フィルムに担持した薬剤ナノ粒子の抗腫瘍活性評価

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The antitumor activity of drug nanoparticles supported on a film (*Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University*) ○Nozomi Saito, Farsai Taemaitree, Ryuju Suzuki, Yoshitaka Koseki, Hitoshi Kasai

Skin ulcers can be caused by skin cancer or cancer from elsewhere that has invaded or metastasized to the skin, resulting in the loss of epithelial tissue. A common treatment for skin ulcers is to perform a topical therapy with an anticancer drug-containing ointment. However, the pharmaceutical efficacy of this topical therapy is generally low due to possible outflowing of drug molecules from the affected area and a low skin permeability of the drug. Comparing to drugs in the molecular state, drug nanoparticles (NPs) have a high pharmaceutical activity and can penetrate deep into the tissue[1]. In this study, we aimed to develop a novel topical therapy focusing on drug NPs. Especially, we prepared drug NPs supported films and evaluated the *in vivo* antitumor activity.

Drug NPs of SN-38, SN-38-cholesterol, and SN-38-dimer (Fig.1) were prepared by the reprecipitation method[2]. Subsequently, drug NPs supported films were prepared by filtering the drug NPs dispersion through membrane filters (Fig.1). The obtained films were transplanted subcutaneously into the tumor of 4T1 cancer-bearing mice model. As a result of tracking the tumor volume, antitumor activity was observed in treatment with the drug NPs supported films (Fig.2). Drug NPs supported films have high potential to be an effective topical therapy for the treatment of skin ulcers.

Key words: Reprecipitation method; Anti-cancer drug; Drug nanoparticles; DDS; Topical therapy

がん性皮膚潰瘍は、皮膚に浸潤・転移したがんが体表面で潰瘍化した状態である。抗がん剤含有軟膏などによる局所療法が一般的に行われるが、潰瘍患部からの薬剤流出、薬剤の浸透性が問題となり、根治は非常に困難である。薬剤ナノ粒子(NPs)は分子状態の薬剤と比較して、非常に高い薬効を持ち、組織深部まで浸透する[1]。本研究では、がん性皮膚潰瘍に対して薬剤 NPs を用いた新規局所療法を開発するため、薬剤 NPs 担持フィルムを作製しマウスを用いた *in vivo* 抗腫瘍活性評価を行った。

薬剤分子である SN-38, SN-38-cholesterol, SN-38-dimer(Fig. 1)をそれぞれ再沈法[2]に供する事で薬剤 NPs 分散液を作製した。続いて、その分散液をろ過することでフィルム上に薬剤 NPs を担持した(Fig. 1)。作製した各薬剤 NPs 担持フィルムを 4T1 担がんマウスモデルの腫瘍部皮下に移植し、腫瘍体積を追跡した結果、抗腫瘍活性が認められた(Fig. 2)。薬剤 NPs 担持フィルムはがん性皮膚潰瘍に対して有効な新規局所療法となることが期待できる。

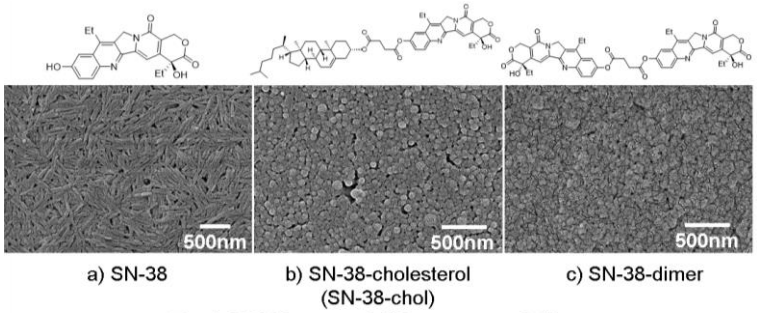

Fig.1 SEM image of NPs supported films

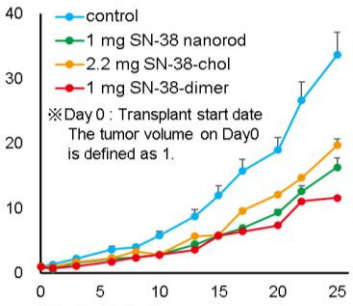

Fig.2 Relative tumor volume

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2) H. Kasai *et al., Angew. Chem., Int. Ed.* 2012, **51**, 10315-10318.