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### Proceedings from the National Students Medical Congress 1999

# Student Journal of Health Sciences

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# - Editorial –

## Students entering the scientific field

During the latest decade the fields research and education have been brought together more tightly than before. This is particularly true at the Faculty of Health Sciences of Linköping University. The students are taught to maintain a scientific attitude. At the Faculty of Health Sciences science is nowadays part of many components of the education. The lecturers are often scientists, the exams are scientifically built up and all students have to present at least one major scientific project to get their exam. The PhD-students are more involved than ever in the i basic education. This influences many students and stimulates them to move on into the academic world after getting their exam.

In order to become part of the scientific field students need to practice. The years students spends at the university is a time of learning and adjustment. Learning by doing, learning by reading and learning by listening. Adjustment to the profession AND to the scientific world. To get this scientific training students need to practice how to be scientists.

To even get a greater insight in what it is like to be a real scientist the Faculty of Health Sciences in Linköping together with the students annually arrange the national Students Medical Congress. On this congress the students have an opportunity to present their research work to other students and to have a discussion about the work. There are two ways to participate, - with a lecture or with a poster. This year 1999 the congress was held on the 11th-12th of May and 39 students presented their works (24 posters and 15 lectures).

One of the cornerstones in the pedagogic system we use at the Faculty of Health Sciences is integration between the different programs. This starts already in the first term of the education and then continues all the way through the education. Some of the integration events are formal and thereby compulsory, while others are mostly informal non-compulsory. The national Students Medical Congress is one of these non-compulsory events. This means that students participate on their own will, which makes it even better. This is really integration at its best! Students integrate because they want to, not because they have to.

Another part of science is the publication of scientific articles. Articles are published in a wide variety of more or less specialised journals. For the individual scientist each published article adds substantial volume to the curriculum vitae. In Linköping we have a specific scientific journal for students only - the Students Journal of Health Sciences.

Why not bring these two areas and the congress and the journal together in order to the message, that students are able, out. So, that is exactly what we have done. This volume of Student Journal of Health Sciences is a proceedings from this years national Students Medical Congress. Here you can read about all the great research students have done recently here in Linköping. Each student had to write an abstract of their work and most of these abstracts are available to you in this volume. Enjoy the fine abstracts that were presented at the national Students Medical Congress.

**Josefine Andin** Vice Chairman of the Students Union

# - Abstract section -

## Effect and placebo effect of acupressure (P6) on nausea and vomiting after outpatient gynaecological surgery

Authors: **Alkaissi A, Stålnert M, Kalman S**, Nursing Program and Department of Anaesthesiology and Intensive Care Linköping University Hospital, Linköping, Sweden.

Background: Acupuncture and acupressure have previously been reported to possess an antiemetic effect. We wanted to investigate the "true" and placebo effect of acupressure in prevention of postoperative nausea and vomiting (PONV).
Patients and methods: Sixty women undergoing minor gynaecological outpatient surgery were entered into a double-blind and randomised study. One group received acupressure with bilateral stimulation of P6 (A), a second group received bilateral placebo stimulation (P) and a third group received no acupressure wrist band and served as a reference group (R). PONV was evaluated as number of patients with complete response (no PONV), nausea only or vomiting. In addition, the need for rescue antiemetic medication and nausea after 24 h was registered.
Results: Complete response was obtained in 11, 11 and 9 patients in groups, A, P and R, respectively. Nine, 7 and 6 patients had nausea before discharge home, and 1, 1 and 8 patients were nauseated (8 vs. 1 patient: $p<0.05$) 24 h after operation in A, P and R groups, respectively. When compared to placebo acupressure (2 patients vomited and 5 needed rescue), significantly ($p<0.05$) fewer needed rescue antiemetic medication after acupressure at P6 (no vomiting or rescue medication). When compared to the observation group (5 vomited and 4 needed rescue antiemetics), significantly fewer vomited after acupressure ($p<0.05$).
Conclusion: In patients undergoing brief gynaecological surgery, placebo effect of acupressure decreased nausea after 24 h but vomiting and need of rescue antiemetics was reduced only by acupressure with the correct P6 point stimulation.

*(This abstract and subsequent article has previously been published in Acta Anaesthesiologica Scandinavica 1999; 43(3): 270-274.)*

# Evaluation of the walking ability of stroke patients after treadmill training - single subject experimental design

Authors: **Linderholm K, Widebrant M,** Physiotherapy Program, Faculty of Health Sciences, Linköping University, Linköping, Sweden.

