

光センサーを用いた末梢循環機能解析装置の開発

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1989 Fiscal Year Final Research Report Summary

Development of an apparatus for measuring peripheral circulatory function using a photo-sensor

Research Project

Project/Area Number

63870028

Research Category

Grant-in-Aid for Developmental Scientific Research

Allocation Type

Single-year Grants

Research Field

公衆衛生学

Research Institution

Kanazawa University

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Project Period (FY)

1988 - 1989

Keywords

photo-sensor / viscoelastic property of arteries / digital arterial pressure / total blood volume / arterial oxygen saturation / workers using vibrating tools

Research Abstract

In order to develop an apparatus for measuring peripheral circulatory function using a photo-sensor, we have performed fundamental experiments, and then we have applied this apparatus for assessment of peripheral circulatory function of workers using vibrating tools. Using luminous diodes for generating the light concerning the absorbance of Hb, HbO₂ and total Hb and a photo-diode for detecting the transmitted light and the reflected light, this new apparatus enabled us to observe several indices of peripheral circulation. The results obtained in this study were as follows: 1) The arterial oxygen saturation was measured noninvasively through the two light, in one of which the absorbances of Hb and HbO₂ were almost equal and in other the absorbances of Hb and HbO₂ were most different. 2) Systolic and mean pressure of digital arteries was measured through the intensity changes of transmitted light, which was

associated with total Hb, in compression induced by a cuff. At the same time, the vascular volume ratio standardized by the vascular volume at the mean pressure was calculated, and it enabled us to assess quantitatively the pressure-volume relationship as a viscoelastic property. 3) The non-linear pattern of peripheral arteries in the pressure-volume relationship was assessed through the relationship between the cuff pressure and the intensity changes of the transmitted light. 4) The whole blood volume was monitored through the two kinds of transmitted light which were associated with total Hb. 5) Clinical application indicated that this apparatus was useful for the early diagnosis of peripheral circulatory disturbance and for the classification of the stages in the peripheral circulatory disorders of the subjects who complained the symptoms such as Raynaud's phenomenon. We have a plan to observe and assess synthetically the effects of vibration, noise and coldness and the combined effects of these factors on the peripheral circulatory function through the several indices of peripheral circulatory function measured by this apparatus and tissue blood flow.▲ Less

Research Products (2 results)

All Other

All Publications (2 results)

[Publications] 中村秀喜,野原聖一,岡田晃: "光センサーを用いた末梢循環機能解析装置" 病態生理. 9(4). 305-311 (1990) ▼

[Publications] Hideki Nakamura, Seiichi Nohara and Akira Okada: "An apparatus for measuring peripheral circulatory function using a photo-sensor" MEDICINA PHILOSOPHICA, 9(4), 305-311, 1990. ▼

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