

November 2024 EVBO Paper-of-the-month

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Specialized post-arterial capillaries facilitate adult bone remodelling

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In our **November 2024 EVBO Paper-of-the-month**, Prof. Ralf H. Adams and Vishal Mohanakrishnan *et al*, from the Max Planck Institute for Molecular Medicine, Münster identifies a specialized type of post-arterial capillaries in the femur.

The study used scRNAseq in combination with immunostaining and confocal imaging, mouse genetics and pharmacological approaches to analyze the heterogeneity of bone ECs. This has led to the identification of a new EC subset (Type R, or rECs) present in adult and aged bone but not in juvenile animals. Type R vessels are strongly associated with osteoprogenitors but also osteoclasts at regions of bone remodeling. Furthermore, type R capillary ECs share certain features with arterial ECs and are connected to distal arterioles around trabecular bone. Strikingly, genetic fate tracking shows that type R ECs are derived from the surrounding sinusoidal vasculature and not from arterial endothelium. Immunostaining results and other data indicate that type R vessels control local oxygenation. Endothelial cell-specific overexpression of DACH1 lead to the expansion of type R capillaries and arteries, which enables osteogenesis in areas that are normally devoid of trabecular bone. Particularly, type R vessels are enhanced by treatment with anti-osteoporosis drugs but also emerge at sites of destructive remodeling in cortical bone of aged mice, which indicates that these vessels might have substantial clinical relevance. Overall, this study outlines fundamental principles of vessel specialization in the developing, adult and ageing skeletal system.