Two thirds of patients who have suffered an acute stroke have, after three weeks, remaining symptoms and physical dysfunctions. International studies have shown that more than half of those who survive the acute phase of a stroke lose their normal walking capacity. The possibility of regaining the ability to walk is of high priority to most patients.
The purpose of this study was to evaluate if treadmill walking, later than one year after the stroke, can increase the walking ability in reference to walking speed and endurance.
This study was done with a Single Subject Experimental Design (SSED), where the three study subjects trained their walking ability on a treadmill during a five week period.
The study shows that all the study subjects improved in their walking speed and endurance on a level hard surface. Two of the three study subjects expressed an improvement of their walking ability. The results of this study can not be generalised. However, even later than one year since the stroke, there seems to be a correlation between treadmill walking and an improvement in walking ability.

# Assessment of work ability in people with fibromyalgia, evaluation of the valpar component work sample 9 - a pilot study

Authors: **Almgren T, Wahlström U,** Occupational Therapy Program, Faculty of Health Sciences, Linköping University, Linköping, Sweden.

The Valpar Component Work Sample (VCWS 9) is an instrument for assessment in workrelated rehabilitation. The VCWS 9, witch detects residual work ability, can be used to assess any form of dysfunction.
The purpose of this study was to evaluate the usefulness of the VCWS 9 when assessing the work ability of people with fibromyalgia.
The study included ten women with fibromyalgia. The VCWS 9 was used to assess work ability; the VAS- scale was used when rating the pain before and after the assessment. The participants were asked to give their total apprehension of the assessment to the authors. Five of the ten participants completed all elements of the assessment. The other five participants carried out parts of the assessment.
The result from the assessment with the VCWS 9 clearly showed types of dysfunction typical for this group. Moreover the assessment did not increase the participants' pain. The greater part of the women were positive towards carrying out the assessment with the VCWS 9. The result from this study shows that the VCWS 9 can be used to assess part of the work ability for people with fibromyalgia. The authors believe that additional types of assessments should be used in order to get a holistic view of the participants' work ability.

# In vitro development of resistance against ceftazidime and cefepime in enterobacter cloacae

Author: **Saidian S**, Medical Program, Faculty of Health Sciences, Linköping University, Linköping, Sweden.

The aim of this study is to investigate if susceptible strains of Enterobacter cloacae have tendency to develop resistance against cephalosporins after exposition to ceftazidime and cefepime.
Methods: One ATCC strain (13047) and 10 clinical strains of Enterobacter cloacae were exposed to broth dilutions of 0.04 - 64 mg/L ceftazidime and cefepime under 24 h in 37°C. MIC was determined through E-test after exposition and was compared to the values before exposition.
Results: The MIC values for ceftazidime were 0.25 - 1.0 and for cefepime 0.023 - 0.094 in non-exposed cultures. We could see a development of resistance against ceftazidime after exposition to a concentration of $\geq$ MIC. There was also a 20-40 times increase in the cefepime MIC. A similar development could be observed after exposition to cefepime concentrations around MIC. There was no development of resistance in high cefepime concentrations.
Conclusion: High concentrations of cefepime do not lead to development of resistance against cephalosporins.

# Regulation of arachidonic acid metabolism by fluid shear stress in UMR 106.01 osteoblastic cell line - a possible role for the cytoskeleton

Author**:** **Patcha V,** Graduate School in Biomedical Research, Faculty of Health Sciences, Linköping University, Linköping, Sweden.

Mechanical stress is subjected to bone cells by skeletal loading and fluid flow within the interstitial spaces of the bone. How bone cells respond to mechanical stimuli is poorly understood. However, it seems clear that mechanotransduction occurs, in part, through the generation of second messengers. The aim of this study was to investigate the role of the actin cytoskeleton and calcium signalling in fluid flow induced release of arachidonic acid (AA) metabolites in UMR 106.01 osteoblastic cells. Cells were pre-incubated with [3H]-labelled arachidonic acid and subjected to laminar fluid flow (12 dynes/$cm^2$) in a closed flow loop. The amount of released radioactivity was determined by liquid scintillation counting of samples of extracellular media that were removed at various times during flow. The results show that fluid flow enhances release of eicosanoids in UMR 106.01 osteoblasts compared to cells maintained in static culture. Using indomethacin, a cyclooxygenase inhibitor, it appears that nearly all of the eicosanoids released as a result of flow are prostaglandins. The ability of cytochalasin D, an actin filament poison, to inhibit flow-induced release of prostaglandins supports a role for the actin cytoskeleton in regulating this response. Cells maintained in static culture appear to release eicosanoids other than prostaglandins. The release of eicosanoids from cells in static culture is not blocked by inhibiting the actin cytoskeleton. In addition, calcium-induced activation of AA metabolism requires the cells to be prestimulated by fluid flow.
Preliminary results suggest that cytoskeleton may be involved in ionomycin-induced release of eicosanoids, which may not be metabolites of the cyclooxygenase pathway.

