Original research articles on the cardiopulmonary system recently appeared in Brazilian clinical and surgical journals

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Summary

In the last few years, a huge increment in the quality of scientific articles published in Brazilian Medical Journals has been observed. Several reasons were related to this feature including the SciELO free access initiative, the English language adopted by most journals, and, more importantly, the increase in the number and quality of Brazilian researchers. This article highlights, in the cardiovascular and respiratory areas, the best articles that have been published in these journals in the last few months. The reader will have a general overview of these areas and can select the original articles for deeper information.

Keywords: Cardiovascular diseases; cardiology; respiratory system; lung diseases; pulmonary disease; chronic obstructive.

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Brazilian clinical and surgical journals have recently enjoyed a very significant increase both in the quality and the total volume of published original science. No small credit is due here to the enhanced visibility induced by the SciELO collection, which requires all journals indexed therein to be of immediate free open access[1]. A second, more recent stimulus has come from the very large increase in Brazilian journals accepted by and indexed in the ISI-THOMSON Journal of Citation Reports (JCR) factor[2]. In all categories, the number of Brazilian ISI THOMSON indexed journals rose from 31 in the 2008 JCR edition to 102 in the 2010 version. This review catalogues and summarizes papers that appeared in clinical and surgical journals that are included, or are about to be included in the ISI JCR Impact Factor collection.

The cardiovascular system

Table 1 summarizes the categories into which articles dealing with the cardiovascular system were classified.

Table 1 – Articles dwelling on human studies of the cardiovascular system

Categories and sub-categories	References
Cardiovascular surgery	
General	3-11
Revascularization	12-24
Cardiac valves	25-30
Congenital heart disease	31-35
Vascular surgery	36-38
Videothoracoscopy	39,40
Clinical cardiology	
Coronary artery disease	41-47
Hypertension	48-56
Exercise	57-59
Metabolic syndrome	60
Congestive heart failure	61
Atherosclerosis	62
Vascular disease	63,64
Microcirculation	65
Neural control	66
Myocardial electrophysiology	67
Hematology	68-70

Cardiovascular surgery

General subjects. Nine articles covered general topics[3-11]. Instructions regarding physiotherapeutical ventilatory exercises were found to reduce anxiety levels in patients undergoing coronary artery bypass graft surgery[3]. The well-known bad quality of life of patients with terminal heart failure and eligible for transplant was measured: mental and social features were least affected while vitality and functional performance were found to be very low[4]. Pulse oximetry wave variation as a non-invasive tool to assess volume status in cardiac surgery was shown to be a simple method for assessing fluid responsiveness in patients following cardiac surgery[5]. Aneurismectomy in patients with severe left ventricular dysfunction was found to result in short and long-term favorable functional outcome and survival[6]. The establishment of an organizational model in a cardiovascular surgery service was described as inducing marked improvements in surgical outcomes[7]. The hydrodynamic profile of different models of roller pumps used in cardiopulmonary bypass was examined with a recommendation that measurements of occlusion are dependent on the design of the pump bed, and comparisons involving roller pumps should be performed with caution[8]. A statistical method was described which allows the investigation of a patient's length of stay in the operating room[9]. Data from the Instituto de Cirurgia Cardiovascular do Oeste do Paraná on reverse remodeling of the left ventricle after 111 months of follow-up show that endoventriculoplasty with septal exclusion is an effective option to treat this group of patients, with improvement of left ventricular function and patients' quality of life[10]. Coronary dominance patterns in the human heart were investigated through corrosion casting and the most common form of coronary circulation is right dominance with an average of 2.16 branches leading to the left ventricle: when dominance is left, the average is 1.2 branches[11].

Cardiopulmonay bypass surgery. *Per se*, or in conjunction with arterial grafting, cardiopulmonary bypass surgery was the object of 13 papers[12-24]. The bypass procedure was found to alter propofol pharmacokinetics and bispectral index during coronary surgery with a resulting increase in the brain's elevated sensitivity to anesthetics[12]. The risk related to the association of other surgical procedures with surgical myocardial revascularization in octogenarian patients was examined and found to elevate mortality by 45% in this population[13]. The composite aortic wall graft technique was proposed as a new technique for performing proximal anastomosis in order to avoid coronary artery bypass graft failure[14]. Preoperative factors predictive of a favorable outcome were identified, and functional improvement after coronary artery bypass grafting in patients with advanced left ventricular dysfunction was assessed[15]. A prospective, randomized study evaluated the hemodynamic and analgesic effects of ketamine by comparing it with propofol starting at the induction of anesthesia until the end of sternotomy in patients undergoing coronary artery bypass grafting surgery: there were no differences between groups in the consumption of sevoflurane or in the use of additional fentanyl.

However, the combination of ketamine, midazolam, and fentanyl for the induction of anesthesia provided better hemodynamic stability during induction and until the end of sternotomy in patients undergoing coronary artery bypass grafting surgery[16]. The site of the proximal anastomosis of the radial artery coronary grafts was examined and found not to interfere in mid- and long-term graft occlusion and patency[17]. Clinical complications of limbs from which saphenous veins were harvested, but where the bridge technique did not eliminate clinical complications, such as paresthesia, infection and edema of the saphenous vein harvesting site were studied[18]. The use of left internal thoracic artery grafting was investigated and isolated grafts were found to be superior to versus sequential grafts in symptomatic patients, except when injuries were greater than 70% and no differences were found[19]. The importance of skeletonizing internal thoracic arteries to be used for coronary bypass graft was studied and it was found that this procedure is important for the preservation of sternal perfusion[20]. The preoperative assessment of coronary vascular resistance was assessed and proved to be a significant predictor of success for coronary artery bypass surgery[21]. Intact segments of human saphenous veins submitted to distensions at different pressures were found to have similar apoptotic proteins expression when compared with non-distended control veins[22]. The use of topical application of epsilon aminocaproic acid was found to reduce postoperative bleeding in the first 24 hours and requirements of blood transfusion after coronary artery bypass graft surgery[23]. The use of electroanalgesia as an effective method in the reduction of pain and consequent improvement in lung function in patients undergoing coronary artery bypass graft surgery was studied: patients submitted to this procedure presented a reduction in the intensity of postoperative pain, which, however, did not mean improvement in respiratory function[24].

Cardiac valve surgery. The subject was covered in six papers[25-30]. Risk factors associated to the implantation of valve prosthesis were analyzed and found to be coherent to the general risk of valve surgery[25]. Three papers discuss mitral valve surgery. Results of beating heart mitral valve surgery via the trans-septal approach are presented and the procedure is offered as an option for myocardial protection[26]. Mitral valve conservative surgery in rheumatic patients was analyzed in a series of patients and found to be a feasible procedure with low operative mortality[27]. The repair of mitral valve regurgitation by intermittent annular reduction is described as a procedure which allows for avoiding the replacement of the valve in children[28]. Aortic valve surgical procedures are examined in two articles[29,30]. The reduction ascending aortoplasty procedure with external wrapping associated with aortic valve replacement is described as a safe procedure with excellent midterm results in high risk patients with ascending aortic aneurysm and aortic valve disease[29]. The implant of aortic valve replacement prosthesis in the presence of atherosclerotic critical coronary artery disease associated in at least two arteries was found to increase hospital mortality[30].

Congenital heart disease. It is the subject of five articles[31-35]. The protective effect of aprotinin on platelet preservation for children with acyanogenic congenital heart disease has been demonstrated[31]. A new development in the technical execution of the total cavopulmonary anastomosis (Fontan operation) is described[32]. Pulmonary artery binding is the object of a critical survey of cases in a tertiary hospital center[33]. A new technique for the execution of the Norwood procedure including anterograde regional cerebral perfusion and retrograde coronary perfusion is described[34]. The successful surgical treatment of aortic coarctation in adults at a tertiary university center is reviewed[35].

Vascular surgery. It is the object of three studies[36-38]. An ultrasound-guided and a landmark-guided technique for internal jugular vein cannulation are described, with the former presenting shorter access and a lower rate of immediate complications[36]. The use of the levels of low-density lipoprotein as predictor of peripheral arterial disease severity is not advised in view of the poor correlation between the two[37]. Surgical treatment of anomalous pulmonary venous connections to the superior vena cava associated with sinus venous atrial septal defect is a well-established procedure. It also correlates with low mortality and morbidity, but a new technique in which the right atrial appendage was used to enlarge the right superior vena cava proved to be a superior solution for the anomaly[38].

