book*. Ljubljana: Slovenian Society of Cardiology, 2000, str. 75. [COBISS.SI-ID [11433177](#)]

130. GORJUP, Vojka, JAZBEC, Anja, GERŠAK, Borut. Transtelephonic ECG system in Slovenia. Analysis of 28 months operation of the system. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 8th Alpe Adria Cardiology Meeting, May 24-27, 2000, Portorož, Slovenia. *Abstract book*. Ljubljana: Slovenian Society of Cardiology, 2000, str. 95. [COBISS.SI-ID [11435481](#)]

131. SAMARIN LOVRIČ, Silvia, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Determination of spatial resolution of different epicardial pacing sites by using body surface mapping. V: 12th International Congress on Cardiac Electrophysiology, Nice Acropolis, French Riviera, 14-17 June 2000. *Abstracts : cardiostim 2000*, (Europace, Vol. 1, Suppl. D 2000). London: W.B.Saunders, 2000, str. D230. [COBISS.SI-ID [15569447](#)]

132. GERŠAK, Borut, TROBEC, Roman, AVBELJ, Viktor, BATISTA, Randas J. V. Body surface potential mapping and its possible use to study the patients operated with partial left ventriculectomy. V: 12th International Congress on Cardiac Electrophysiology, Nice Acropolis, French Riviera, 14-17 June 2000. *Abstracts : cardiostim 2000*, (Europace, Vol. 1, Suppl. D 2000). London: W.B.Saunders, 2000, str. D243. [COBISS.SI-ID [15569703](#)]

133. TRUNK, Primož, MOČNIK, Jaka, PIPAN, Gregor, TROBEC, Roman, GERŠAK, Borut. Visualization of computer simulated heart temperature during topical cooling. V: ERŽEN, Ida (ur.), ŠTIBLAR-MARTINČIČ, Draga (ur.). *Life sciences 2000 : programme, abstracts, Gozd Martuljek, September 28th to October 1st, 2000*. Ljubljana: Slovenian Society for Stereology and Quantitative Image Analysis, 2000, str. 26. [COBISS.SI-ID [11877593](#)]

134. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Imaging of power spectral heart rate variability regarding subject position. V: ERŽEN, Ida (ur.), ŠTIBLAR-MARTINČIČ, Draga (ur.). *Life sciences 2000 : programme, abstracts, Gozd Martuljek, September 28th to October 1st, 2000*. Ljubljana: Slovenian Society for Stereology and Quantitative Image Analysis, 2000, str. 31. [COBISS.SI-ID [11878617](#)]

135. AVBELJ, Viktor, KALIŠNIK, Jurij-Matija, TROBEC, Roman, GERŠAK, Borut. Heart rate and

breathing spectrograms regarding body position in normal subjects. V: ŠTRANCAR, Janez (ur.). International Conference on Life Sciences 2001, Gozd Martuljek, Slovenia, September 22-26, 2001. *Book of abstract[!] with programme*. Ljubljana: Slovenian Biophysical Society, 2001, str. 97. [COBISS.SI-ID [13765593](#)]

136. FRLJAK, Sabina, TROBEC, Roman, GERŠAK, Borut. Comparison of changes in qt interval variability after surgery in cardioplegic arrest beating heart surgery. V: ŠTRANCAR, Janez (ur.). International Conference on Life Sciences 2001, Gozd Martuljek, Slovenia, September 22-26, 2001. *Book of abstract[!] with programme*. Ljubljana: Slovenian Biophysical Society, 2001, str. 98. [COBISS.SI-ID [13765849](#)]

137. SAMARIN LOVRIČ, Silvia, AVBELJ, Viktor, TROBEC, Roman, RAKOVEC, Peter, GERŠAK, Borut. Analysis of heart rate after cardiac transplantation based on respiration cycle. V: ŠTRANCAR, Janez (ur.). International Conference on Life Sciences 2001, Gozd Martuljek, Slovenia, September 22-26, 2001. *Book of abstract[!] with programme*. Ljubljana: Slovenian Biophysical Society, 2001, str. 99. [COBISS.SI-ID [13766105](#)]

138. TRUNK, Primož, TROBEC, Roman, GERŠAK, Borut. Computer simulation of the heart temperature changes during non-beating heart operation. V: ŠTRANCAR, Janez (ur.). International Conference on Life Sciences 2001, Gozd Martuljek, Slovenia, September 22-26, 2001. *Book of abstract[!] with programme*. Ljubljana: Slovenian Biophysical Society, 2001, str. 100. [COBISS.SI-ID [13766361](#)]

139. BLUMAUER, Robert, GERŠAK, Borut, VALENČIČ, Vojko. Simulation of the influence of the diameter and position of endovascular stentgraft on the blood flow and shear forces in descending aorta. *The heart surgery forum*, 2001, letn. 4, suppl 2, str. S61. [COBISS.SI-ID [18534873](#)]

140. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Comparison of sequential changes in heart rate variability after on-pump and off-pump CABG. *The heart surgery forum*, 2001, letn. 4, suppl 2, str. S63. [COBISS.SI-ID [18535129](#)]

141. TRUNK, Primož, GERŠAK, Borut, TROBEC, Roman. 3D heart model for computer simulations in cardiac surgery. *The heart surgery forum*, 2001, letn. 4, suppl 2, str. S105. [COBISS.SI-ID [18535385](#)]

142. UJIJE, T., AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Cardiac ECG signal changes after partial left ventriculectomy. *The heart surgery forum*, 2001, letn. 4, suppl 2, str. S117. [COBISS.SI-ID [18535641](#)]

143. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut. Changes in vagal modulation after CABG regarding subject position. *The heart surgery forum*, 2001, letn. 4, suppl 2, str. S118. [COBISS.SI-ID [18536153](#)]

144. TRUNK, Primož, GERŠAK, Borut, TROBEC, Roman. Use of topical cardiac cooling is not adequately lowering right ventricular myocardial temperature - computer simulation of myocardial temperature changes. *The heart surgery forum*, 2001, letn. 4, suppl 2, str. S118. [COBISS.SI-ID [18535897](#)]

145. GERŠAK, Borut. Comparison of normothermic CPB/hypothermic CPB with hypothermic blood cardioplegia and off-pump aortocoronary bypass grafting. *The heart surgery forum*, 2001, letn. 4, suppl 2, str. S119. [COBISS.SI-ID [18536409](#)]

146. GORJUP, Vojka, GERŠAK, Borut, GOLOB-GULIČ, Tatjana, ČERNIČ ŠULIGOJ, Nataša. Right ventricular metastatic choriocarcinoma obstructing in- and outflow tract. *J. Kardiol.*, 2001, jg. 8, suppl. E, str. 11. [COBISS.SI-ID [1983039](#)]

