Table 2. Change in arterial CO₂ tension caused by O₂ inhalation (nasal catheter 1 L/min) found on 33 cases with chronic pulmonary emphysema. Figures in the table represent numbers of cases observed.

		Elevation of arterial CO ₂ tension	
		Over 3 Torr	Less than 3 Torr
Arterial CO ₂ tension prior to O ₂ administration	Over 45 Torr	10	9
	Lower than 45 Torr	8	6
Total		18	15

arterial hypoxemia and not every cases with such impediment reveal exaggerated CO₂ retention under the treatment of administering O₂ of high concentration.

As being described above the acute exacerbation furnishes us with many important clinical and pathophysiological problems with reference to the chronic respiratory failure. Thus in this present symposium the participants focused their discussion on this particular problem of acute exacerbation in chronic respiratory failure.

LITERATURE CITED

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2. Risk Factors in Acute Exacerbation and their Influence on the Prognosis of Chronic Respiratory Failure

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Respiratory failure (REF) is characterized by multifactorial causes, complicated clinical profiles and multiorgan involvement. In order to elucidate morbidity, pathophysiology, natural history and prognosis of RF, retrospective study was conducted at this department and affiliated hospital to find 63 cases of various origin. In addition, a nationwide survey was conducted by distributing a questionnaire and asking the result of pertinent clinical as well as laboratory examination. RF is arbitrarily defined as respiratory disorders of which PaO₂ is 60 torr or less or equivalent abnormal state.

Twenty one institutions complied with the request and provided the complete data of RF on

1093 cases. As the symposium focus at chronic respiratory failure, this report is concerned mainly with chronic REF (CREF) who suffered from respiratory failure at least a month or longer.

As many factors as 286 that are related to acute exacerbation, clinical course and prognosis were selected and fed to a computer. The statistical analysis of these data were made with the SPSS. The result obtained from the patient of both local and nationwide distribution can be summarized as follows.

- (1) Incidence of REF was 4.5% among hospitalized patients, whereas that of CREF was 5.6% among autopsied cases.
- (2) Major underlying disease responsible for

3. The Pulmonary Gas Exchange of Chronic Respiratory Failure

CREF include tuberculosis and related conditions (43.3%), chronic obstructive pulmonary disease (43%), lung cancer (6%), and interstitial pneumonitis (5%). On average REF was observed in one third after 5 years and in half after 10 years from the onset of those underlying illness.

- (3) Acute exacerbation (AE) requiring hospitalization of the CREF were reported 2.5 times on average (1 – 10 times) during their observation period. AE was not more than 3 times for 77% of CREF.
- (4) Cumulative survival curve obtained with life table method indicated that survival rate was

62.5% at 3 years, 42.5% at 5 years and 34.5% at 7 years after the onset of REF. The survival rate was 60.7% after three times, and 44.8% after five times of A.E. The cause of death was attributable to respiratory disease in 77% of CREF.

- (5) The risk factors that carries poor prognosis for CREF include old age, right heart failure peptic ulcers and abnormal serum electrolytes. Factors that relates to favorable prognosis consist of those with COPD as underlying pathology, those who has longer history before the onset of REF, and those who has higher PaO_2 at the time of AE.

3. The Pulmonary Gas Exchange during the Acute Exacerbation of Chronic Respiratory Failure

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This study was conducted to investigate the impairment of gas exchange in the lungs during acute exacerbation of chronic respiratory failure. Respiratory failure was defined as the respiratory impairment in which arterial O_2 tension fell below 60 torr (or the patient shows the equivalent symptoms) while inhaling room air, as agreed by the research committee on respiratory failure of the Ministry of Health and Welfare of Japan. Chronic respiratory failure was defined as respiratory failure lasting for not less than a month. Acute exacerbation of chronic respiratory failure referred to those cases in which a further and rapid deterioration of chronic respiratory failure occurred to a condition which required more intensive treatment, preferably hospitalization.

SUBJECTS AND METHODS

Thirty-eight patients were studied in this investigation. All of them were inpatients who had been admitted to Keio University Hospital with acute exacerbation of chronic respiratory failure. Arterial blood gas examination was per-

formed on all of the subjects while inhaling room air, both during the stable and the acute exacerbation period of their chronic respiratory failure. The clinical diagnoses of the subjects were as follows: chronic pulmonary emphysema (CPE, 11 patients), interstitial pneumonitis and pulmonary fibrosis (FLD, 10 patients), post-thoracoplasty and/or callosity of the pleura and/or deformity of the thorax (thorax group, 10 patients) and others (7 patients). The total number of episodes of acute exacerbation experienced by the subjects was 78.

Right heart catheterization studies were performed on 5 of the 38 patients both during the stable period and during the acute exacerbation period. These studies enabled analysis of the distribution spectra of ventilation-perfusion ratios ($\dot{V}_A/\dot{Q}_C$) in the lungs and comparison of $\dot{V}_A/\dot{Q}_C$ uneven distributions during the acute exacerbation period and the stable period. In the analysis O_2 , CO_2 and N_2 were used as indicator gases, and no diffusion barriers for these indicator gases were assumed.