Videothoracoscopic surgery. This kind of surgery and its possible uses are discussed in three papers[39-41]. Its range of applications was demonstrated with respect to a number of pathologies[39]. It was also used for T2 or T3 level sympathectomy for the treatment of hyperhidrosis, with similar results except for the lower level of compensatory response observed with the T3 level approach[40]. The efficacy and safety of videothoracoscopic pericardial drainage in the treatment and diagnostic of pericardial effusion was evaluated through a twenty-six-case review, showing that the procedure is feasible, safe, reproducible and allowed an etiological diagnostic[41].

Clinical cardiology

Coronary artery disease. It is the subject of seven articles[42-48]. The presence of atrial fibrillation and the absence of oral β-blockers were suggested to increase in-hospital mortality of patients with acute myocardial infarction; oral β-blockers reduced the incidence of atrial fibrillation,

which might be at least partially responsible for the drug's benefit[42]. Long-term follow-up of patients with myocardial infarction revealed that intensive therapy procedures during the in-hospital phase were at least as effective in elderly patients as in younger patients[43]. The high anxiety and depression prevalence observed in patients complaining of chest pain indicates the need for early and specialized approach to these disorders. When coronary arterial disease is present, this may decrease complications and shorten hospital stay[44]. Obstructive sleep apnea was found to be unrelated to myocardial ischemia, heart rate variability or arrhythmias in patients with stable coronary artery disease and did not alter the circadian pattern of myocardial ischemia[45]. After 17 years of follow-up in the "Rio de Janeiro Study", the blood pressure of young individuals showed a significant association with cardiovascular risk variables and with the occurrence of myocardial symptoms during young adult life[46]. Permanently low HDL-c during eight years of monitoring was identified as a risk factor for the development of cardiovascular events in the elderly[47]. A risk score was developed for the non-ST-segment elevation in acute coronary syndrome to predict death or (re)infarction for the Brazilian population[48].

Hypertension. This is the subject of nine original studies[49-57]. A study of the influence of hypertension control upon quality of life in patients with and without complications showed that special care programs with multidisciplinary activities, individualized and personalized assistance, easy access to pharmacological treatment, frequent meetings, and active telephone calls for hypertensive patients significantly ameliorate blood pressure control but do not interfere with the quality of life[49]. Coronary blood flow reserve reduction has been proposed as a mechanism for the progression of compensated left ventricular hypertrophy to ventricular dysfunction; however, in a group of hypertensive patients, endothelium-dependent and endothelium-independent coronary blood flow reserve vasodilator administrations had similar effects in patients with either normal or decreased left ventricular systolic function[50]. Blood pressure responses during resistance exercise in hypertensive subjects were examined to determine whether it alters these responses and showed that resistance exercise increased systolic blood pressure considerably more in hypertensives than in normotensives, and that this increase was greater when low-intensity exercise was performed to the point of exhaustion[51]. A study was designed to create a protocol to measure the baseline and post-captopril glomerular filtration rate using 51Cr-EDTA, and to verify whether changes in the glomerular filtration rate permit differentiation between hypertensive patients with and without renal artery stenosis. It concludes that captopril induced a decrease in the GFR that could be quantitatively measured with 51Cr-EDTA. The reduction is more pronounced in hypertensive patients[52]. The efficacy and tolerability of the fixed combination, amlodipine + enalapril, when compared to amlodipine in the normalization of the diastolic arterial pressure were evaluated in patients with coronary artery disease and systemic arterial hypertension. The fixed combination of enalapril and amlodipine, as well as isolated amlodipine, was effective in the normalization of diastolic pressure in patients with coronary artery disease and hypertension[53]. The prognostic value of uncontrolled daytime arterial pressure in resistant hypertensive women was studied and a 67% increase in the risk of a cardiovascular event was found[54]. The metabolic, hemodynamic, autonomic, and endothelial responses to short-term red wine consumption in subjects with hypercholesterolemia or arterial hypertension and healthy controls showed that red wine elicits different metabolic, autonomic, and endothelial responses among individuals with hypercholesterolemia or arterial hypertension and healthy controls. These findings highlight the need to consider patient characteristics when evaluating the response to red wine[55]. A protocol to validate the treadmill six-minute walk test (6MWT) for the evaluation of patients with pulmonary arterial hypertension found that that the test is a useful prognostic and functional marker for the routine evaluation of pulmonary arterial hypertension patients[56]. Sublingual administration of sildenafil was found to be an effective and safe alternative as a vasodilator during the pulmonary hypertension reversibility test in patients with heart failure and awaiting a heart transplant[57].

Exercise. Exercise and its relation to cardiovascular pathology were studied in three articles[58-60]. The dose-response curve for the hypotensive response was evaluated to determine the number of sessions that are necessary to cause a hypotensive effect in hypertensive individuals. An important hypotensive effect was observed from the 1st session on and it was observed that the dose-response curve can be abrupt and decrescent, instead of flat[58]. A study was designed to evaluate (a) the pattern and reproducibility of the blood pressure throughout 15 minutes of physical exercise at constant and moderate intensity; and (b) to compare pressure measurement obtained with a digital *vs*. a conventional device during the exercise. It was found that for exercises of moderate and constant intensity in a cycle ergometer with a 15-minute duration, pressure measurements must be carried out from minute #7 on. Digital measurements and those obtained with the conventional mercury-column sphygmomanometer were, for clinical purposes, very similar and reproducible[59]. The association between initial (rapid and slow) and final transient heart rate responses during exercise showed that it is important to standardize the measurement of resting hear rate for the analysis of transient responses[60].

Metabolic syndrome. It was studied to compare circuit weight training with jogging on multiple cardiovascular disease, metabolic risk factors and fitness of overweight and obese women: the results suggest that both protocols improved the condition of cardiovascular disease patients and reduced metabolic syndrome[61].

Congestive heart failure. It was the object of a study which compared left ventricular regional wall motion, the global left ventricular ejection fraction, and the New York Heart Association functional class pre- and postoperatively, to conclude that although endomyocardial fibrosis patients have improved clinical symptoms after surgery, the global left ventricular ejection fraction and regional wall motion in these patients do not change. This finding suggests that other explanations, such as improvements in diastolic function, may be operational[62].

Atherosclerosis. It was examined to correlate non-invasively detectable indicators of the coronary manifestation with the extent of coronary disease assessed by the Friesinger index from conventional coronary angiography. It was found that it is possible to approximately determine the presence and extent of the disease by non-invasive methods, especially by calcium score, HDL-c and TG/HDL-c ratio assays[63].

Vascular disease. It was investigated in two studies[64,65]. Cardiovascular risk factor profiles and 24-month mortality were analyzed in patients with symptomatic peripheral arterial disease: a high prevalence of uncontrolled (treated or untreated) cardiovascular risk factors was detected in patients undergoing planned peripheral vascular reconstruction. Chronic use of aspirin was associated with reduced all-cause mortality in these patients[64]. The thickness of the common carotid intima-media was compared between Brazilians of African *vs*. European descent. No differences were observed, but longitudinal studies are required for a better evaluation of incidence, etiologic factors and evolution of carotid intima-media thickening in this population[65].

Microcirculation. It was the theme of an original research effort to examine the effect of *Piper sarmentosum* on the level of nitric oxide in response to oxidative stress applied to endothelial cells of the human umbilical vein and concludes that aqueous extract of *Piper sarmentosum* may improve endothelial function by promoting NO production in this structure[66]. Metabolic, hemodynamic, autonomic, and endothelial responses to short-term red wine consumption in subjects with hypercholesterolemia or arterial hypertension were compared to those of healthy controls; it is claimed that red wine elicits different metabolic, autonomic, and endothelial responses between individuals with hypercholesterolemia, arterial hypertension, or healthy controls. These findings highlight the need to consider patient characteristics when evaluating their response to red wine[67].