# Influence of cytokines, co-cultured macrophages and 1α, 25-$(OH)_2$-$D_3$ on permeability and expression of cytochrome p450 3A4 and MDR-I mRNA in the caco-2 cell Line

Author: **Bertilsson P,** Graduate School in Biomedical Research, Faculty of Health Sciences, Linköping University, Linköping, Sweden

It is known that inflammatory mediators alter the expression of cytochrome P450 3A4 (CYP3A4) in the liver. It has been reported that the bioavailability of some orally administered drugs increases in inflammatory bowel disease. This could be attributed to both a reduced metabolism in the liver as well as in the small intestine. Alterations in srnall intestinal permeability, mucosal blood flow and drug efflux transporters such as P-glycoprotein (Pgp) may also affect the bioavailability. However, the effect of inflammatory mediators on CYP3A4 and Pgp in the intestine has not been studied. In this study we investigated the impact of proinflammatory cytokines (IL-1, IL-6, TNF-α, and IFN-γ) and J774 macrophages on permeability and mRNA expression of CYP3A4 and MDR1 mRNA (coding for Pgp) in the Caco-2 cell line. The Caco-2 cells were grown on permeable supports with or without 1α,25-$(OH)_2$-$D_3$, an inducer of CYP3A4. In the co-culture experiments, J774 macrophages were grown in the bottom of the wells. Semi-quantitative RT-PCR with *GAPDH* as internal standard was utilized to measure the expression of CYP3A4 and MDR1 mRNA. Viability was assessed with TEER measurements and with the paracellular marker sodium fluorescein. Our results show that proinflammatory cytokines decreased the mRNA expression of CYP3A4 and increased the MDR1 mRNA expression in Caco-2 cells grown in growth medium containing 1α,25-$(OH)_2$-$D_3$. In growth medium without 1α, 25-$(OH)_2$-$D_3$ the expression of both gene products was altered to a lesser degree. Macrophages in combination with IFN-γ and IL-6 gave the most pronounced down-regulation of CYP3A4. The permeability measured by sodium fluorescein flux increased in all treatments whereas the TEER value showed contradictory results since it decreased in cells without 1α, 25-$(OH)_2$-$D_3$.

# The minisatellite D2S44 in the chimpanzee has a different tandem repeated unit localized 200 bases upstream of the human repeat array

Author: **Evertsson U,** Graduate School in Biomedical Research, Faculty of Health Sciences, Linköping University, Linköping, Sweden.

D2S44 is a tandem repeat region situated on the human chromosome 2. This chromosome is the result of a fusion between the two ancestral primate chromosomes 2p and 2q. D2S44 has previously been detected in several primates including the gorilla and the chimpanzee with a hybridization technique using a 2 kbp probe (pYNH24). The D2S44 nucleotide sequence was successfully elucidated by us in one gorilla and two chimpanzee alleles. The human repeat unit, with one single base substitution, was found in both the gorilla and the chimpanzee but it was not tandem repeated. Instead, the chimpanzee had another tandem repeated 30 bp sequence also found in the human. This repeat array is situated about 200 bases upstream of the human repeat array. The gorilla had no tandem repeats at all and also lacked the unit repeated in the chimpanzee. An explanation of the different structures in D2S44 could be that the tandem repetitions were developed after the evolutionary split between chimpanzees and humans.

# Absolute concentrations of metabolites in the human brain in vivo by means of localized proton MR spectroscopy, application to Parkinson's disease

Author**:** **Jänis A,** Graduate School in Biomedical Research, Faculty of Health Sciences, Linköping University, Linköping, Sweden

Magnetic resonance spectroscopy (MRS) provides a noninvasive, *in vivo* method of quantitating metabolite changes within the brain. This technique has now been applied to many pathologies providing diagnostic specificity and increasing insight into mechanisms of pathophysiology. There are pathologies as ischaemia, cancer, multiple sclerosis, Alzheimer's disease, epilepsy, metabolic disorders and so on.

