Evaluation of the eNOS function in cerebral micro vessels using synchrotron angiography system.

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Nitric oxide(NO) derived from endothelial NO synthase(eNOS) is regarded as a protective factor against many vascular diseases. But under severe hypercholesterolemia, essential eNOS co-factor BH4 is oxidized to BH2, and eNOS becomes ‘uncoupled’ and cannot maintain its function.

In this study, we used C57BL6 wild type and eNOS overexpression transgenic mice as normal cholesterol models, and apoE-deficient mice and apoE deficient/eNOS transgenic mice as hypercholesterolemia models. The diameter of the mid cerebral artery(MCA) was analyzed using SR microangiography.

Under normal cholesterol conditions, genetically overexpressed eNOS could significantly dilate the MCA (Fig.1B). But under hypercholesterolemia, overexpressed eNOS couldn’t dilate the MCA (Fig.1D). This result implies that hypercholesterolemia might worsen the endothelial derived vasodilatation by inducing the eNOS ‘uncoupling’ conditions.

Using these systems, we could investigate the diameter of micro vessels and could speculate the function of eNOS.

Quantitative evaluation of tumor microvessels using monochromatic x-ray after intra-arterial anticancer drugs

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Purpose: The present studies aimed to quantitative evaluate changes in tumor microvessels using synchrotron radiation in vivo after intraarterial administration of anticancer drugs.

Material and Methods: VX2 carcinomas were transplanted into the auricles of 36 rabbits. Three days later, rabbits were divided into two groups. Group 1A was administered anticancer drugs by intraarterial injection over 5 min. Groups were administrated cisplatin, carboplatin, doceatex hydrate and adriamycin, respectively. Untreated VX2 rabbits that were administrated sodium saline served as the Control group. In all groups, tumor microvessels were microangiologically evaluated before and 5 min, 15 min and 30 min after administration.

Microangiograms of VX2 carcinomas were obtained using a synchrotron radiation system.

Image analysis was done with Image-Pro Plus.

Among the field where the microvessels with diameters of less than 200 µm were observed within the tumor, the field of 2 by 2mm was decided as the Area Of Interest (AOI). The area of the AOI was measured and evaluated changes in tumor microvessels after administration of anticancer drugs quantitatively.

Results: In the control group, the number of tumor microvessels remained stationary during the experimental time, and there was no significant difference in the AOI between before and 30 min. after administration. As for the degree of the changes in microvessels, there was a difference among each drug. The number of tumor microvessels had decreased after administration of cisplatin and doceatex hydrate, significantly. Changes in microvessels of approximately 50 to 200 µm in diameter in the central zone of tumor were observed in both groups.

Conclusion: The synchrotron radiation system was a useful tool for quantitative evaluation of changes in tumor microvessels after administration of anticancer drugs.