The Neural Control. The Neural Control of cardiac vagal tone in non-obese healthy men with unfavorable anthropometric characteristics showed that this population tends to present lower cardiac vagal tone levels. Early identification of this trend by simple protocols that are non-invasive and risk-free, using select anthropometric characteristics, may be clinically useful in a global strategy to prevent cardiovascular disease[68].

Myocardial electrophysiology. It was studied by analyzing the effects of sevoflurane general anesthesia and bupivacaine selective spinal anesthesia on QT dispersion and corrected QT interval. Results show that although volatile induction and maintenance of anesthesia with sevoflurane might prolong the corrected QT interval, it did not result in arrhythmia[69].

Hematology. It was studied in three articles[70-72]. The initial experience of a tertiary university hospital with selective fetoscopic laser photocoagulation of superficial placental anastomoses for the treatment of severe twin-twin transfusion syndrome is reported and results are consistent with those described for larger endoscopes[70]. A research on the influence of late treatment on how chronic myeloid leukemia responds to imatinib reveals that when such patients were treated with second-line imatinib therapy, the probability of achieving and maintaining major molecular remission was higher in patients who received early treatment compared with those patients for whom the time interval between diagnosis and initiation of imatinib therapy was longer than one year[71]. An evaluation of the role of HFE, TfR2 and SCL40A1 mutations in Brazilian subjects with hemochromatosis showed that one-third of Brazilian subjects with the classical phenotype of HH do not carry HFE or other mutations that are currently associated with the disease in Caucasians. This observation suggests a role for other yet unknown mutations in the aforementioned genes or in other genes involved in iron homeostasis in the pathogenesis of HH in Brazil[72].

The respiratory system

Table 2 summarizes the categories into which articles dealing with the respiratory system were classified.

General pneumology

Diagnosis. It is covered by five studies[73-77]. The participation of the coagulation system in the differential diagnosis of pleural effusions was studied and led to the conclusion that coagulation tests show differences between transu-

Table 2 – Articles dwelling on human studies of the respiratory system

Categories	References
General pneumology	73-85
Asthma	86-102
Chronic obstructive pulmonary disease	103-115
Cystic fibrosis	116-124
Oncology	125-132
Apnea	133-139
Ventilation	140-162
Infectious diseases	163-184
Smoking	185-194

dates and exudates but not among exudate subgroups[73]. A locally developed system of computer vision for use with high resolution computerized tomography images, designated *SIStema para a Detecção e a quantificação de Enfisema Pulmonar* (SISDEP – system for detection and quantification of pulmonary emphysema) is presented and compared with a freeware system tool: SISDEP was found to be efficient in segmenting the lungs and quantifying lung hyperinflation, presenting an excellent correlation with the Osiris system[74]. Semiquantitative evaluation of intrapulmonary vascular dilatations was correlated with quantitative evaluation of shunt levels and was found to be a safe and useful tool for assessing intrapulmonary vascular dilatations[75]. The influence of radiological techniques and clinical characteristics in predicting complications from CT-guided fine needle aspiration biopsy of pulmonary lesions; a lower rate of complications was observed, with higher rates of complications on lesions that lack pleural contact[76]. Parenchimal lung disease was the object of a study which showed that diagnosis through videothoracoscopy is a safe, effective and viable procedure for the diagnosis of diffuse parenchymal lung diseases[77].

Bronchoalveolar lavage. It was used to analyze victims of severe facial burns who inhaled smoke and showed that increased numbers of ciliated epithelial cells in the lavage fluid –which denote bronchial epithelial desquamation – were associated with higher mortality in this population[78]. The evolution of lipoid pneumonia in children, based on clinical, radiological and bronchoalveolar lavage fluid findings showed that a diagnosis of lipoid pneumonia should be considered in patients with chronic refractory pneumonia or tuberculosis, especially if there is a history of mineral oil ingestion. Bronchoscopy with multiple bronchoalveolar lavages was an efficient treatment for the clearance of mineral oil from the lung parenchyma and the prevention of fibrosis. This strategy contributed to reducing the morbidity of lipoid pneumonia, which remains a rare diagnosis[79].

Social security. The prevalence of temporary social security benefits due to respiratory disease granted to employees, as well as the number of lost workdays and their resulting costs in Brazil were determined between 2003 and 2004. The most prevalent diseases were airway diseases and pneumonia. Workers from auxiliary transportation equipment manufacturing, tobacco product manufacturing and computer-related activities were the most affected. Diseases caused by exogenous agents demanded longer sick leaves and resulted in greater costs[80].

Thromboembolism. Risk factors for venous and pulmonary thromboembolism in the city of Manaus, Brazil were identified. It was also observed that common prophylactic measures were not employed in patients prone to developing VTE and its complications[81].

Quality of life. A study on the expectations and patient satisfaction related to the use of thoracotomy and video-assisted thoracoscopic surgery for treating recurrence of spontaneous primary pneumothorax showed that video-assisted thoracoscopic should be considered as first-line surgical treatment for patients with recurrent primary spontaneous pneumothorax[82].

***Pectus excavatus* and *pectus carinatum*.** Prevalence in students in the city of Manaus, Brazil found a lower than reported in other Brazilian studies, but higher than that reported in the literature[83].

Epidemiology. An epidemiological study on the morbidity and mortality of respiratory diseases among adults attending a tertiary hospital in Nigeria showed that pulmonary tuberculosis (TB), asthma and pneumonia were the leading causes of respiratory disease-related morbidities. These conditions should be given higher priority in patient care, and, in addition, antiretroviral therapy should be readily accessible and affordable to HIV-infected individuals[84].

Duchenne muscular dystrophy. It was the subject of an article in which cough efficiency using two manually-assisted cough techniques was analyzed. It was found that chest compression and air stacking techniques were efficient in increasing PCF. However, the combination of these two techniques had a significant additional effect[85].

Asthma

Epidemiology. It is the object of six papers[86-91]. Three papers describe the prevalence and characteristics of asthma in Spain and in Latin America[86], in the Brazilian city of Fortaleza[87], and in the Amazonian region[88]. They all conclude that the management of the disease is suboptimal both in terms of diagnosis and treatment. A study conducted in

pediatric patients with severe early-onset asthma found that they are at increased risk of dental enamel defects and therefore require priority dental care[89]. Diagnostic criteria for asthma evaluated through a Brazilian Ministry of Health directive were found to be suitable for diagnosis[90], whereas an epidemiological questionnaire was not found to be entirely suitable for the task[91].

Pulmonary function. It was the object of five papers[92-96]. A within-breath analysis of respiratory mechanics by forced oscillation was shown to permit a non-invasive and detailed analysis in different phases of the respiratory cycle, providing parameters that are adequate for the diagnosis of asthma with high accuracy. These results confirm the high clinical and scientific potential of this methodology in the evaluation of asthmatic patients[92]. An investigation of the effects of airway obstruction on albuterol-mediated variations in the resistive and elastic properties of the respiratory system of adult asthmatic patients showed greater reductions in R0 and Edyn after albuterol use. These reductions are greater among BR+ patients than among BR- patients[93]. The incidence of asthma symptoms and pulmonary function alterations among amateur swimmers within the 6-14 age range was found to be high; additionally, a relevant proportion of these athletes was receiving no treatment[94]. The combined effects of asthma and chronic obstructive pulmonary disease (COPD) as well as their treatment in Brazil were found to be in agreement with data in specialized non-Brazilian reports[95]. The spontaneous release of superoxide anion by peripheral blood granulocytes was evaluated in atopic patients with uncontrolled asthma undergoing glucocorticoid therapy, and in healthy subjects. It was found that the impact of corticosteroids on inflammatory modulation occurred in the uncontrolled asthmatics with forced expiratory vital capacity in the first second (FEV_1) between 60 and 80%. In those with FEV_1 of 60%, this finding was not observed[96].

Prophylaxis. This was the object of a study which evaluated the "Programa de Controle da Asma e Rinite Alérgica" in Feira de Santana (ProAR-FS, Program for the Control of Asthma and Allergic Rhinitis in the city of Feira de Santana, in the state of Bahia) and found that the implementation of a referral center for the treatment of asthma and rhinitis in the Unified Health Care System, with the free distribution of inhaled corticosteroids and the support of an education program, is a highly effective strategy for the control of asthma[97].

