A reporter mouse to study lymph vessels and lymphangiogenic processes

**Cathrin Pollmann, René Hägerling, Martin Andreas and Friedemann Kiefer**

*Max Planck Institute for Molecular Biomedicine, Münster, Germany*

Besides the blood vascular system, higher vertebrates rely on a second vessel system, the lymphatic vascular system, which is essential for tissue homeostasis and immune surveillance. In addition to development, lymphangiogenesis also takes place during inflammation, wound healing and tumour formation. Despite the initial lymphatic capillaries, which collect extravasated fluid and macromolecules, the mature lymphatic system also depends on the collecting lymphatic vessels, which guide the lymph back into the venous circulation and are characterized by a continuous basement membrane and intraluminal valves, preventing the backflow of lymph.

To specifically equip lymphatic vessels with a fluorescent marker for microscopic observation, we designed a transgenic mouse expressing the fluorescent reporter protein mOrange2 under the lymphatic endothelial cell-specific promoter of the homeobox transcription factor Prox1. Analysis of these mice demonstrated specific fluorescence in all lymphatic vessels of different tissues, including embryonic skin. Specificity was confirmed by counterstaining with positively identifying lymphatic markers, such as Lyve1 and the endothelial cell marker PECAM-1. mOrange2 expression mirrored the characteristic Prox1 expression pattern, which is prominent in the initial lymphatics, weak in the LECs of mature collectors and very strong in the intraluminal valves.

Taken together, the *prox1*-mOrange2pA reporter mouse provides us with a powerful model system to image lymph vessels and their function in various organs, developmental lymphangiogenesis but also the maturation and maintenance of lymphatic vessels and their associated essential structures in living animals.