147. TROBEC, Roman, PIPAN, Gregor, GERŠAK, Borut. Parallel simulation of topic heart cooling. V: 15th International Parallel & Distributed Processing Symposium, IPDPS 2001, San Francisco, California,

USA, April 23-27, 2001. *Proceedings [and] abstracts and CD-ROM*. Los Alamitos [etc.]: IEEE Computer Society, 2001, 6 str. [COBISS.SI-ID [15953191](#)]

148. KRNJAK, Ljuba, GERŠAK, Borut, TRUNK, Primož, LENART, Katarina, ČERNE, Darko, OSREDKAR, Joško. Evaluation of S100B serum concentration during coronary artery bypass grafting. V: *The 18th International Congress of Clinical Chemistry and Laboratory Medicine : The 50th Anniversary of International Federation and Clinical Chemistry : The 42th Annual Meeting of the Japan Society of Clinical Chemistry : Kyoto, Japan, 20-25 October 2002 : abstracts volume*, (Clinical Chemistry and Laboratory Medicine, Vol. 40, special suppl.). Berlin; New York: W. de Gruyter, 2002, str. S 316. [COBISS.SI-ID [1224561](#)]

149. GERŠAK, Borut. Kirurgija na delujočem srcu = Valve surgery on the beating heart. V: BOBNAR NAJŽER, Elizabeta (ur.). *Gradivo*. Ljubljana: Svetovni slovenski kongres: = Slovenian World Congress, 2002, str. 34-35. [COBISS.SI-ID [15320281](#)]

150. GERŠAK, Borut. Beating heart surgery - from aortocoronary bypass surgery to procedures on valves. *The heart surgery forum*, 2002, letn. 5, št. 2, str. 153. [COBISS.SI-ID [15124953](#)]

151. GERŠAK, Borut. Načela modernega kirurškega zdravljenja bolezni aortne in mitralne zaklopke = Principles of modern surgical treatment of aortic and mitral valve diseases. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). *Končni program in zbornik izvlečkov*. [Ljubljana]: Združenje kardiologov Slovenije, [2002], str. 25. [COBISS.SI-ID [14614489](#)]

152. TRUNK, Primož, KRNJAK, Ljuba, GERŠAK, Borut, OSREDKAR, Joško. Comparison of serum S100B protein changes in off pump vs on pump CABG. V: *5th International Congress on Coronary Artery Disease - From Prevention to Intervention - ICCAD, Florence, Italy, October 19-22, 2003 : abstracts*, (The Journal of Coronary Artery Disease, Vol. 5, no. 1). [S.l: s.n.], 2003, str. 142.

Objective Č The S100B protein has been recognized as an early marker of cerebral damage. Elevated levels of S100B were detected in patients after the cardiac surgery with the use of cardiopulmonary bypass. We were interested if there are any differences in S100B serum concentrations between the off pump CABG and on pump CABG group of patients. **Methods** Č We studied 35 patients undergoing CABG surgery and measured the concentration of S100B protein in blood samples taken preoperatively, at the end of operation and first day after the surgery. The patients were divided in two groups, those having off-pump operations and those having heart operations with the use of cardiopulmonary bypass. **Results** Č We found peak levels of S100B immediately after surgery. The median concentration of S100B in off pump group was 0.40 gžL compared to 1.50 gžL in on-pump group of patients (p=0.0006). **Conclusions** Č The results are consistent with some other studies and suggest that heart surgery without the use of cardiopulmonary bypass could be less invasive regarding the cerebral damage. [COBISS.SI-ID [1434225](#)]

153. DOLENC-STRAŽAR, Zvezdana, GERŠAK, Borut, KOŽELJ, Mirta. Cardiac hemangioma. *Virchows Arch.*, September 2003, letn. 443, št. 3, str. 465. [COBISS.SI-ID [16697561](#)]

154. ŠOŠTARIČ, Maja, KALIŠNIK, Jurij-Matija, GERŠAK, Borut. Extubation in the operating room after endoscopic heart surgery. V: *13[^{sub}]th world congress of anaesthesiologists, Paris, April 18-23, 2004*. Paris: Colloquium, 2004. [COBISS.SI-ID [18986713](#)]

155. UJIIE, T., GERŠAK, Borut. Cardiac valve surgery on the beating heart. *Interactive cardiovascular and thoracic surgery*, June 2004, letn. 3, suppl. 1, str. S43. [COBISS.SI-ID [17741017](#)]

156. SAMARIN LOVRIČ, Silvia, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut, ZORMAN, Darko, HOJKER, Sergej, RAKOVEC, Peter, MILČINSKI, Metka. Circulating catecholamines and heart rate variability after orthotropic heart transplantation. *Interactive cardiovascular and thoracic surgery*, June 2004, letn. 3, suppl 1, str. S48. [COBISS.SI-ID [17741529](#)]

157. MILČINSKI, Metka, SAMARIN LOVRIČ, Silvia, TROBEC, Roman, GERŠAK, Borut, ZORMAN,

Darko, HOJKER, Sergej, RAKOVEC, Peter, AVBELJ, Viktor. Analysis of heart rate variability and QT interval in heart transplantant patients with respect to allograft sympathetic reinnervation. *Interactive cardiovascular and thoracic surgery*, June 2004, letn. 3, suppl 1, str. S49. [COBISS.SI-ID [17742041](#)]

158. KALIŠNIK, Jurij-Matija, GERŠAK, Borut, TRUNK, Primož, GABRIJELČIČ, Tone. Endoscopic radial artery harvesting : the Ljubljana experience. *Interactive cardiovascular and thoracic surgery*, June 2004, letn. 3, suppl 1, str. S54. [COBISS.SI-ID [17743065](#)]

159. MILČINSKI, Metka, SAMARIN LOVRIČ, Silvia, AVBELJ, Viktor, TROBEC, Roman, GERŠAK, Borut, ZORMAN, Darko, HOJKER, Sergej, RAKOVEC, Peter. Sympathetic reinnervation of cardiac allografts evaluated with iodine-123-meta-iodobenzylguanidine (123I-MIBG) : impact of heart region of interest (ROI) on heart/mediastinum ratio (HMR). *Interactive cardiovascular and thoracic surgery*, June 2004, letn. 3, suppl1, str. S70-S71. [COBISS.SI-ID [17743321](#)]

160. KRNJAK, Ljuba, GERŠAK, Borut, LENART, Katarina, OSREDKAR, Joško. Renal function and elimination of S100B after coronary artery bypass grafting. V: RAINBOW, Sandra (ur.), HALLWOTH, Mike (ur.). *16th IFCC-FESCC European Congress of Clinical Chemistry and Laboratory Medicine - EUROMEDLAB 2005 : 18-12 May 2005 Glasgow*, (Clinica Chimica Acta, Vol. 355, suppl. may). Amsterdam: Elsevier, 2005, str. S98, MP2.45. [COBISS.SI-ID [1735281](#)]

