Relation between ^{67}Ga Uptake and the Stage of Inflammation Induced by Turpentine Oil in Rats

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Received September 7, 1984

For the establishment of the experimental system to judge easily the effect of anti-inflammatory drug, ^{67}Ga -citrate was used. The weight of granuloma tissues induced by inflammable agent, turpentine oil, gradually increased and reached a maximum at 6 days after the administration of turpentine oil. Gallium-67 accumulation in the inflammatory lesions showed also a maximum at 6 days after that. Both patterns were closely similar each other. These results showed that the processes and/or stages of inflammation could be indicated by the pattern of ^{67}Ga uptake.

Key Words: turpentine oil, inflammation, gallium-67-uptake

1. Introduction

For the screening and judgement of the effect of anti-inflammatory drugs, it is important in the first place to decide the processes and/or stages of inflammation. The decision, however, has required much effort and time. Namely, the extraction and isolation of several components, which fluctuate together with the stage of inflammation, from the tissues of inflammatory lesions, and the identification and quantitative determination of each one must be done each day after the administration of inflammable agent. Then, it is necessary for the development of a new anti-inflammatory drug to propose easy experimental system in which the decision of the stages of inflammation is rapidly able to be done.

Gallium-67 citrate has been used for diagnostic agent of various tumors and inflammatory lesions⁽¹⁻³⁾. Many reports concerning ^{67}Ga accumulation in the inflammatory lesions induced by various inflammable agents have been presented⁽⁴⁻⁶⁾, so it is thought that the processes and/or stages of inflammation will be able to be shown by the ^{67}Ga uptake pattern in the inflammatory lesions.

In the present study, we attempted to establish the experimental system to judge easily

the effect of anti-inflammatory drug by the change of the pattern of ^{67}Ga uptake in the inflammatory lesions.

2. Materials and Methods

Animals: The rats used were males of the Wistar strain weighing 150–200 g, and were housed in wire mesh cages in a room temperature of $23 \pm 1^\circ\text{C}$ and in relative humidity of $55 \pm 5\%$.

Gallium-67 citrate: Gallium-67 citrate (kindly supplied by Nihon Medipysics Co. Ltd., Takarazuka, Japan) was diluted with 0.08 M sodium citrate to 925 kBq/ml ($25 \mu\text{Ci/ml}$) and was intravenously administered at a dose of 185 kBq/rat.

Induction of granuloma tissues: The induction of granuloma tissues was performed by two different methods on the same animal. One was the paper pellet implantation method and another was the air pouch method. The former and the latter were carried out essentially by the same method described by Tanaka, et al.⁷ and Selye⁸, respectively. Namely, paper pellet used was the paper disc (size 8 m/m) for the analysis of antibiotics. Paper pellet dipped in turpentine oil was implanted in the subcutaneous tissues of the abdominal both side walls of each animal, and the open wound made was closed

Fig. 4 The changes of ^{67}Ga uptake ratios in various tissues.

3.3 The change of ^{67}Ga uptake ratios in various tissues

This result is shown in Fig. 4. The uptake ratios in granuloma tissues induced by pouch method (Pou-Granuloma) and Pel-Granuloma gradually increased, reached a maximum at 6 days after the administration of turpentine oil, and then decreased until day 12. On the other hand, those of liver and spleen gradually decreased until day 6, and then reached at a constant values. The uptake ratio in the exudate induced by the pouch method was much lower than that in the granuloma tissues.

In the present study, two different methods, paper pellet implantation and air pouch method, were used for the induction of inflammatory tissues. The latter method was suitable for obtaining exudate, but the uptake ratio of ^{67}Ga in it was much lower than that in granuloma tissues. In the former method it was easy to distinguish and separate granuloma tissues from surrounding normal ones, though it was difficult in the latter. From these results, paper pellet method will have to be used in this experimental system.

The weight of inflammatory lesions, granu-

loma tissues induced by turpentine oil, increased gradually and reached a maximum at 6 days after the administration of turpentine oil. Gallium-67 uptake ratio in granuloma tissues also showed a maximum at 6 days after the administration. Both patterns of the change of granuloma weight and the ^{67}Ga uptake ratio were closely similar each other.

The results obtained in the present study showed that the processes and/or stages of inflammation could be easily indicated by the pattern of ^{67}Ga uptake. It is thought that the experimental system established in the present study is useful for the judgment of the effect of anti-inflammatory drugs and the development of new one.

We will report the results of the judgment for the effect of anti-inflammatory drugs by using of this experimental system.

Acknowledgment

We are indebted to Dr. S. Tsurufuji, Department of Biochemistry, Faculty of Pharmaceutical Sciences, Tohoku University, for his kind experimental suggestion.

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要 旨

テレピン油誘発ラット炎症 Stage と ^{67}Ga Uptake について

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炎症部位への集積性が認められる ^{67}Ga を用い, 抗炎症薬の薬効判定を容易に行い得る実験系を確立することを目的として本研究を行った。テレピン油誘発ラット肉芽組織の重量は起炎剤投与後, 6 日目でピークを示した。 ^{67}Ga の肉芽組織への uptake パターンは肉芽重量変化と非常によく一致した。この事実は ^{67}Ga uptake パターンを利用して炎症の stage を示し得るものと考えられ, この実験系は抗炎症薬の薬効判定に有用であると思われる。