Education. The education of asthma patients was evaluated through a survey of the level of knowledge of techniques for using prescribed inhalation devices among patients with asthma or COPD treated at a tertiary teaching hospital. Although most of the patients claimed to know how to use inhalation devices, the fact that 94.2% made at least one error shows that their technique was inappropriate and reveals a discrepancy between understanding and practice[98]. A second study evaluated the understanding of asthma and the clinical improvement in patients with moderate or severe persistent asthma prior to and after their participation in an educational program presented during the routine outpatient visits and showed that the majority of non-specialized physicians working within the public health care system do not manage the treatment of patients with asthma in accordance with the guidelines[99].

Post-menopausal asthma. Post-menopausal asthma in obese patients undergoing treatment with inhaled corticosteroids found a slight positive protective effect of high BMI against osteoporosis in these patients, but this effect is overcome by time and menopause status. Consequently, the protective effect of obesity against osteoporosis in asthma patients seems not to be significant[100].

Asthma comorbidities. Asthma comorbidities such as frequency of rhinitis, nasal polyposis, gastroesophageal reflux disease, vocal cord dysfunction and bronchiectasis were determined in patients with severe asthma which constitute 10% of the total asthmatic population, resulting in a recommendation that patients with severe asthma, associated diseases should be investigated as the cause of respiratory symptoms and uncontrolled asthma[101].

Quality of life. The quality of life of asthmatic adolescents was assessed and claims that a multidisciplinary team needs to face the challenge of providing good quality of life with the purpose of making these patients better adapted to society and to their own needs[102].

Chronic obstructive pulmonary disease (COPD)

Quality of life. It is the object of seven studies[103-109]. A 24-month pulmonary rehabilitation program provided benefits in terms of anxiety, depression, quality of life and physical performance of COPD patients, which persisted throughout the 24-month study period[103]. An attempt to correlate health related quality of life with clinical parameters and the six-minute walk distance in women with COPD only found that these patients presented severe limitations in functional capacity, breath control and personal life[104]. Two quality-of-life questionnaires, the Saint Georges Respiratory Questionnaire (SGRQ) and the Medical Outcomes Study 36-item Short-Form Health Survey (SF-36), were compared in patients with COPD and found that the expected similarities were duly observed[105]. A similar study to determine the quality of life of COPD patients by using SF-36, and SGRQ correlating the scores with respiratory function parameters found that in COPD patients, a decline in FEV_1 is associated with poorer quality of life, as

evaluated using the SGRQ[106]. A Portuguese version of the Chronic Respiratory Questionnaire was tested and found to be reproducible and valid for use in Brazilian patients with COPD[107]. Factors associated with the minimal clinically important difference for health-related quality of life were identified after physical conditioning in patients with COPD. Minimal clinically important difference for health-related quality of life after physical conditioning is associated with dyspnea reduction in COPD patients. Therefore, there is a need to develop treatment strategies designed to interrupt the dyspnea-inactivity-dyspnea cycle in such patients[108]. A Brazilian sample of patients with COPD was found to be more active than those evaluated in studies conducted in Europe, which were less active than the controls[109].

Respiratory function. It was the object of three articles[110-112]. The use of albuterol improved the resistive and reactive properties of the respiratory system of the COPD patients under study. These changes occurred regardless of the FEV_1-based classification, thereby indicating that the use of this parameter in isolation might not suffice to identify the physiological effects involved[110]. Deep breathing heart rate variability was found to be associated with respiratory muscle weakness in patients with COPD[111]. An analysis of cardiopulmonary variables in COPD patients with or without lean body mass (LBM) depletion, prior to and after the 6MWT, demonstrated that functional exercise tolerance and quality of life were unaffected by LBM depletion. However, the patients with LBM depletion presented more pronounced lower limb fatigue during the 6MWT, which underscores the importance of the evaluation and treatment of systemic manifestations in COPD patients[112].

Diagnosis. A report on diagnosis reveals that simple diagnostic methods can facilitate the diagnosis of COPD, which is a major public health problem, because a number of clinical examination findings could be used as diagnostic tests for COPD[113].

Nutritional status. It was the object of a study about severe COPD patients who were overweight or obese who had a greater fat free mass (FFM), exercise capacity and inspiratory muscle strength than patients with the same degree of airflow obstruction who were of normal weight or underweight, leading to the conclusion that a higher FFM was independently associated with higher exercise capacity. These characteristics of overweight or obese patients might counteract the drawbacks of excess weight and lead to an improved prognosis in COPD[114].

The BODE index and its possible correlation with ventilatory and metabolic responses in the Activities of Daily Living assessment of COPD concluded that no such correlation could be demonstrated[115].

Cystic fibrosis

Pulmonary function. Four articles cover this topic[116-119]. Respiratory therapy followed by the use of inhaled albuterol was evaluated to determine whether it modifies the pulmonary deposition of inhaled tobramycin in patients with cystic fibrosis and whether pulmonary deposition correlates with disease severity or genotype; it was concluded that the use of a respiratory therapy technique and the administration of inhaled albuterol immediately prior to the use of inhaled tobramycin decreased the pulmonary deposition of the latter in CF patients, and this reduction correlates with disease severity and genotype[116]. The association between nutritional status measurements and pulmonary function in children and adolescents with cystic fibrosis was analyzed and the conclusion was that all nutritional status measurements correlated directly with the pulmonary function of children and adolescents with cystic fibrosis. However, body composition measurements allowed earlier detection of nutritional deficiencies[117]. Spirometric patterns of respiratory disorders and their relationship with functional severity and maximal expiratory flows at low lung volumes were evaluated in patients with cystic fibrosis and the conclusion was that respiratory pattern was impaired in 88% of the patients with the disease; the most common pattern was obstructive lung disease (OLD) with reduced foced vital capacity (FVC). The degree of functional impairment was greater in the OLD with reduced FVC group and in the mixed obstructive and restrictive lung disease (MORLD) group than in the other groups. Maximal expiratory flows at low lung volumes were impaired in a low percentage of patients with preserved respiratory function[118]. A study was designed to identify predictive factors of oxygen desaturation during the 6MWT in patients with cystic fibrosis and concluded that resting $SpO_2 < 96\%$ and $FEV_1 < 40\%$ can predict oxygen desaturation during the test[119].

Perception of disease severity. It was studied in cystic fibrosis patients through an analysis of its relation with clinical score, radiographic score, respiratory function tests, adherence to treatment and perception of self-care practices and concluded that the perception correlated with objective measurements (clinical score and respiratory function tests) and with reported self-care practices, but not with adherence to treatment[120].

Nutritional, clinical and socioeconomic profile. The profile of patients with cystic fibrosis treated at a referral center in northeastern Brazil showed that socioeconomic factors proved favorable, especially maternal education and *per capita* income. Age at diagnosis was higher than that reported in the literature, although the Shwachman score and the incidence of respiratory infections demonstrated that the patients presented good clinical status[121].

Genetics. The genetic makeup of cystic fibrosis was further clarified by an association between the TC genotype of the *T869C* polymorphism (TGF-β1) and mild pulmonary disease in CF patients. In the *CD14* gene, the TT genotype seems to be a risk factor for pulmonary disease but is not a modulator of severity. No association was found between being a ΔF508 homozygote and presenting severe lung disease[122].

Renal function. The renal function in cystic fibrosis patients revealed a possible correlation between genotype and renal phenotype in the presence of proteinuria[123].

Malnutrition. It was the object of a research project correlating dietary intake and nutritional status, which found (a) that the prevalence of malnutrition was low in this sample of patients, (b) an association between dietary intake and nutritional status, and (c) that dietary intake was a predictive factor of growth development in young patients with cystic fibrosis[124].

Pulmonary oncology

Pulmonary metastases. They were studied in two papers[125,126]. Clinical, pathological, and treatment-relevant variables associated with long-term (90-month) overall survival in patients with lung metastases undergoing pulmonary metastasectomy were analyzed leading to the conclusion that the procedure is safe and potentially curative for patients with treated primary tumors. A select group of patients can achieve long-term survival after resection[125].

