[Ⅲ]研究成果の刊行に関する一覧表

研究成果の刊行に関する一覧表

雑誌

班員	発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
田村雄一	Tamura Y, Nakajima Y, Ozeki Y, Ono T, Takei M, Yamamoto T, Fukuda K.	Temperature Variations around Medication Cassette and Carry Bag in Routine Use of Epoprostenol Administration in Healthy Volunteers.	PLOS ONE	7 (12)	e52216	2012
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T. Satoh, Y. Okada, Y. Hara, F. Sakamaki, S. Kyotani, T. Tomita, N. Nagaya, N. Nakanishi	Time-Course of Ventilation, Arterial and Pulmonary CO2 Tension During CO2 Increase in Humans.	The Netherlands C. A. Nurse, C. Gonzalez, C Peers, N. R. Prabhakar.	Arterial Chemorecenption	Sorubger 社	Netherlands	2012	63-70
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[Ⅳ]研究成果の刊行物・別刷

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Temperature Variations around Medication Cassette and Carry Bag in Routine Use of Epoprostenol Administration in Healthy Volunteers

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Abstract

Background: According to several treatment guidelines, epoprostenol is an important treatment option for pulmonary arterial hypertension. However, the pharmacokinetic characteristics and poor stability of epoprostenol at room temperature make its administration challenging. We therefore studied temperature fluctuations between the drug administration cassette and atmosphere to promote the safe use of epoprostenol.

Methods and Findings: Five healthy volunteers carried a portable intravenous infusion pump attached to a medication cassette containing saline in a bag during their ordinary activities over 16 days during which the mean atmospheric temperature was 29.6±1.5°C. The temperature around the medication cassette was not less than 25°C on any occasion, and the mean period over 24 h during which the temperature around the cassette exceeded 35°C and 40°C was 96.9±156.4 min and 24.4±77.3 min, respectively. Significant correlations were observed between the temperatures outside the bag and around the cassette, as well as between temperatures around the cassette and of the saline solution in the cassette ($r=0.9258$ and 0.8276, respectively). There were no differences in the temperatures outside the bag or around the cassette with respect to the bag material.

Conclusions: Temperatures around a medication cassette and outside the bag containing the medication increase with sunlight exposure. The temperature around cassettes used for administering epoprostenol must therefore be kept low for as long as possible during hot summer conditions to maintain the drug stability.

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Introduction

Pulmonary arterial hypertension (PAH) is a progressive disease characterized by increased pulmonary arterial pressure and pulmonary vascular resistance, which eventually results in death due to right heart failure. The median life expectancy is longer than 7 years, and the 5-year survival rate of PAH patients is 65% [1]. There are effective treatments that target the pathophysiology of PAH, among which the vasodilator prostanoids are the best established [2,3]. Several oral therapies targeting other pathophysiological mechanisms including endothelin receptor antagonists and PDE5 inhibitors have become available in recent years; these therapies have significantly improved the management and outcomes of these patients. Despite the availability of several oral therapies, epoprostenol remains an important treatment option for PAH patients; several treatment guidelines worldwide recommend epoprostenol for the treatment of class III and IV (class Ia recommendation) PAH patients [4]. Treatment with higher dosages of epoprostenol improves hemodynamics to a greater extent in PAH treatment [5]. However, its pharmacokinetic characteristics and poor stability at room temperature make its administration challenging. Thus, epoprostenol solution is administered as a continuous intravenous infusion via a central venous catheter; it is necessary to use ice packs to keep the temperature of the epoprostenol cassette below 8°C when the reconstituted solution is used beyond 8 h [6]. This need for icepacks for everyday use can cause considerable inconvenience and discomfort for patients. Therefore, a formulation of epoprostenol with higher temperature stability is highly desirable.

However, the maximum and minimum temperatures of the drug cassette and carry bag during routine use, fluctuations in temperature during a routine 24-h period, and the relationships of these variations with atmospheric temperatures have not been investigated. Such information will be useful to both physicians and patients so that necessary precautions are taken to ensure safe and effective use of epoprostenol, whose stability is affected by higher temperatures.