Proton magnetic resonance spectroscopy ($^1$H MRS) has been used in the study of Parkinsonian disorders, localizing the volume of interest (VOl) to the basal ganglia. The main metabolites visible with $^1$H MRS are lactate, choline-containing compounds, myo-inositol, creatine-phosphocreatine, neurotransmitters including glutamate and γ-aminobutyric acid (GABA), N-acetylaspartate (NAA) which are *in vivo* marker of neuronal loss or dysfunction.

In most of these studies the results are expressed as ratios between metabolite signals obtained at certain experimental conditions but absolute quantitation of the metabolite content in moles per unit tissue weight is desirable because it will increase the amount of information which can be extracted from the spectroscopic data and thus make easier interlaboratory comparisons.

In this work, $^1$H MRS, localized to basal ganglia, was carried out in 6 patients with Parkinson's disease and 5 healthy agematched controls. LCModel method, which was used for analysis of spectra, gave absolute metabolite concentrations for more than ten different metabolites.

# Progesterone receptor-like immunoreactivity and mRNA expression in brainstem of female rat

Author**:** **Kastrup Y,** Graduate School in Biomedical Research, Faculty of Health Sciences, Linköping University, Linköping, Sweden

It is evident that there are gender differences in the perception of pain and that these in part can be attributed to gonadal hormones. We have shown estrogen receptors to be present in the rat spinal dorsal horn and these are believed to influence pain inhibiting mechanisms. It seems highly plausible that progesterone receptors hold pain modulating properties. Thus we have examined the presence of progesterone receptor mRNA and immunoreactivity (PR-ir) in the rat nervous system by in situ hybridization (ISH) and immunohistochemistry (IHC) respectively. ISH was performed with $^{35}$S-labelled riboprobe complementary to PR mRNA, a generous gift from Mr Shuji Hirata. The sections were pre-treated with proteinase K, hybridized for 18 h at 59$^{\circ}$C and then posthybridized under high stringency conditions, followed by autoradiography. IHC was performed with a rabbit polyclonal antibody directed against the DNA-binding domain of human PR, supplied by DAKO. Labeling with ISH and IHC corresponded to a large extent and was visible for example in the nucleus of the solitary tract, ventrolateral medulla, areas in the reticular formation and several other regions in the brainstem. Our results show that PR are present in brainstem areas included in the pain modulating system, hence we suggest that PR exerts influence on this system.

# A new method for measuring atrioventricular plane displacement with m-mode echocardiography for assessment of systolic ventricular function

Authors**:** **Carlhäll C-J, Hatle L, Lindström L, Wranne B, Nylander E**, Medical Program and Dept of Clinical Physiology, Linköping Heart Center Faculty of Health Sciences, Linköping University, Linköping, Sweden

Background: M-mode echocardiography has become an established method for the measurement of atrioventricular plane displacement (AVPD). Several studies have shown a relation between mitral ring motion (MRM) and ejection fraction (EF) in patients with left ventricular (LV) dysfunction. Thus, MRM is often used as an expression of LV systolic function. The conventional method for measuring total AVPD is from the bottom of the a-wave to the point of maximal displacement towards the apex. However, true systole begins after the bottom of the a-wave. The displacement towards the apex often has two peaks of which the latter reflects isovolumic relaxation and should not be included in the measurement of systolic motion.
Method: Twenty-eight cardiopulmonary healthy men, mean age 28 years (20-39) were studied. Total AVPD was obtained both in the conventional way and by measuring from 6O msec after the beginning of QRS to the first peak of the total wave, these points in time corresponding to mitral and aortic valve closure, respectively.
Results: For the mitral annulus, the new method resulted in a smaller total AVPD by 10% ($p<0.0001$) 14.7 + 2.3 mm vs 16.4 + 2.0 (mean + SD) and for the tricuspid annulus a reduction by 12% ($p<0.0001$) 19.5 + 2.6 mm vs. 22.2 + 2.5, compared to the conventional method.
Conclusion: The conventional method overestimated total AVPD in systole for both tricuspid and mitral AV plane. The magnitude of this overrating is different in different individuals. Thus, there is an uncertainty in earlier decisions of EF and systolic function expressed as AVPD, and in previously presented reference values for AVPD. We recommend the proposed methodology for measuring AVPD in evaluation of systolic ventricular function.