Diagnosis. Esophageal cancer was the object of a study on the value of endobronchial ultrasound application for diagnosis of tracheobronchial tree invasion by esophageal cancer, which concluded that the procedure showed signs of tracheobronchial invasion not observed by conventional bronchoscopy, adding information to staging in most of the cases when compared with CT and endoscopic US[126]. A second paper on diagnosis showed that the Brazilian version of the Functional Assessment of Cancer Therapy-Lung (FACT-L) with the FACT-Lung Symptom Index (FLSI) questionnaire is reliable, simple and quick to apply[127].

Epidemiology. An epidemiological study on the characteristics of patients with lung cancer in the city of Manaus, Brazil, showed that survival rates were considerably lower than those reported in the literature. This might be attributable to the limited access to the specialized health care system and the advanced stage of the disease at diagnosis[128].

Pulmonary function and quality of life. A study determined that pulmonary resection has a direct negative impact on pulmonary function and quality of life, especially on that related to aspects directly linked to pulmonary function. The importance of preoperative assessment of pulmonary function in patients undergoing pulmonary resection is stressed in order to predict their postoperative evolution[129].

Genetics. It is the object of a study which estimated and compared the frequency of *CYP1A1**2A gene polymorphisms in a Brazilian population and determined the possible contribution of these genetic variations to lung cancer risk. It concluded that the *CYP1A1**2A gene cannot be linked with lung cancer risk in Brazilian patients at this time. Larger epidemiologic studies are needed in order to establish whether the CC plus TC polymorphism increases the risk of lung cancer in African-Brazilians[130].

Malignant mediastinal tumors. Malignant mediastinal tumors were the object of a report on the characteristics associated with complete surgical resection of such malignant tumors, which found that preoperative radiological evidence of invasion of organs other than the lung is associated with the incomplete surgical resection of primary malignant mediastinal tumors[131]. Mediastinal lymph nodes were the object of an evaluation on the efficacy of the joint use of cervical mediastinoscopy and video-assisted thoracoscopy for their sampling in patients with non-small cell lung cancer and candidates for pulmonary resection. The evaluation found that joint use of cervical mediastinoscopy and video-assisted thoracoscopy for the evaluation of posterior mediastinal lymph nodes proved to be an efficacious method. When there is no access to posterior chains by means of ultrasound with transbronchial or transesophageal biopsy, which dispenses with general anesthesia, this should be the method of choice for the correct evaluation of mediastinal lymph nodes in patients with NSCLC[132].

Apnea

Sleep apnea. It is covered by four articles[133-136]. Relationships between sleep apnea, myocardial ischemia and cardiac arrhythmia in patients with coronary artery disease are investigated and results reveal that obstructive sleep apnea is not related to these pathologies in patients with stable coronary artery disease and did not alter the circadian pattern of myocardial ischemia[133]. The effects of sildenafil on autonomic nervous function during sleep in obstructive sleep apnea were evaluated in patients with severe obstructive sleep apnea. It is claimed that the decrease in arousal response to apnea/hypopnea events along with the increase in HFnu components and decrease in LH/HF components of the heart rate variability ratio during slow wave sleep suggest that, in addition to worsening sleep apnea, sildenafil has potentially immediate cardiac effects in patients with severe obstructive sleep apnea[134]. The

prevalence of obstructive sleep apnea syndrome in truck drivers was investigated and found to be lower than that reported in other studies of truck drivers and yet higher that that observed for the general population. In addition, results suggest that work characteristics, such as employment status, are associated with the problem. These data show the relevance of considering work activity in studies of factors associated with the syndrome[135]. The prevalence of obstructive sleep apnea in children and adolescents with sickle cell anemia was found to be high, indicating the importance of identifying signs of the syndrome as soon as possible, and to determine the mean annual hemoglobin level because of the inverse correlation between that level and the total sleep time with SpO_2 < 90% or < 80%[136].

Sleepiness. It was the subject of two papers[135,136]. The dimensions of sleepiness and their correlations with sleep-disordered breathing in mild sleep apnea underscore the multidimensionality of EDS in mild sleep apnea[137]. A Portuguese-language version of the Epworth sleepiness scale: validation for use in Brazil was developed and it proved to be a valid and reliable instrument for the assessment of daytime sleepiness, equivalent to its original version when applied to individuals who speak Brazilian Portuguese[138].

Sleep in infants with congenital heart. The disease was investigated resulting in the finding that such infants frequently present with sleep-disordered breathing associated with oxygen desaturations but not arousals. Therefore, sleep may represent a significant burden to infants with congenital heart disease[139].

Ventilation

Mechanics. The mechanics of the respiratory system was the most commonly occurring subject[140-146]. Three sets of references equations for spirometry in children and adolescents with distinct body mass indices (BMIs) were compared: it was found that in individuals with distinct BMIs, the measured FVC and FEV_1 values were not equivalent to those predicted via the Polgar & Promadhat and Hsu et al. equations. The same was not true for the Mallozi equations. The BMI was not a relevant factor for the predictive index of these equations; therefore, the Mallozi equations can be used without alteration for children and adolescents with distinct BMIs[140]. The occurrence of cardiorespiratory alterations and adverse events during the intrahospital transport of patients on invasive ventilation was investigated. The conclusion was that during intrahospital transport, cardiorespiratory alterations were common (67.2%), and adverse events occurred in 75.7% of cases[141]. The incidence, type and intensity of adverse effects, as well as the comfort, of total face masks, facial masks, and nasal masks during non-invasive ventilation were investigated: the short-term adverse effects caused by such interfaces are related to mask type and pressure settings. The total mask is a reliable alternative to the nasal and facial masks. Rebreathing of CO_2 from the circuit was found to be less likely to occur when the total face mask is used[142]. The manner in which mechanical ventilation is employed in pediatric intensive care units was described: out of the admitted children, 35.7% received mechanical ventilation for 24 h or more. Pressure ventilation modes were standard. Of the children studied, 91% had chronic functional status. There was a high incidence of acute respiratory distress syndrome, but a lung-protective strategy was not fully implemented. Inspiratory pressure at the beginning of mechanical ventilation was a predictor of mortality within 28 days and of a longer course of mechanical ventilation[143]. A study designed to quantify the interaction between increased intra-abdominal pressure and positive-end expiratory pressure showed that the addition of a 5 kg weight onto the abdomen significantly increased both intra-abdominal and airway plateau pressure, confirming that intra-abdominal hypertension elevates the plateau pressure. However, plateau pressure alone cannot be considered a good indicator for the detection of elevated intra-abdominal pressure in patients under mechanical ventilation using PEEP. In these patients, the intra-abdominal pressure must also be measured[144]. Short-term effects of positive expiratory airway pressure in patients being weaned from mechanical ventilation were investigated and showed in weaning patients from mechanical ventilation, the use of a fixed level of expiratory positive airway pressure caused an increase in work of breathing that was not accompanied by any other significant cardiorespiratory changes[145]. A study designed to evaluate the heart rate variability during bilevel ventilation in young healthy subjects found that it was able to alter the cardiac autonomic nervous system, resulting in a reduction in parasympathetic activity and an increase in sympathetic activity; higher level of positive pressure can cause a greater influence on the cardiovascular and respiratory system[146].

Diagnostic procedures. These were studied in four projects[147-150]. The diagnostic performance and cut-off value for the rapid shallow breathing index in predicting extubation failure among adult patients in the intensive care unit was estimated and the classic index cut-off value proved inappropriate, predicting only 20% of the cases of extubation failure in our sample. A new cut-off value is proposed, which provided substantial improvement in sensitivity, with an acceptable loss of specificity. The area under the ROC curve indicated that the discriminative power of the rapid shallow breathing index is satisfactory, which justifies the validation of this index for use[147].

A photogrammetric model for the analysis of thoracoabdominal respiratory mechanics in the assessment of isovolume maneuvers (IVMs) in children is proposed which was effective in profiling changes in the thoracoabdominal silhouette during the IVMs; the selected subdivisions were useful for the identification of areas contributing the most and the least to chest wall composition[148]. A study was conducted in smokers (a) to evaluate the ability of the forced oscillation technique to detect smoking-induced respiratory alterations, with special emphasis on early alterations; and (b) to compare the diagnostic accuracy of the forced oscillation technique and spirometric parameters; authors claim that forced oscillation technique parameters were able to detect early smoking-induced respiratory involvement when pathologic changes are still potentially reversible. These findings would therefore support the use of the forced oscillation technique as a versatile clinical diagnostic tool in helping with COPD prevention, diagnosis, and treatment[149]. A new concept is proposed for a functional assessment of interstitial lung diseases, desaturation-distance ratio, a new composite index using continuous peripheral oxygen saturation and the distance walked as a more reliable tool for the functional evaluation of these patients. Results indicate that desaturation-distance ratio is a promising concept and a more reliable physiologic tool to assess pulmonary diseases characterized by involvement of the alveolar-capillary membrane, such as interstitial lung diseases[150].

