KIT is dispensable for physiological organ vascularisation in the embryo

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Abstract

Blood vessels form vast networks in all vertebrate organs to sustain tissue growth, repair and homeostatic metabolism, but they also contribute to a range of diseases with neovascularisation. It is therefore important to define the molecular mechanisms that underpin blood vessel growth. The receptor tyrosine kinase KIT is required for the normal expansion of hematopoietic progenitors that arise during embryogenesis from hemogenic endothelium in the yolk sac and dorsal aorta but has also been reported to be expressed in endothelial cells during embryonic brain vascularisation and has been implicated in pathological angiogenesis. However, it is neither known whether KIT expression is widespread in normal organ endothelium nor whether it promotes blood vessel growth in developing organs. Here, we have used single cell analyses to show that KIT is expressed in endothelial cell subsets of several organs, both in the adult and in the developing embryo. Knockout mouse analyses revealed that KIT is dispensable for vascularisation of growing organs in the midgestation embryo, including the lung, liver and brain. By contrast, vascular changes emerged during late-stage embryogenesis in these organs, concurrent with severe erythrocyte deficiency and growth retardation. These findings suggest that KIT is not required for developmental tissue vascularisation in physiological conditions, but that KIT deficiency causes foetal anaemia at late gestation and thereby pathological vascular remodelling.