# Nurses counselling and information concerning sexuality toward patients suffering from myocardial infarction - a pilot study

Authors**:** **Bäckman J, Reinecke E,** Nursing Program, Faculty of Health Sciences, Linköping University, Linköping, Sweden

Sexuality is an important part of the human life. Earlier studies claim that patients suffering from myocardial infarction (MI) want to have sexual counselling initiated by nurses. Other studies suggest that very few nurses conduct sexual counselling and if they do, it is on a general level.
The aim of this study was to examine cardiac nurses sexual counselling and information toward patients with MI. The questionnaire was passed out to the nurses (n=57) working at a cardiology clinic. Thirty-six questionnaires were returned by mail. Two males and 34 females responded. The material was tested with Fishers exact test and content analysis. There were 15 nurses that claimed that they had discussed sexuality with a patient, but only 7 nurses had by themselves initiated a conversation regarding sexuality. Many of the nurses commented that the initiative should be on the patientís side. Some nurses also commented that they felt embarrassment and lack of time and knowledge. Almost all nurses thought that sexuality was a part of nursing. Among 35 responding nurses there were 26 who never used the keyword sexuality in the nursing documentary system VIPS. Many nurses claimed that the responsibility for the sexual counselling was on the physician and the nurses working with rehabilitation. We found that there are many aspects of the questionnaire that could be refined.
The conclusion is that there is an educational need among nurses regarding sexual counselling and information.

# Endothelial nitric oxide synthase immunoreactivity in human gastric mucosa

Authors**:** **Runesson A**, Graduate School in Biomedical Research, Linköping University, Linköping, Sweden

The stomach is equipped with several potent defence mechanisms. Hydrochloric acid will kill ingested microorganisms, but the stomach must also protect itself from low pH and digestive enzymes. Nitric oxide (NO) is suggested as one out of many mediators of gastric mucosal defence, for instance by regulating mucosal blood flow and gastric secretion. Dyspepsia is a problem among people in the western society and a disease about which very little is known. Some patients suffer from nausea and vomiting, others have problems with anorexia or abdominal bloating, but common for functional dyspepsia is that no clinical evidence of disease can be found. In this study, we have investigated the expression of endothelial nitric oxide synthases (eNOS) in the gastric mucosa of patients with dyspepsia using immunohisto-chemical staining. Immunoreactivity against eNOS was found in gastric glandular cells of patients with dyspepsia and in healthy individuals. Although we have investigated only a small number of subjects, the results indicate that those suffering from dyspepsia had a higher amount of eNOS in the gastric mucosa.

# Levitating drops for protein enrichment ≤ acoustic-levitation enrichment of proteins separated by 2D-gel electrophoresis for mass-spectrometric analysis

Authors**:** **Immerstrand C**, Graduate School in Biomedical Research, Faculty of Health Sciences, Linköping University, Linköping, Sweden

Mass Spectrometry (MS) is a valuable tool for the identification of proteins separated by Two-Dimensional (2D) gel electrophoresis. The protein of interest is cut out from the 2D gel, enzymatically cleaved, and the resulting digest is subjected to mass spectrometric analysis, which generates a peptide-mass map of the protein. The aim of this project was to develop a method for enriching the in-gel digests prior to MS analysis, thereby enabling detection of low- intensity spots. The enrichment was performed in a levitated drop, by letting a flow-through microdispenser eject the digest into the ultrasonic field of an acoustic levitator. The enriched digest in the levitated drop was analyzed with Matrix-Assisted Laser Desorption/Ionization Time-of-Flight (MALDI-TOF) MS. Our preliminary findings suggest that acoustic levitation can be used for the enrichment of in-gel digests from 2D gels. However, we have three suggestions on how to improve the enrichment procedure in future experiments. First, a desalting step is recommended prior to the enrichment procedure because high salt concentrations seemed to interfere with the ionization of the sample. Second, the microdispenser system we used can be modified to better suit the small-volume digest samples. Third, the surroundings of the levitated drop can with advantage be heated. This increases the evaporation rate and thereby reduces the time needed for the enrichment procedure.