Epidemiology. It is the object of three studies[151-153]. Work related respiratory symptoms are described for carpenters of the city of Mashad in northeastern Iran. Pulmonary function tests confirmed these work related symptoms caused by exposure to irritating chemicals[151]. Peak expiratory flow was evaluated in a population sample in the city of São Carlos, Brazil, and compared to reference values for populations in the USA, England and Cuba. Predicted values were found to appropriate for a population of individuals with the same characteristics as the study sample, except for males in the 20-30 age group[152]. Ventilator-associated pneumonia, a major cause of nosocomial infection, was evaluated to determine the clinical evolution of patients; a high incidence of infection with resistant bacteria and inappropriate initial antibiotic therapy was noted[153].

Ventilatory problems associated to cardiovascular surgery. These were the subject of three studies[154-156]. Patients submitted to coronary artery bypass surgery present important reductions in pulmonary volume and capacity, as well as in the ventilatory muscle strength during the postoperative period[154]. Postoperative pain decreased lung function in patients submitted to open heart surgery, precluding deep inspirations, in special, at the first postoperative day[155,156].

Exercise. The importance of exercise as a predictive marker of length hospital stay was demonstrated through the application of the 6MWT to patients prior to hospitalization[157]. In contrast, deep breathing exercises and flow oriented spirometry did not significantly affect maximal respiratory pressures, spirometric variables and oxygen saturation in patients undergone deep breathing exercises and flow-oriented incentive spirometry after coronary artery bypass grafting[158].

Chest physiotherapy. The effects of chest physiotherapy on the respiratory function of postoperative gastroplasty patients suggest that both conventional chest physiotherapy and conventional chest physiotherapy + transcutaneous electric diaphragmatic stimulation prevent the reduction of pulmonary function during the Roux-en-Y gastric bypass postoperative period, and that transcutaneous electric diaphragmatic stimulation also contributes to expiratory muscle strength[159].

Gerontology. The influence of ageing on the resistive and reactive properties of the respiratory system was investigated with the following findings: respiratory system resistance and dynamic compliance are not modified; respiratory system homogeneity decreases; forced oscillation is easy to perform and provides information complementary to spirometry. Authors claim that this technique may be a promising alternative and/or complement to other conventional exams used to evaluate older people who are unable to adequately perform spirometric tests[160].

Pharmacology. A pharmacological study on the effects of intrathecal morphine plus general anesthesia in cardiac surgery evaluated its effects on pulmonary function, analgesia, and morphine plasma concentrations after cardiac surgery. Findings indicate that intrathecal morphine administration did not significantly alter pulmonary function; however, it improved patient analgesia and reduced morphine consumption and morphine plasma concentration[161].

Hardware. Available heat and moisture exchangers were evaluated in terms of their capacity to efficiently recover humidity showed that that heat and moisture exchangers are more efficient when used with low tidal volume ventilation and the roles of flow and respiratory rate were of lesser importance, suggesting that their adjustment has a less significant effect on the performance of heat and moisture exchangers[162].

Infectious diseases

Reports on infectious diseases fall under seven main headings.

Tuberculosis. Not surprisingly, this is the subject of 13 articles[163-175], mostly on epidemiology: a survey in the state of São Paulo showed that the pleural type was the predomi-

nant extrapulmonary form of TB in the state of São Paulo, with a stable incidence between 1998 and 2005, although there was a trend toward a decrease in the incidence of the pulmonary forms. The diagnosis of pleural TB was confirmed through histology and bacteriology in 44.4% of the cases[163]. The prevalence of tuberculosis among inmates of a prison hospital in Bahia was investigated with results showing a very high incidence of active or latent forms; the need to implement public policies specifically directed towards disease control in this population is stressed[164]. A similar investigation conducted among inmates of a tuberculosis referral hospital in the city of Rio de Janeiro resulted in the successful implementation of biosafety measures[165]. The incidence of *Mycobacterium tuberculosis* infection among community health agents monitoring TB patients in the city of Cachoeiro de Itapemirim, Brazil, showed that prevalence among said agents is higher than that found among their family members, fueling the debate on the occupational risk involved in the activities of these professionals[166]. A cohort study conducted among household contacts, aged 15 years or younger in the city of Vitória, Brazil, indicated that even though no significant difference was found between the two groups regarding the incidence of TB, it is of note that there is a greater risk of becoming infected with *M. tuberculosis* if the bacterial load of the index case is high[167]. A study on the prevalence rates of drug-resistant *M. tuberculosis* in patients under intermittent treatment compared with those observed in patients under daily treatment revealed no significant differences were found between patients treated with an intermittent regimen and those treated with a daily regimen in term of resistance rates[168].

Diagnosis and therapy. Four papers covered these topics. The proportion of negative preoperative sputum smear results among patients presenting active tuberculosis, as identified through the evaluation of surgical samples, showed that sputum smear microscopy has a very low yield; many previously treated patients can present negative sputum smear results and yet have the active disease, while active tuberculosis can be mistaken for secondary infections or for cancer[169]. The performance of nested-PCR in the specific detection of *M. tuberculosis* complex in blood samples of pediatric patients was evaluated: in spite of the difficulties in diagnosing tuberculosis in children and the low number of cases evaluated in the present study, nested-PCR in blood samples proved to be a rapid and specific technique, albeit one with low sensitivity. Authors recommend that in order to establish its true usefulness in the diagnosis of paucibacillary forms, especially in the case of extraordinary tuberculosis, further studies need to be carried out with larger samples of children and analyzing biological specimens other than blood[170]. The clinical characteristics and evolution of a group of patients with positive sputum cultures for multidrug-resistant *M. tuberculosis* and treated at a referral center in the city of Rio de Janeiro were analyzed: Bilateral pulmonary involvement and a cavity pattern greatly reduced the chances for cure of the patients with the multiresistant form; most patients who presented treatment failure died within the 8-year follow-up period[171]. A survey of factors associated with non-adherence to TB chemoprophylaxis in patients older than 15 years of age treated via a referral tuberculosis control programs led to a recommendation of strategies targeted to improve adherence chemoprophylaxis; however, new control program strategies are needed, especially for health care workers and HIV-infected patients[172].

Public health. It was the subject of an evaluation of the impact that Family Health Program (FHP) team training and active surveillance have on the detection of tuberculosis cases in a low-income community in the city of Fortaleza, Brazil; training and sensitization of FHP professionals were effective in promoting an increase in the number of cases detected in a low-income community[173]. A second study showed that the distribution of food baskets can be a useful strategy to improve compliance with TB treatment at primary health care clinics[174].

Genetics. It was the object of a comparative analysis of mutations in two different regions of the *katG* gene, which is responsible for isoniazid resistance; the number of mutations at codon 315 was high, which is consistent with cases described in Brazil and in other countries, and the analysis of region 1 resulted in a 9.2% increase in the rate at which mutations were identified[175].

Pneumonia. It was the subject of four articles[176-179]. High resolution computed tomography used to survey patients with bacterial pneumonia following bone marrow transplants: the most common findings were air-space consolidation, small centrilobular nodules and ground-glass opacities, most often in the central and peripheral regions of the middle and lower lung zones[176]. Histomorphometric differences in lung biopsies of patients with systemic sclerosis and idiopathic interstitial pneumonia showed increased collagen synthesis, destruction of elastic fibers, high myofibroblast proliferation and poor microvascularization might represent a remodeling process found in idiopathic interstitial pneumonia, whereas the reverse might represent a repair process in SSc-associated interstitial pneumonia[177]. Semiquantitative analyses of surgical biopsies of distinct lung lobes of patients with usual interstitial pneumonia/idiopathic pulmonary fibrosis found no significant histological differences between the studied lung lobes; the definitive histological diagnosis of usual interstitial pneumonia did not alter the stage of the disease[178]. A spatial analysis of hospitalizations for

pneumonia in the Vale do Paraíba region of Brazil was successful in determining the spatial autocorrelation, as well as in identifying the cities in which an intervention is necessary regarding the number of hospitalizations for pneumonia in infants under one year of age[179].