161. KALIŠNIK, Jurij-Matija, GERŠAK, Borut, TRUNK, Primož, GABRIJELČIČ, Tone. Endoscopic radial artery harvesting as minimal invasive technique of harvesting grafts for myocardial recascularization: first results. *Endosk. rev.*, 2005, letn. 10, št. 23, str. 63. [COBISS.SI-ID [19351769](#)]

162. RUŽIČ-MEDVEŠČEK, Nadja, ZUPAN, Igor, DOLENC-NOVAK, Maja, SAMARIN LOVRIČ, Silvia, LATIFIĆ-JASNIČ, Dunja, STOPAR, Tanja, MEŽNARIČ, Ksenija, GERŠAK, Borut. Chronic heart failure and cardiac resynchronization therapy : the first experiences. *Slov. kardiol.*, 2005, letn. 2, suppl. 1, str. 34. [COBISS.SI-ID [19954905](#)]

163. DOLENC-STRAŽAR, Zvezdana, GERŠAK, Borut, KOŽELJ, Mirta. Cardiac angiosarcoma. *Virchows Arch.*, 2005, letn. 447, št. 2, str. 462-463. [COBISS.SI-ID [22094553](#)]

164. GERŠAK, Borut, BLUMAUER, Robert. Endoskopsko kirurško zdravljenje mitralne in trikuspidalne zaklopke. V: SMRKOLJ, Vladimir (ur.). *Kirurgija v starostnem obdobju : zbornik povzetkov*. [S. l.: Združenje kirurgov Slovenije], 2006, str. 103-104. [COBISS.SI-ID [21373145](#)]

165. KALIŠNIK, Jurij-Matija, SUWALSKI, Piotr, SUWALSKI, Grzegorz, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Kazimierz B., GERŠAK, Borut. Autonomic modulation of the heart after successful ablation for paroxysmal and persistent atrial fibrillation. V: CHITWOOD, W. Randolph (ur.), WOLF, Randall K. (ur.). *Program book*. Beverly: [s.n.], 2006, str. 228-229. [COBISS.SI-ID [26417625](#)]

166. KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, VIDMAR, Gaj, TROBEC, Roman, GERŠAK, Borut. Comparison of electrophysiological properties of the heart after off-pump and on-pump myocardial revascularization. *Interactive cardiovascular and thoracic surgery*, 2007, letn. 6, suppl. 1, str. S147. [COBISS.SI-ID [26419161](#)]

167. SUWALSKI, Grzegorz, KALIŠNIK, Jurij-Matija, SLEDZ, M., CZACHÓR, M., SWITAJ, J., GERŠAK, Borut, SUWALSKI, Kazimierz B. Successful off-pump pilmonary vein isolation for paroxysmal atrial fibrillation protects against autonomic nervous system imbalance. *Interactive cardiovascular and thoracic surgery*, 2007, letn. 6, suppl. 1, str.[C3-1]. [COBISS.SI-ID [26411993](#)]

168. KALIŠNIK, Jurij-Matija, SUWALSKI, Piotr, SUWALSKI, Grzegorz, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Kazimierz B., GERŠAK, Borut. Cardiac autonomic modulation in the late postoperative period after successfulablation : can we differentiate between ablated paroxysmal and permanent atrial fibrillation?. *Liječ. vjesn., Supl.*, 2007, letn. 129, suppl. 4, str. 24-25. [COBISS.SI-ID [26415065](#)]

- 169.** KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, VIDMAR, Gaj, TROISE, Giovanni, GERŠAK, Borut. Is decreased frequency of arrhythmic disturbances after beating heart myocardial revascularization a consequence of better preserved cardiac autonomic modulation and/or less impaired ventricular repolarization than in conventional arrhythmic heart coronary artery bypass grafting?. *Liječ. vjesn., Supl.*, 2007, letn. 129, suppl. 4, str. 77-78. [COBISS.SI-ID [26415321](#)]
- 170.** ŠOŠTARIČ, Maja, GERŠAK, Borut, KALIŠNIK, Jurij-Matija, BLUMAUER, Robert. Continuous local anesthetic infusion for pain management after endoscopic heart surgery. *Liječ. vjesn., Supl.*, 2007, letn. 129, suppl. 4, str. 87-88. [COBISS.SI-ID [26415577](#)]
- 171.** KALIŠNIK, Jurij-Matija, GERŠAK, Borut. Endoscopic vein harvesting as a choice of preference for harvesting single or double venous grafts : presentation of modified standard technique. *Liječ. vjesn., Supl.*, 2007, letn. 129, suppl. 4, str. 116-117. [COBISS.SI-ID [26415833](#)]
- 172.** KALIŠNIK, Jurij-Matija, GERŠAK, Borut. Radial artery harvesting: do the improved outcomes repay the efforts of introducing endoscopic technique already in the initial phase? : do the improved outcomes repay the efforts of introducing endoscopic technique already in the initial phase?. *Liječ. vjesn., Supl.*, 2007, letn. 129, suppl. 4, str. 130-131. [COBISS.SI-ID [26416089](#)]
- 173.** SUWALSKI, Grzegorz, SUWALSKI, Piotr, KALIŠNIK, Jurij-Matija, SLEDZ, Mariusz, SWITAJ, Julita, OGINSKA, Anna, GERŠAK, Borut, SUWALSKI, Kazimierz B. How does successful off-pump pulmonary vein isolation for paroxysmal atrial fibrillation influence heart rate variability and autonomic activity?. V: CHITWOOD, W. Randolph (ur.). *Program book*. Beverly: [s.n.], 2007, str. 133-134. [COBISS.SI-ID [26417369](#)]
- 174.** KLOKOČOVNIK, Tomislav, GERŠAK, Borut, ŠPAN, Matjaž, WEISS, Miha, VODIŠKAR, Janez. Off-pump coronary artery bypass grafting: single-center 10-years experience. V: FRAS, Zlatko (ur.), KENDA, Miran F. (ur.). *Cardiovascular medicine: from prevention to intervention : book of abstracts*, (Slovenska kardiologija, Supplement, vol. 5, 1). Ljubljana: Slovenian Society of Cardiology - Slovenian Heart House, 2008, 2008, letn. 5, suppl. 1, str. 7. [COBISS.SI-ID [24516057](#)]
- 175.** KALIŠNIK, Jurij-Matija, KŠELA, Juš, AVBELJ, Viktor, SUWALSKI, Piotr, SUWALSKI, Grzegorz, SUWALSKI, Kazimierz B., GERŠAK, Borut. Characteristics of patients prone to atrial fibrillation after coronary bypass surgery. V: FRAS, Zlatko (ur.), KENDA, Miran F. (ur.). *Cardiovascular medicine: from prevention to intervention : book of abstracts*, (Slovenska kardiologija, Supplement, vol. 5, 1). Ljubljana: Slovenian Society of Cardiology - Slovenian Heart House, 2008, 2008, letn. 5, suppl. 1, str. 35. [COBISS.SI-ID [24533977](#)]
- 176.** ŠOŠTARIČ, Maja, GERŠAK, Borut, KALIŠNIK, Jurij-Matija, BLUMAUER, Robert, NOVAK-JANKOVIČ, Vesna. Predictors for the success of on table extubation after endoscopic heart surgery. *The heart surgery forum*, 2008, letn. 11, suppl. 1, str. S64-S65. [COBISS.SI-ID [26413529](#)]
- 177.** KALIŠNIK, Jurij-Matija, KŠELA, Juš, AVBELJ, Viktor, SUWALSKI, Piotr, SUWALSKI, Grzegorz, SUWALSKI, Kazimierz B., GERŠAK, Borut. Characteristics of patients prone to atrial fibrillation after coronary bypass surgery. *The heart surgery forum*, 2008, letn. 11, suppl. 1, str. S106. [COBISS.SI-ID [26413273](#)]
- 178.** KALIŠNIK, Jurij-Matija, SUWALSKI, Piotr, SUWALSKI, Grzegorz, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Kazimierz B., GERŠAK, Borut. Sinus rhythm after ablation : cardiac autonomic modulation independent on type of atrial fibrillation. *The heart surgery forum*, 2008, letn. 11, suppl. 1, str. S112. [COBISS.SI-ID [26413785](#)]
- 179.** KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, TROBEC, Roman, VIDMAR, Gaj, TROISE, Giovanni, GERŠAK, Borut. Arrhythmias, repolarization and cardiac autonomic modulation in beating and arrhythmic heart revascularization. *The heart surgery forum*, 2008, letn. 11, suppl. 1, str. S113. [COBISS.SI-ID [26414041](#)]

