

AN AVIAN MODEL FOR STUDIES OF EMBRYONIC LYMPHANGIOGENESIS**J. Wilting, M. Schneider, M. Papoutsis, K. Alitalo, B. Christ**

Anatomisches Institut der Albert-Ludwigs-Universität, Freiburg (JW,MS,MP,BC), Freiburg, Germany, and Molecular and Cellular Biology Laboratory, University of Helsinki (KA), Helsinki, Finland

ABSTRACT

Embryonic development of lymphatics (lymphangiogenesis) in recent years has rarely been studied experimentally. Using an avian model, we showed that both intra- and extra-embryonic blood vessels of chick and quail embryos are accompanied by lymphatics. The lymphatics of the chorioallantoic membrane (CAM) are drained by lymphatic trunks of the umbilicus and are connected to the posterior lymph hearts. Intra-embryonic lymphatics are drained via paired thoracic ducts into the jugulo-subclavian junction. The lymphatic endothelial cells are characterized by the expression of Vascular Endothelial Growth Factor Receptors (VEGFR) -2 and -3. Application of VEGF-C, the ligand of these two receptors, on the differentiated CAM, induces proliferation of lymphatic endothelial cells and formation of huge lymphatic sinuses. These lymphatics derive from pre-existing lymphatic endothelial cells, whereas, in early embryos lymphangioblasts are present in the mesenchyme. This phenomenon can be demonstrated by interspecific grafting experiments between chick and quail embryos. Together with the early lymph sacs, the lymphangioblasts form the embryonic lymphatic system. Our studies demonstrate the importance of lymphangioblasts and lymphangiogenic growth factors in embryonic lymphangiogenesis.