Chronic empyema. A prosthesis for open pleurostomy cases was developed, to be used where pulmonary decortication is not indicated, or where post-pneumonectomy space infection occurs; it is described as a minimally invasive procedure that can be as effective as a conventional open pleural window for management of chronic empyemas[180].

Common variable immunodeficiency. The impact of intravenous immunoglobulin on the physical properties of the sputum and on inflammatory alterations in the airways of patients with common variable immunodeficiency associated with bronchiectasis; authors conclude that immunoglobulin administration in common variable immunodeficiency patients results in significant improvement in indexes of inflammation of the airways with improvement in the transportability of the respiratory mucus by cough[181].

Influenza. Type A/H1N1 influenza epidemic led to an article on the pathological and ultrastructural analysis of surgical lung biopsies in patients in the city of São Paulo which evidenced that viral-like particles can be successfully demonstrated in lung tissue by ultrastructural examination, without confirmation of the virus by RT-PCR on nasopharyngeal aspirates; authors claim that bronchioles and epithelium, rather than the endothelium, are probably the primary target of infection, and diffuse alveolar damage the consequence of the effect of airways obliteration and dysfunction on innate immunity, suggesting that treatment should be focused on epithelial repair[182].

Viral bronchiolitis. A report was published to determine the effects that two different respiratory physical therapy techniques have on cardiorespiratory parameters in infants with acute viral bronchiolitis, their effects on the heart rate, respiratory rate and SpO_2 of infants with acute viral bronchiolitis; it was found that neither expiratory flow increase technique nor vibration accompanied by postural drainage resulted in benefits to affected infants; however, over time, respiratory physical therapy seems to contribute to decreasing the respiratory rate in these patients[183].

Infected sternotomy wounds. An assessment of the results of single-stage treatment of such lesions using bilateral pectorals major myocutaneous advancement flaps led to a recommendation in favor of the single-stage early management of sternotomy infected wounds with debridement, drainage and immediate closure of the wound using bilateral pectoralis major myocutaneous advancement flaps to the medium line of the sternum; the procedure is described as effective and may contribute to decrease the morbidity[184].

Smoking

Prevalence. Factors associated with smoking among medical students, were evaluated together the profile of this group; prevalence of smoking remains significant among medical students; authors strongly recommend the implementation of more effective strategies for prevention and cessation of smoking in order to reduce the number of smokers among future doctors[185]. The characteristics of smokers enrolled in a public smoking cessation program was examined and found that smokers seeking such assistance were socially disadvantaged, with a high degree of nicotine dependence and had previously made smoking-cessation attempts without the benefit of a structured program; it is claimed that in order to be effective, smoking control interventions should take into consideration the general characteristics of the smokers treated via the public health care system[186]. The prevalence of smoking and its association with the use of other drugs among students in the city of Brasília, Brazil, were estimated: the most significant finding is that smoking is a gateway to the use of other drugs[187]. A modified "Reasons for Smoking Scale" was translated to Portuguese, cross-culturally adapted for use in Brazil and tested-retested for reliability; it showed satisfactory cross-cultural equivalence and test-retest reliability, and can be a useful tool in the evaluation and treatment of smokers in Brazil[188]. The impact of smoking cessation on patient quality of life twelve months after smoking cessation is yet another illustration of the positive effect of tobacco abstinence, especially in terms of mental health[189].

The clinical and haemodynamic evaluation of chronic thromboembolic pulmonary hypertension patients scheduled for pulmonary thromboendarterectomy conducted to determine whether schistosomiasis hypertension is an important confounding factor came to the negative conclusion, i.e. that the prevalence of hematological disorders and schistosomiasis was low (less than 10%)[190]. Postintubation injuries and open surgical tracheostomy discussions on whether isthmectomy should always be performed conclude that not performing isthmectomy in parallel with tracheostomy leads the surgeon to open the tracheal stoma more distally than expected, leading in turn to more stomal complications[191]. The nutritional profile of lung transplant candidates found that patients with pulmonary fibrosis presented the highest body mass index, although the corresponding triceps skinfold thickness and mid-arm muscle circumference were normal. Patients with cystic fibrosis and bronchiectasis presented the highest prevalence of nutritional depletion, based on triceps

skinfold thickness and mid-arm muscle circumference[192]. The outcomes of patients undergoing repair of congenital tracheal stenosis find that congenital tracheal stenosis is a curable disease, but that its repair is complex and is associated with high rates of morbidity and mortality[193]. The experience of a Brazilian referral center with foreign body aspiration in children and adolescents shows that the clinical, radiological and endoscopic characteristics of foreign body aspiration among individuals under the age of 15 indicate that preventive care should be a priority for male children under the age of 3 living in outlying areas[194].

Pediatrics

Pediatric pneumopathology was the subject of seven papers[195-201]. Fluid and electrolyte balance during the first week of life and the risk of bronchopulmonary dysplasia in the preterm neonate were correlated to establish an association between them; it was found that differences in renal function and tubular handling of potassium and phosphorus are present during the first week of life among preterm neonates who will develop bronchopulmonary dysplasia; authors indicate that the higher rate of patent ductus arteriosus and indomethacin use may influence these differences. Serum levels of calcium also appear to play a role in spontaneous ductus arteriosus closure[195]. The efficacy of thoracoscopy in the management of children with complicated parapneumonic pleural effusion at the fibrinopurulent stage was evaluated through a multi-institutional study; the study concludes that the effectiveness of thoracoscopy in children with parapneumonic pleural effusion at the fibrinopurulent stage is 88%, that the procedure was safe, with a low rate of severe complications, and that thoracoscopy should be the first-choice treatment for children with parapneumonic pleural effusion at the fibrinopurulent stage[196]. Intermittent mandatory ventilation with synchronized intermittent mandatory ventilation plus pressure support were compared in terms of time on mechanical ventilation, duration of weaning and length of stay in a pediatric intensive care unit: no statistically significant difference was found between the procedures in terms of time on ventilation, duration of weaning or time spent in intensive care[197]. The occurrence of metabolic syndrome (MS) and independent associated risk factors was evaluated in adolescents in the city of Vitória, Brazil: metabolic syndrome and associated cardiovascular risk factors are serious clinical conditions in this age group; a significant number of adolescents showed borderline results, which may increase the prevalence of metabolic syndrome, or of independent risk factors in the short term[198]. An evaluation of how different ways of handling the neonatal self-inflating bag influence peak pressure and tidal volume led to the conclusion that most professionals deliver excessively high peak pressures and tidal volumes, which could increase the risk of barotrauma and volutrauma, especially when both hands were used to ventilate; in contrast, a small number of professionals delivered insufficient pressure and volume for adequate lung expansion and ventilation; delivery of inadequate ventilation was not dependent on profession[199]. The prevalence of high blood pressure and associated factors among schoolchildren from Caxias do Sul, state of Rio Grande do Sul, Brazil, was studied and results indicate a high prevalence of high blood pressure levels; increased waist circumference, high socioeconomic status, and low physical capacity were associated with this condition. We suggest that measures be taken to promote the practice of physical activity and dietary control to improve blood pressure levels and thus reduce risk factors[200]. A comparison between overweight cutoff points for detection of high blood pressure in adolescents led to the proposal of a Brazilian standard which offers the greatest accuracy for indicating high blood pressure levels[201].

Medically relevant basic research

Twenty-eight original basic research articles have been published in the surveyed collection of medical journals. Table 3 summarizes the topics of this research.