- 180.** KNEZ, Jure, KALIŠNIK, Jurij-Matija, VIDMAR, Gaj, GERŠAK, Borut. Rhythmias and autonomic heart regulation after off-pump coronary artery bypass graft surgery. *The heart surgery forum*, 2008, letn. 11, suppl. 1, str. S164. [COBISS.SI-ID [26414297](#)]
- 181.** KŠELA, Juš, KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, SUWALSKI, Piotr, SUWALSKI, Grzegorz, SUWALSKI, Kazimierz B., GERŠAK, Borut. First description of non-linear heart dynamics after beating heart revascularization. *The heart surgery forum*, 2008, letn. 11, suppl. 1, str. S254. [COBISS.SI-ID [26414553](#)]
- 182.** KALIŠNIK, Jurij-Matija, KŠELA, Juš, SUWALSKI, Piotr, SUWALSKI, Grzegorz, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Kazimierz B., GERŠAK, Borut. Sinus rhythm before operation differentiates patients developing atrial fibrillation from the patients that remain in sinus rhythm after cardiac revascularization. *Interactive cardiovascular and thoracic surgery*, 2008, letn. 7, suppl. 1, str. S47. [COBISS.SI-ID [26411481](#)]
- 183.** KALIŠNIK, Jurij-Matija, SUWALSKI, Piotr, SUWALSKI, Grzegorz, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Kazimierz B., GERŠAK, Borut. Similar cardiac autonomic regulation in sinus rhythm following successful ablation of permanent and paroxysmal atrial fibrillation : what can we see on the level of structural electrophysiological substrate of the heart?. *Interactive cardiovascular and thoracic surgery*, 2008, letn. 7, suppl. 1, str. S48. [COBISS.SI-ID [26411737](#)]
- 184.** KŠELA, Juš, KALIŠNIK, Jurij-Matija, AVBELJ, Viktor, SUWALSKI, Piotr, SUWALSKI, Grzegorz, SUWALSKI, Kazimierz B., GERŠAK, Borut. Postoperative atrial fibrillation after beating heart revascularization : can we foresee it preoperatively?. V: FLEGE, John B. (ur.). *Program book*. Beverly: [s.n.], 2008, str. 267-268. [COBISS.SI-ID [26417881](#)]
- 185.** KALIŠNIK, Jurij-Matija, SUWALSKI, Piotr, SUWALSKI, Grzegorz, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Kazimierz B., GERŠAK, Borut. Permanent versus paroxysmal atrial fibrillation back in sinus rhythm : equally potent autonomic drivers but different electrophysiological substrate?. V: FLEGE, John B. (ur.). *Program book*. Beverly: [s.n.], 2008, str. 344-345. [COBISS.SI-ID [26418649](#)]
- 186.** PEČLIN, Polona, KNEŽEVIČ, Ivan, MIRKOVIČ, Tihomir, GERŠAK, Borut, RADAN, I., PODBREGAR, Matej, ROZMAN, Janez. Selective stimulation of the vagus nerve in a man. V: 4th European Congress for Medical and Biomedical Engineering, 23-27 November 2008, Antwerp. *Programme*. [Antwerp: s.n., 2008], 2008, str. 364. [COBISS.SI-ID [25294297](#)]
- 187.** JELENC, Matija, GERŠAK, Borut. Influence of coronary artery and bypass graft parameters on graft flow and pulsatility index : a mathematical model with in vivo correlations. *The heart surgery forum*, 2009, letn. 12, št. 6, str. 313. [COBISS.SI-ID [26428377](#)]
- 188.** JELENC, Matija, KNEŽEVIČ, Ivan, STANKOVIČ, Milenko, GERŠAK, Borut. Intraoperative left subclavian artery occlusion with left hand ischemia. *The heart surgery forum*, 2009, letn. 12, št. 6, str. 313. [COBISS.SI-ID [26428121](#)]
- 189.** KALIŠNIK, Jurij-Matija, SUWALSKI, Piotr, KŠELA, Juš, AVBELJ, Viktor, VIDMAR, Gaj, SUWALSKI, Grzegorz, GERŠAK, Borut. Prediction of atrial fibrillation from preoperative nonlinear R-R interval dynamics in patients undergoing beating-heart myocardial revascularization. *Innovations*, 2009, letn. 4, št. 3, str. 176. [COBISS.SI-ID [26420697](#)]

1.13 Published professional conference contribution abstract

- 190.** GERŠAK, Borut, PŠENIČNIK, Majda, OKANO, K.... Spremembe arterijske stene pri kirurških postopkih. V: KENDA, Miran F. (ur.), POREDOŠ, Pavel (ur.). *Srce in žilje 1992 : zbornik prispevkov*. Novo mesto: Krka, 1992, str. 115. [COBISS.SI-ID [9607385](#)]

