ゲノム障害病理研究分野
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1. 臨床応用してきた細胞治療を、緊急被ばくによる血管障害にも応用可能であると考えられる。さらに、放射線による血管障害におけるゲノム障害修復の分子機構についての研究を加えることにより、安全かつ有効な細胞療法が可能となる。血管内皮細胞／血管内皮前駆細胞の発生、分化、誘導の機序を詳細に解明して、新たな動脈硬化治療の開発を行いたい（図1）。
2. ROCKにはROCK1とROCK2の相同体があるが、ROCK1およびROCK2ノックアウトマウスを用いた*in vivo*実験、マウスより培養した内皮細胞や平滑筋細胞を用いた*in vivo*実験により、心血管疾患におけるROCK1とROCK2の下流シグナルを検討している。また、ROCK活性をバイオマーカーとした心血管疾患における臨床的検討も行っている（図2）。

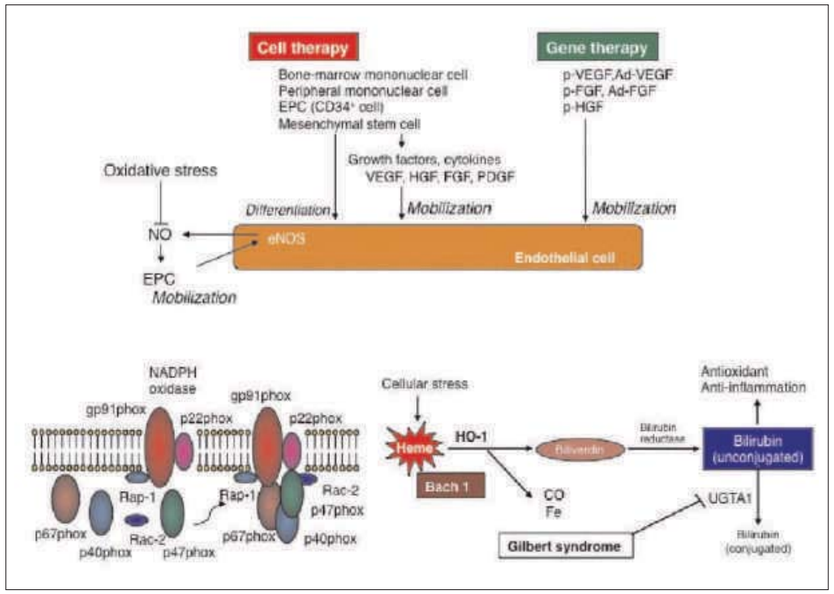

図 1 放射線による血管障害におけるゲノム障害修復分子機構と血管再生機序の解明/動脈硬化における血管内皮細胞／血管内皮前駆細胞の機能解析。

Figure 1 Development of cell therapy, cell repair, and angiogenic biology for regenerative medicine/Repair system of genome damage induced by radiation in endothelial cells/Role of endothelial cells/endothelial progenitor cells in atherosclerosis

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1. Application and challenges for future as following: explanation of further the mechanism of production of new blood vessels after cell therapy; establishment of bone marrow bank center; effective and safer method to culture autologous bone marrow mesenchymal stem cell or adipocyte derived stroma cell. It is thought that the technology also improves severe vascular endothelium damage, including vascular injury induced by radiation. An automated culture facility is under development for practical application in near future. We reported that the role of endothelial cells and endothelial progenitor cells in atherosclerosis. In addition, we have shown the differentiation system of endothelial cells. We would like to clarify the mechanisms of development, differentiation, and induction of endothelial progenitor cells. It is expected that evaluation of the role of endothelial cells and endothelial progenitor cells in atherosclerosis leads to the development of new strategy for anti-atherosclerosis. (Fig.1)
2. ROCK has two isoforms, viz. ROCK1 and ROCK2. We are trying to reveal the downstream signaling pathways of ROCK1 and ROCK2 on cardiovascular injury using not only ROCK1 and ROCK2 knockout mice but also cells isolated from the mice. In addition, we are also focusing on the possibility of ROCK activity as a biomarker of cardiovascular disease in a clinical setting. (Fig.2)

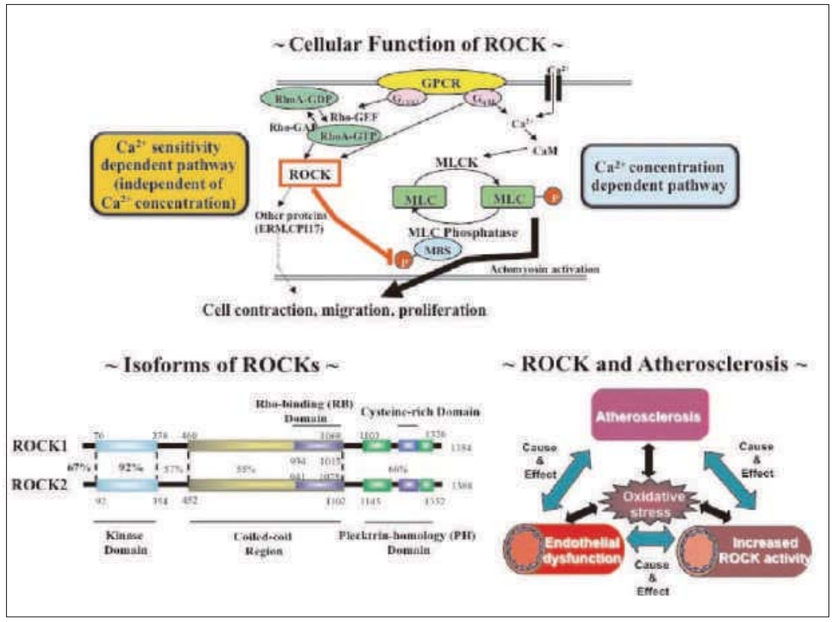

図 2 心血管疾患におけるメディエーターとしての、そしてバイオマーカーとしてのROCK活性の意義。

Figure 2 Role of ROCK as a mediator and a biomarker for cardiovascular disease.