Table 3 – Articles dwelling on medically relevant cardiopneumologic basic research

Categories	References
Myocardial pathophysiolgy	202-208
Hypovolemia	209-213
Angiology and microcirculation	214-221
Hypertension	222-223
Pneumology	224-227
Baroreceptor reflex	228
Biophysics	229

Myocardial pathophysiology. Seven papers cover research in this field[202-208]. Selective cyclooxygenase-2 inhibition (rofecoxib) was found to protect against myocardial damage in a canine model of experimental acute ischemia[202]. A study performed on isolated rats' hearts assessed whether and found that dP/dt was better in preconditioned hearts and was changed by N-Acetylcysteine[203]. The effects of ischemic postconditioning on left ventricular function in isolated rat hearts was evaluated by the same research group, which found that postconditioning by three cycles of reperfusion/ischemia of 10/10s was effective for preservation of the myocardial[204]. Memantine, an N-methyl-d-aspartate glutamate receptor antagonist used to treat Alzheimer's disease, was found to prevent cardiomyocyte nuclear size reduction in the left ventricle of rats exposed to cold stress[205]. The effects of fluoxetine on mitochondrial ultrastructure of right ventricle in rats

exposed to cold stress was determined: the analysis revealed that fluoxetine strongly prevents mitochondrial cristolysis in rat heart, suggesting a protector effect under cold stress condition[206]. The role of oxidative stress and lipid peroxidation in ventricular remodeling induced by tobacco smoke exposure after myocardial infarction was investigated in a murine model showing that oxidative stress is associated with the intensification of ventricular remodeling after myocardial infarction[207]. The effects of therapeutic angiogenesis with plasmid VEGF165 on ventricular function were investigated in a canine model of chronic myocardial infarction: injection of the plasmid resulted in preservation of left ventricular ejection fraction, contrary to the control group where left ventricular ejection fraction showed continuous decline during the experiment; histological examination, however, was unable to explain completely these results[208].

Hypovolemia. Experiments on hypovolemic hypotension and shock contributed five entries[209-213]. In a porcine model of severe hemorrhagic hypotension, hyperkalemia accompanies hemorrhagic shock and correlates with mortality[209]. A study performed on a canine model evaluated retroperitoneal hematomas produced by bilateral injury of iliac arteries (uncontrolled hemorrhage); blood volume loss, transcapillary refill, the effects of volume replacement on retroperitoneal bleeding and the hemodynamic changes with and without treatment were monitored; in spite of rebleeding, which occurred in treated groups, the utilization of hypertonic saline solution with dextran proved to be effective in the initial reanimation, producing evident transcapillary refill, while the lactated Ringer's solution produced capillary extravasation and was ineffective in the initial volume replacement in this model of uncontrolled hemorrhage[210]. Pulse pressure respiratory variation amplification, observed in hypovolemia, can also be observed during sodium nitroprusside-induced vasodilation as determined in rabbits[211]. A novel fluid resuscitation strategy is described which modulates pulmonary transcription factor activation in a murine model of hemorrhagic shock; HSPTX exerts its anti-inflammatory effects by interfering with nuclear factor kappa B/cAMP response element-binding protein (NF-κB-CREB) competition for the coactivator CREB-binding protein (CBP) in lung tissue, thus affecting pro-inflammatory mediator production; it may therefore have therapeutic potential in the attenuation of ischemia-reperfusion injury observed after severe hemorrhagic shock[212]. Severe chronic asymptomatic pneumonia in swine has been found to affect the response to hemorrhage and resuscitation; it had little influence on pulmonary gas exchange, but influenced cardiac output, urine output and survival compared to healthy swine, suggesting a decrease in the physiologic reserve[213].

Angiology and microcirculation. Eight basic research papers cover these subjects[214-221]. Fresh soy oil protects against vascular changes in an estrogen-deficient rat model: an electron microscopy study, which shows that the damage to the tunica intima and the increase in the ratio of tunica intima/media thickness induced by repeated consumption of heated soy oil are prevented by substituting fresh oil in castrated female rats[214]. A study designed to assess the biological behavior of porcine decellularized heterograft compared to cryopreserved homograft implanted in juvenile sheep found that decellularized heterograft had a different biological behavior when compared to cryopreserved homograft and became repopulated by cells with fibroblasts and endothelial cells characteristics. The matrix was preserved and some regenerative potential was present[215]. Histological changes of the aorta, the renal arteries and the renal parenchyma in swine, induced by a metallic uncovered stent implanted in transrenal position in the abdominal aorta, showed these stents caused a significant inflammatory reaction with thickening of the aortic wall; however, the renal arteries remained patent and the renal parenchyma did not present embolic or ischemic changes[216]. The effect of ischemic postconditioning on mesenteric ischemia treatment was the object of an experimental study in rats which showed that ischemic pre- and postconditioning were capable of minimizing – in a similar intensity – the degree of tissue injury on the intestinal mucosa of rats submitted to mesenteric ischemia and reperfusion process[217]. Beneficial effects of n-acetyl cysteine on pancreas and kidney following experimental pancreatic ischemia-reperfusion were described for a murine model[218]. A study was conducted to determine the effects of buflomedil and pentoxifylline on hamster skin-flap microcirculation: it was found that the functional capillary density values were higher in the buflomedil group compared to the control and pentoxifylline groups and the technique showed favorable potential to assess/predict the viability of skin flaps within 1 h after surgery using orthogonal polarization spectral imaging[219]. Because bacterial translocation has been shown to occur in critically ill patients after extensive trauma, shock, sepsis, or thermal injury, a study was devised to investigate mesenteric microcirculatory dysfunctions, the bacterial translocation phenomenon, and hemodynamic/metabolic disturbances in a rat model of intestinal obstruction and ischemia. It concludes that intestinal obstruction and ischemia in rats are a relevant model for the *in vivo* study of mesenteric microcirculatory dysfunction and of the occurrence of bacterial translocation[220]. The effects of different peep levels on mesenteric leukocyte-endothelial interactions in rats during mechanical ventilation were investigated and concluded that high intrathoracic pressure is harmful to mesenteric microcirculation in the experimental model of rats with normal lungs and stable systemic blood pressure, a finding that may have relevance for complications related to mechanical ventilation[221].

Hypertension. Hemodynamic, morphometric and autonomic patterns in hypertensive rats were the object of a study which showed that autonomic dysfunction and the modulation of the renin-angiotensin system activity are contributing factors to end-organ damage in hypertension and that both factors could be interacting. The findings suggest that management of hypertensive disease must start before blood pressure reaches the highest stable levels and the consequent established end-organ damage is reached[222]. Physical exercise attenuates the cardiac autonomic deficit induced by nitric oxide synthesis blockade in rats submitted to aerobic exercises during a 10-week period: previous physical exercise prevented the deficit in the autonomic cardiac control induced by the treatment with L-NAME, but did not prevent the increase in the SAP variability[223].

Pneumology. Lung morphometry, collagen and elastin content were found to be altered after hyperoxic exposure in preterm rabbits: the procedure impaired alveolization and lowered the proportion of collagen fibers, with an evident fiber network disorganization[224]. The importance of type V collagen and its relationships with other types of collagen and with vascular and epithelial apoptosis were studied in a model of chemical carcinogenesis in the mouse lung: results show that a direct link between low amounts of type V collagen and decreased cell apoptosis may favor cancer cell growth in the mouse lung after chemical carcinogenesis, suggesting that strategies aimed at preventing decreased type V collagen synthesis or local responses to reduced apoptosis may have a greater impact in lung cancer control[225]. An evaluation of the stability of hemodynamic, respiratory and gas exchange variables in an animal model of oleic acid-induced acute lung injury found that the model is stable for some of the variables tested, although stabilization occurs at different times. The respiratory and gas exchange variables stabilized at 30 min, whereas the hemodynamic variables stabilized at 60 min[226]. Minimum alveolar concentrations and hemodynamic effects of two different preparations of sevoflurane were investigated in pigs and showed that propylene glycol as an additive for sevoflurane seems to be as safe as a water additive, at least in terms of hemodynamic and pulmonary effects[227].

Baroreceptor reflex. Strain differences in baroceptor reflex in adult Wistar Kyoto rats were investigated and variability regarding baroreflex sensitivity among Wistar Kyoto rats from the same laboratory was recorded[228].

Biophysics. The effects of different vehicles of K^+ replacement on blood K^+ levels in furosemide hypokalemic rats were studied and K^+ replacement in different vehicles did not affect blood K^+ levels in rats[229].

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