- 191.** GERŠAK, Borut, BRUČAN, Andrej. Prikaz primera bolnika z disekcijo aorte tip B in Marfanovim sindromom = A case report of a patient with aortic dissection type B and Marfan syndrome. V: BRUČAN, Andrej (ur.), GRIČAR, Marko (ur.). *Urgentna medicina : izbrana poglavja 3 : zbornik : selected topics 3 : proceedings*. Ljubljana: Slovensko združenje za urgentno medicino: = Slovenian Society for Emergency Medicine, 1997, 1997, str. 349-350. [COBISS.SI-ID [30681](#)]
- 192.** GERŠAK, Borut, GABRIJELČIČ, Tone, KLOKOČOVNIK, Tomislav, KIRBIŠ, Janez, KNEŽEVIČ, Ivan. Kirurška revaskularizacija miokarda brez uporabe zunajtelesnega krvnega obtoka. V: *Program in zbornik prispevkov*. Združenje kardiologov Slovenije, [1999], str. 29-30. [COBISS.SI-ID [11808473](#)]
- 193.** GABRIJELČIČ, Tone, GERŠAK, Borut, KLOKOČOVNIK, Tomislav, KIRBIŠ, Janez, KNEŽEVIČ, Ivan. Premostitvene operacije venčnih arterij brez uporabe zunajtelesnega krvnega obtoka : izkušnje kliničnega oddelka za kirurgijo srca in ožilja v Ljubljani = By-pass operations of coronary arteries without extracorporeal blood flow : experiences of the department of cardiovascular surgery in Ljubljana. V: BOBNAR-NAJŽER, Elizabeta (ur.), PODOBNIK, Jana (ur.). *Svetovni slovenski kongres : gradivo*. Ljubljana: Svetovni slovenski kongres, 1999, str. 56-57. [COBISS.SI-ID [10265305](#)]
- 194.** GERŠAK, Borut. Kirurgija aortne in mitralne zaklopke na delujočem srcu = Aortic and mitral valve beating heart surgery. V: BOBNAR-NAJŽER, Elizabeta (ur.), PODOBNIK, Jana (ur.). *Svetovni slovenski kongres : gradivo*. Ljubljana: Svetovni slovenski kongres, 1999, str. 58-59. [COBISS.SI-ID [10265561](#)]
- 195.** GERŠAK, Borut. New therapeutic approaches in treatment of end-stage heart. *Acta physiol. Hung.*, 2002, letn. 89, št. 1/3, str. 165. [COBISS.SI-ID [16238297](#)]
- 196.** GERŠAK, Borut. Kirurgija srca in ožilja - preteklost, sedanost in prihodnost = Cardiovascular surgery: past, present and future. V: AVGUŠTIN, Sonia Adriana (ur.), BOBNAR-NAJŽER, Elizabeta (ur.). *IV. konferenca slovenskih zdravnikov iz sveta in Slovenije, Novo mesto, 19. do 21. maj 2005*. Ljubljana: Svetovni slovenski kongres: = Slovenian World Congress, 2005, str. 41-42. [COBISS.SI-ID [19652825](#)]
- 197.** GERŠAK, Borut, ŠOŠTARIČ, Maja, TRUNK, Primož. Srčna kirurgija pri starostniku. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). *Program in zbornik prispevkov*. Ljubljana: Združenje kardiologov Slovenije, Slovenska hiša srca: = Slovenian Society of Cardiology, Slovenian Heart House, [2005], str. 33. [COBISS.SI-ID [19444185](#)]
- 198.** GERŠAK, Borut, FRLJAK, Sabina, POHAR PERME, Maja, STARE, Janez. Chronic ischemic mitral regurgitation - short and long-term results of various surgical interventions. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 14. kardiološki dnevi, strokovni sestanek Združenja kardiologov Slovenije z mednarodno udeležbo, Portorož, 26. in 28. oktober 2006. *Končni program in zbornik izvlečkov*. Ljubljana: Združenje kardiologov Slovenije, Slovenska hiša srca: = Slovenian Society of Cardiology, [2006], str. 62. [COBISS.SI-ID [22117081](#)]
- 199.** GERŠAK, Borut, KLOKOČOVNIK, Tomislav, KNEŽEVIČ, Ivan, VODIŠKAR, Janez. Off pump coronary revascularization. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 14. kardiološki dnevi, strokovni sestanek Združenja kardiologov Slovenije z mednarodno udeležbo, Portorož, 26. in 28. oktober 2006. *Končni program in zbornik izvlečkov*. Ljubljana: Združenje kardiologov Slovenije, Slovenska hiša srca: = Slovenian Society of Cardiology, [2006], str. 63. [COBISS.SI-ID [22117337](#)]
- 200.** GERŠAK, Borut, GRAČNER, Rajko, BRECELJ, Aleš, KIRBIŠ, Janez, JAKLIČ, Ladislav, KLOKOČOVNIK, Tomislav, KNEŽEVIČ, Ivan, LAKIČ, Nikola, KOVAČIČ, Nace, JELENC, Matija, GABRIJELČIČ, Tone. Primerjava rezultatov bolnikov, operiranih zaradi ishemične bolezni srca s sladkorno boleznijo in brez nje. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 24. Radenski dnevi, Radenci, Slovenija, 26. in 27. maj 2006. *Program in zbornik prispevkov*. Ljubljana: Združenje kardiologov Slovenije, Slovenska hiša srca: = Slovenian Society of Cardiology, Slovenian Heart House, [2006], str. 26. [COBISS.SI-ID [21333465](#)]

201. GERŠAK, Borut, KALIŠNIK, Jurij-Matija, BRECELJ, Aleš, GABRIJELČIČ, Tone, GRAČNER, Rajko, KLOKOČOVNIK, Tomislav, JAKLIČ, Ladislav, KNEŽEVIČ, Ivan, LAKIČ, Nikola, SOJAK, Vladimir. Kirurško zdravljenje atrijske fibrilacije. V: KENDA, Miran F. (ur.), FRAS, Zlatko (ur.). 25. Radenski dnevi, Radenci, Slovenija, 24. - 26. maj 2007. *Program in zbornik prispevkov*. Ljubljana: Združenje kardiologov Slovenije, Slovenska hiša srca: = Slovenian Society of Cardiology, Slovenian Heart House, [2007], str. 23. [COBISS.SI-ID [22948825](#)]

202. GERŠAK, Borut, KNEZ, Jure, KOVAČIČ, Nace, GRAČNER, Rajko, GABRIJELČIČ, Tone, BRECELJ, Aleš, KIRBIŠ, Janez, JAKLIČ, Ladislav, KLOKOČOVNIK, Tomislav, KNEŽEVIČ, Ivan, LAKIČ, Nikola. Operativno zdravljenje anevrizem trebušne aorte. V: BLINC, Aleš (ur.), KOZAK, Matija (ur.). *Žilne bolezni v klinični praksi*. Ljubljana: Združenje za žilne bolezni Slovenskega zdravniškega društva, 2007, str. 59-60. [COBISS.SI-ID [22623705](#)]