# Fucosylation activity in granulocytes from a family with abnormal glycosylation pattern

Author**:** **Karlsson L**, Graduate School in Biomedical Research, Faculty of Health Sciences, Linköping University, Linköping, Sweden

Fucosyltransferases (FucT) are required to construct the carbohydrate epitopes $Le^X$ and $SLe^X$ on leukocytes. These epitopes are suggested to interact with selectins on endothelial cells and thereby contribute to leukocyte rolling, prior to invasion of inflamed tissue. The fucosylation activity of one family's leukocytes was investigated with focus on two main enzymes, FucTIV and FucTVII. The family was selected on basis of the abnormal glycosylation patterns on their polymorphonuclear cells (PMN). Some of the investigated individuals also had a point mutation in the gene encoding FucTVII (hetero- and homozygous). The assay was based on whole cell lysate of PMN and two synthetic acceptors (N-acetyllactosamine- and Sialyl-N-acetyllactosamine-O-sp-biotin). The heterozygously mutated individuals had about half the FucTVII activity compared to control persons. One person with no point mutation, however, showed the same trend. The reduced activity was also seen in the individual carrying the homozygous mutation. However, the FucTIV activity was approximately twice as high in this individual compared to the control person. All the other test persons could not be distinguished from each other concerning FucTIV activity. If the variation in fucosylation activity observed in these persons is correlated to the abnormal glycosylation pattern can not be concluded from this study.

# Intracellular changes in yeasts saccharomyces cerevisiae and kluyveromyces thermotolerance due to cold acclimation

Authors**:** **Kronstrand M**, Biomedical Laboratory Science Program, Faculty of Health Sciences, Linköping University, Linköping, Sweden

In this study intracellular changes due to cold stress in yeast Saccharomyces cerevisiae and Kluyveromyces thermotolerance was investigated. It has been shown that these strains survive freezing at –20°C when first cold acclimatized at +4° C. The question now was what happens intracellularly in the cells. Osmopotential measurements showed a slightly higher osmopotential in both strains in of yeast cell grown at +4°C compared to cells grown at +25°C, which is the optimal growth temperature. SDS-PAGE gel electrophoresis was carried out and it showed that different proteins were present in cells grown at +4°C and +25°C respectively. A completely new method to detect proteins called the SELDI-system was also used. This showed protein differences and even with a higher resolution. A lot of studies have been made on different types of stress during the years (e.g. heat, salt and hydrogen peroxide conditions). An idea was to investigate if there could be a crossprotection so that cells grown under these conditions could survive freezing at –20°C. Some results indicated that this was the case, but others did not. It would be interesting to measure further which of the proteins that accumulate at +4°C and which compounds cause the stress-tolerance.

# Pericardiocentesis guided by 2-D echocardiography is the method of choice for treatment of pericardial effusion

Authors**:** **Kjellberg M, Lindenberger M, Karlsson E, Wranne B**, Medical Program and Linköping Heart Center, Faculty of Health Sciences, University Hospital, Linköping, Sweden

Background: Percutaneous pericardiocentesis guided by 2-D echocardiography was introduced at Linköping Heart Center in 1983 as an alternative to electrocardiographic or fluroscopic guided puncture in the treatment of pericardial effusion.
Aim: The purpose of this study was to determine the etiology of pericardial effusion in patients that needed puncture. Further to evaluate our experiences of the 14 years the method has been used.
Method: From 252 consecutive patients treated with percutaneous pericardiocentesis guided by 2-D echocardiography between 1983 and 1997, 120 were randomiy selected and included in a retrospective study.
Results: The etiology in the 120 patients were dominated by patients who had undergone cardiac surgery (n=50), followed by malignant (n=31), inflammatory (n=8) and infectious diseases (n=7), miscellaneous (n=3) and idiopathic (n=21). In the group of patients who had undergone cardiac surgery, the pericardial puncture was performed a median of 12 days (range 0-56) after surgery. Seventy-seven percent had undergone valve surgery and 12,5 % by-pass surgery. The survival rate after 30 days was 87 % in the group with malignant disease (10 % 1-year survival). Indwelling catheter was used in 93 % of the patients. Median duration of use was 4 days (range 0-14). The catheter was also used to instill chemotherapeutic agents in the pericardium of 17 patients with malignant disease. Complications were few, nine minor and one major. No lethal complications occurred. Eleven patients had recurring effusion and needed further treatment. Five patients needed additional pericardiocentesis, four were treated surgically and three with a combination of pericardiocentesis and surgery.
Conclusion: Pericardiocentesis guided by 2-D echocardiography is a safe and efficient method to treat pericardial effusion. It is also a valuable palliative treatment for patients with malignant disease.