1.16 Independent scientific component part or a chapter in a monograph

203. GERŠAK, Borut, PIRC, Borut. Poškodbe arterij in ven. V: SMRKOLJ, Vladimir (ur.), ARNEŽ, Zoran M. *Kirurgija*. Ljubljana [i. e. Žalec]: Sledi, 1995, 1995, str. 339-342. [COBISS.SI-ID [185049](#)]

1.17 Independent professional component part or a chapter in a monograph

204. GERŠAK, Borut. Načela modernega kirurškega zdravljenja bolezni aortne in mitralne zaklopke. V: KENDA, Miran F. (ur.), KOŽELJ, Mirta (ur.), FRAS, Zlatko (ur.). *Prirojene in pridobljene srčne napake : izbrana poglavja*. Ljubljana: Združenje kardiologov Slovenije, 2002, str. 85-89. [COBISS.SI-ID [14757337](#)]

205. GERŠAK, Borut. Kirurško zdravljenje motenj arterijske prekrvavitve pri sladkornem bolniku. V: URBANČIČ-ROVAN, Vilma (ur.), KOSELJ, Miha (ur.), TRILLER, Ciril (ur.). *Oskrba diabetičnega stopala : priručnik za medicinske sestre in zdravstvene tehnike*. 3. izd. Ljubljana: Združenje endokrinologov Slovenije pri Slovenskem zdravniškem društvu, 2008, str. 187-190. [COBISS.SI-ID [24966105](#)]

206. GERŠAK, Borut, ŠOŠTARIČ, Maja. Možganskožilne bolezni pri srčnih operacijah. V: ŽVAN, Bojana (ur.), ZALETEL, Marjan (ur.). *Akutna možganska kap V : učbenik za zdravnike in zdravstvene delavce*. Ljubljana: Društvo za preprečevanje možganskih in žilnih bolezni, 2010, str. 55-59. [COBISS.SI-ID [26764249](#)]

1.20 Preface, afterword

207. GERŠAK, Borut. Editorial. *Comput. biol. med.*. [Print ed.], 1998, letn. 28, št. 4 Spec Issue, str. 341. [COBISS.SI-ID [9065945](#)]

208. GERŠAK, Borut. Inštitut za biomedicinsko informatiko in Medicinski razgledi. V: ADAMIČ, Štefan, STARE, Janez, VIDMAR, Gaj, HUDOMALJ, Emil, DIMEC, Jure, DORNIK, Ema. *25 let delovanja Inštituta za biomedicinsko informatiko*. Ljubljana: Medicinska fakulteta, Inštitut za biomedicinsko informatiko, 2002, str. 28. [COBISS.SI-ID [14689497](#)]

1.22 Interview

- 209.** GERŠAK, Borut, TROBEC, Roman. Večkanalni EKG - dosežek slovenskih strokovnjakov : brazilski kardiokirurg je razvil novo operacijo na srcu, naši strokovnjaki pa so dodali novo metodo merjenja EKG. *Delo (Ljubl.)*, 11. II. 1998, str. 9. [COBISS.SI-ID [13304103](#)]
- 210.** GERŠAK, Borut, ŠINKOVEC, Matjaž. Aritmija - najpogostejša motnja srčnega ritma. *Moje zdravje*, 19. avgust 2008, letn. 3, str. 12-14. [COBISS.SI-ID [24759001](#)]
- 211.** GERŠAK, Borut. Bolečina, znanilka periferne arterijske bolezni. *Moje zdravje*, 8. julij 2008, letn. 3, str. 16-18. [COBISS.SI-ID [24759257](#)]
- 212.** GERŠAK, Borut. Bitka za srce na operacijski mizi. *Nedelj. dnev.*, 5. oktober 2008, letn. 62, str. 2-3. [COBISS.SI-ID [24802009](#)]
- 213.** GERŠAK, Borut. Tricentimetrski rez za novo zaklopko. *Hišni zdravnik*, 2010, letn. 2, št. 1, str. 44-46. [COBISS.SI-ID [26419417](#)]

1.25 Other articles or component parts

- 214.** GERŠAK, Borut. Fibrous changes and presence of calcium in the vessel walls six months after end-to-end arterial anastomoses in growing dogs Šletterč. *J Thorac Cardiovasc Surg*, 1990, letn. 99, št. 2, str. 379-380. [COBISS.SI-ID [2604761](#)]
- 215.** GORJUP, Vojka, GERŠAK, Borut. Drugo mnenje - nova možnost za slovenske bolnike in zdravnike. *Isis (Ljubl.)*, avgust-september 1998, letn. 7, št. 8/9, str. 27-28. [COBISS.SI-ID [9154777](#)]
- 216.** GERŠAK, Borut, PETEK, Miro. Neskončna obzorja srčne kirurgije. *Večer (Marib.)*. [Tiskana izd.], 6. dec. 2003, leto 59, št. 282, str. 36-37, portret. [COBISS.SI-ID [6674484](#)]

MONOGRAPHS AND OTHER COMPLETED WORKS

2.09 Master's thesis

- 217.** GERŠAK, Borut. *Primerjava arterijskih anastomoz šivanih z resorbilnim in neresorbilnim šivalnim materialom = Comparison between asorable and nonasorbable sutures in arterial anastomoses*. Ljubljana: [B.Geršak], 1988. 38 str., ilustr. [COBISS.SI-ID [5294041](#)]

2.12 Final research report

- 218.** ARNEŽ, Zoran M., GODINA, Marko, BAJEC, Janez, BARAGA, Andrej, ŠOLINC, Matjaž, BRECELJ, Aleš, EDER, Ergon, KERSNIČ, Milenko, ROTT, Tomaž, URBANC-BERČIČ, Olga, KOVAČIČ, Nace, GRACNER, Rajko, GERŠAK, Borut, BRČIČ, Arsen, KOŽELJ, Tomaž, BRUČAN, Andrej, DOLANC, Marko, MILČINSKI, Metka, MOŽINA, Martin, PAHOR, Bojan. *Srce in ožilje : kirurgija srca in ožilja : poročilo o delu za leto 1985*. Ljubljana: Univerzitetni klinični center, 1985. 1 zv. (loč.pag., priloge). [COBISS.SI-ID [16344793](#)]
- 219.** GERŠAK, Borut. *Primerjava arterijskih anastomoz šivanih z resorbilnim in neresorbilnim šivalnim materialom*, (Primerjava arterijskih anastomoz šivanih z resorbilnim in neresorbilnim šivalnim materialom), (Ateroskleroza, tromboza in njune komplikacije). Ljubljana: RSS, 1987. 25 str., ilustr.

[COBISS.SI-ID [22939136](#)]

220. GERŠAK, Borut, JEZERNIK-LESKOVŠEK, Jolanda, BAJC, Janez. *Primerjava arterijskih anastomaz šivanih z resorbilnim in neresorbilnim šivalnim materialom : poročilo o delu za leto 1988, [Kalcinacije v stenah arterij šivanih s prolenom in PDS]*, (Srce in ožilje). Ljubljana: UKC, 1988. 12 f. [COBISS.SI-ID [106170368](#)]

221. GERŠAK, Borut, JEZERNIK-LESKOVŠEK, Jolanda. *Primerjava arterijskih anastomoz šivanih z resorbilnim in neresorbilnim šivalnim materialom*, (Srce in ožilje). Ljubljana: RSS, 1989. 1 zv. (loč. pag.), ilustr. [COBISS.SI-ID [53148160](#)]

222. GERŠAK, Borut. *Primerjava arterijskih anastomoz šivanih z resorbilnim in neresorbilnim šivalnim materialom*, (Primerjava arterijskih anastomoz šivanih z resorbilnim in neresorbilnim šivalnim materialom), (Arteroskleroza, tromboza in njune komplikacije). Ljubljana: RSS, 1990. 1 zv. (loč. pag.), ilustr. [COBISS.SI-ID [28780032](#)]

223. VALENČIČ, Vojko, TROBEC, Roman, AVBELJ, Viktor, BERKOPEC, Aleš, DIVJAK, Saša, GABRIJELČIČ, Tone, GERŠAK, Borut, GERŠIČ, Maja, HABINC, Rok, JANEŽIČ, Dušanka, JURČIČ-ZLOBEC, Borut, KRAŠNA, Andrej, LOGAR, Luka, MENCEJ, Matjaž, OREL, Bojan, PARKELJ, Mojca, PAVEŠIČ, Nikola, SLIVNIK, Boštjan. *Paralelizacija računsko intenzivnih metod v elektrotehniki : zaključno poročilo o rezultatih opravljenega znanstveno-raziskovalnega dela na področju temeljnega raziskovanja*. Ljubljana: Fakulteta za elektrotehniko, 1997. 14 str., [198] str. dokazil. [COBISS.SI-ID [782164](#)]

2.13 Treatise, preliminary study, study

224. AVBELJ, Viktor, GERŠAK, Borut, RUŽIČ-MEDVEŠČEK, Nadja, TROBEC, Roman, VOKAČ, Damijan. *Računalniško modeliranje in predstavitev ishemičnih prodročij srčne mišice na osnovi meritev z mnogokanalnim EKG*, (IJS delovno poročilo, 7415). 1996. [COBISS.SI-ID [12064295](#)]

PERFORMED WORKS (EVENTS)

3.11 Radio or television event

225. GERŠAK, Borut, TROBEC, Roman, AVBELJ, Viktor, KNEŽEVIČ, Ivan. *Herz-Amputation : predstavljeno na RTL, oddaja FUTURE, februar*. 1998. [COBISS.SI-ID [13329703](#)]

3.15 Unpublished conference contribution

226. GERŠAK, Borut, TROBEC, Roman. *Comparison of the St-40ms isointegral maps prior and after aortocoronary revascularisation : poster on the IEEE International Conference on Computers in Cardiology, September 10-13*. 1997. [COBISS.SI-ID [12857127](#)]

3.25 Other performed works

227. SMRKOLJ, Vladimir, POTRČ, Stojan, BOŠNJAK, Roman, MIKSIĆ, Kazimir, GERŠAK, Borut,

SECONDARY AUTHORSHIP

Editor

- 228.** *XXV. Tavčarjevi dnevi, Ljubljana, 9.-11.11.1983*, (Medicinski razgledi, Suplement, Letn 22, 4). Ljubljana: OO ZSMS Medicinske fakultete, 1983. [6],343 str., ilustr. [COBISS.SI-ID [4387129](#)]
- 229.** *Almanah ob 30. obletnici Zdravstvenega doma Maribor : [uredniški odbor Darja Benčan-Treppo ... et al.]*. Maribor: Zdravstveni dom, 1987. XXXI, 305 str. [COBISS.SI-ID [539191](#)]
- 230.** LEDLEY, Robert S. (ur.), GERŠAK, Borut (ur.). *Computers in Biology and Medicine : 9th International Conference on Mechanics in Medicine and Biology*, (Computers in biology and medicine, Vol. 28, no. 4). New York: Pergamon, 1998. str. 341-456, ilustr. [COBISS.SI-ID [333937](#)]
- 231.** GERŠAK, Borut (ur.), SMRKOLJ, Vladimir (ur.). *Žilne anastomoze*. Ljubljana: Medicinska fakulteta, Katedra za kirurgijo, Podiplomska šola kirurških tehnik, 1999. 43 str., ilustr. ISBN 961-6264-07-9. [COBISS.SI-ID [80064512](#)]
- 232.** *The heart surgery forum*. Geršak, Borut (editor 1998-). Charlottesville, VA: Forum Multimedia Pub., cop. 1998-. ISSN 1098-3511. [COBISS.SI-ID [16749785](#)]
- 233.** *Slovenska kardiologija*. Geršak, Borut (member of editorial council 2004-). Ljubljana: Klinika za kardiologijo, 2004-. ISSN 1581-8543. [COBISS.SI-ID [128494336](#)]

Supervisor for Doctoral Dissertations

- 234.** KALIŠNIK, Jurij-Matija. *Neinvazivna ocena elektrofizioloških lastnosti srca pred premostitveno operacijo koronarnih arterij in po njej : doktorsko delo*. Ljubljana: [J. M. Kališnik], 2004. 70 f., ilustr., tabele. [COBISS.SI-ID [2764308](#)]
- 235.** KŠELA, Juš. *Novejši kazalci avtonomne regulacije srca kot napovedni dejavniki za pojav aritmij po aortokoronarnih obvodih na delujočem srcu : doktorsko delo*. Ljubljana: [J. Kšela], 2009. XII, 76 f., ilustr., tabele. [COBISS.SI-ID [245897216](#)]
- 236.** ANTONIČ, Miha. *Perioperativna ledvična okvara pri endoskopskih in klasičnih operacijah na mitralni zaklopki : doktorsko delo*. Ljubljana: [M. Antonič], 2009. XIV, 76 f., tabele, graf. prikazi. [COBISS.SI-ID [244654848](#)]

Supervisor for Master's Theses

- 237.** KALIŠNIK, Jurij-Matija. *Primerjava kazalcev variabilnosti srčne frekvence pri bolnikih s prizadetimi venčnimi arterijami pred in po operaciji aortokoronarnih premostitev : [magistrsko delo]*. Ljubljana: [J.M. Kališnik], 2001. VII, 34 f., tabele.

Background: Indexes of heart rate variability (HRV) provide information about sympathovagal balance rendering the insight into mechanisms of its maintenance in various disease states. Cardiac vagal modulation is reduced in patients with coronary artery disease or previous myocardial infarction. The propensity to lethal arrhythmias is thus increased. The highest vagal modulation in coronary artery has been gained by adopting right recumbent position. The studies reporting on HRV in the immediate postoperative period show considerable inconsistency. Moreover, no attempt has been made to determine HRV according to the assumed various lying positions or comparing two different operative procedures, namely conventional and beating heart surgery. Methods: Seven female and twenty-five male subjects, mean age 62.6±8yr. enrolled in the study. Electrocardiograms and respiratory waveform signals were recorded for 10 minutes by means of newly developed DEKG recording device. Power spectra were computed from 5-minute stable RR intervals using Fast Fourier Transform analysis (FFT). Normalized high frequency power (nHF) indicated cardiac vagal modulation, normalized low frequency power (nLF) indexed sympathetic baroreflex modulated activity. To verify the normal distribution of data, log power spectra were calculated by taking the natural logarithm of the power spectra of each component. The results of power spectral measurements were further analyzed using paired and non-paired t-tests, $p < 0.05$ considered significant. Results: Total power and the powers in HF, LF and nHF range were significantly higher when lying supine on fourth and seventh day, respectively ($p < 0.05$). RR interval shortened significantly immediately after the operation (approximately by one fourth). TP, HF and LF were depressed markedly after operation, showing significant secondary reduction on seventh day as compared to the first and second postoperative day ($p < 0.05$). (Abstract truncated at 2000 characters). [COBISS.SI-ID [2257684](#)]

Supervisor - Other

238. TRUNK, Primož. *Tridimenzionalni računalniški model srca za simulacijo temperaturnih sprememb na človeškem srcu*, (Prešernove naloge). Ljubljana: [P. Trunk], 1999. IX, 40 f., ilustr.

Development of fast parallel computers has enabled us to study some of the biomedical processes with the help of computer simulations. Such studies can be cheaper, and are less dangerous to the patients. Many times, they are the only way to get insight into a particular biomedical problem. The aim of our work was to use the photographs of cross sections of the human heart to build a three-dimensional computer model of the heart and to simulate with it the cooling and warming of the heart. We also wanted to compare the simulated temperatures to the temperatures measured on the animal model heart. For the development of three-dimensional computer model of the heart we used VHD photographs of human heart cross sections. To work with them, we used some of the commercial software packages and some of our programs. Temperatures on animal heart models were measured with specially designed temperature probes, which had to be calibrated first and temperature recording device. The simulation has been done on a cluster of 12 PC computers. Simulated temperature curves have similar course to the measured temperatures. They differ in the absolute values of measurements. These differences are mainly statistically significant. The described three-dimensional computer model is in the present form usable for simulations in certain intervals of measurements. With some of the further improvements, we can expect more accurate simulations. [COBISS.SI-ID [2096916](#)]

239. TRUNK, Primož. *Tridimenzionalni računalniški model srca za simulacijo temperaturnih sprememb = Simulating human heart temperature changes with three-dimensional computer model of the heart*. V: ZUPANIČ SLAVEC, Zvonka (ur.). *Zbornik povzetkov raziskovalnih nalog*. Ljubljana: Univerza v Ljubljani, Medicinska fakulteta, 2000, str. 8-9. [COBISS.SI-ID [11446489](#)]

240. KNEZ, Jure. *Aritmije in avtonomna regulacija srca po premostitveni operaciji koronarnih arterij brez uporabe zunajtelesnega obtoka*, (Prešernove naloge). Ljubljana: [J. Knez], 2007. 45 f., ilustr. [COBISS.SI-ID [3116052](#)]

Author of introduction

241. ADAMIČ, Štefan, STARE, Janez, VIDMAR, Gaj, HUDOMALJ, Emil, DIMEC, Jure, DORNIK, Ema. *25 let delovanja Inštituta za biomedicinsko informatiko*. Ljubljana: Medicinska fakulteta, Inštitut za biomedicinsko informatiko, 2002. Ilustr., 48 str. ISBN 961-6264-34-6. <http://www.mf.uni-lj.si/ibmi/splosno/jubileji/IBMI-25-let-brosura.pdf>. [COBISS.SI-ID [118017536](#)]

Co-Supervisor for Master's Theses

242. BLUMAUER, Robert. *Povezava med plazemskim proteinom A, povezanim z nosečnostjo, in encimi srčno mišičnega razpada pri bolnikih, operiranih na srcu : [magistrska naloga]*. Ljubljana: [R. Blumauer], 2002. 49 f., ilustr., tabele. [COBISS.SI-ID [2638100](#)]

243. KRNJAK, Ljuba. *Proučevanje spreminjanja koncentracije proteina S100B v serumu z metodo imunoluminiscence pri bolnikih operiranih na srcu = A study on the changes of protein S100B concentration in serum using a chemiluminescence immunoassay on patients undergoing coronary artery bypass grafting : magistrsko delo*, (Fakulteta za farmacijo, Ljubljana, Magistrske naloge, M136/02). Ljubljana: [Krnjak L.], 2002. VII, 46 f. [COBISS.SI-ID [1160817](#)]

Co-Supervisor for Undergraduate Theses

244. FERBEŽAR, Tomaž. *Krmiljenje mitralnega simulatorja : diplomsko delo*. Ljubljana: [T. Ferbežar], 2006. II, 83 f., ilustr. [COBISS.SI-ID [5306708](#)]

245. DAMJANOVIĆ, Zorica. *Zdravstvena nega pacienta po operaciji na odprtem srcu v enoti intenzivne terapije = Nursing care of patient after the cardiac surgery on the open heart in the intensive care unit*. Ljubljana: [Z. Damjanović], 2008. 47 f., ilustr. [COBISS.SI-ID [3406187](#)]

UNCLASSIFIED

246. GERŠAK, Borut. *Pitajte nebo*, (Biblioteka SF Zvezdane staze). 1. izd. Beograd: Narodna knjiga, 1987. 111 str. ISBN 86-331-0004-5. [COBISS.SI-ID [10135047](#)]

247. GERŠAK, Borut. *Spremembe arterijskih in venskih sten pri kirurških postopkih*, (KL CENTER). Ljubljana: RSS, 1991. 1 zv. (loč. pag.). [COBISS.SI-ID [42338304](#)]

248. GERŠAK, Borut. *Vpliv tlaka žilne prijemale na kontraktilno in relaksacijsko sposobnost torakalne aorte podgan : doktorska disertacija*. Ljubljana: [B. Geršak], 1994. 55 str., ilustr., tabele. [COBISS.SI-ID [42149120](#)]

Request for bibliography sent from: 89.142.7.240
Selected format of bibliographic unit: ISO 690

Source of bibliographic records: shared data base COBISS.SI/COBIB.SI