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## Prof. Christiana Ruhrberg

PhD, Professor in Neuronal and Vascular Development, Wellcome Trust Junior Investigator

Institute of Ophthalmology  
11-43 Bath Street  
London EC1V 9EL

Tel: (office) 020 7608 4017  
Tel: (lab) 020 7608 6972  
Fax: 020 7608 6810

Email: [c.ruhrberg@ucl.ac.uk](mailto:c.ruhrberg@ucl.ac.uk)

### Summary of current research interests

My laboratory studies how growing blood vessels integrate into their host organs without disrupting the organisation and function of other cell types, such as neurons in the brain and retina. Our main approach is to combine reverse genetics with tissue culture models to define the physiological

function of signalling molecules that have previously been implicated in vascular growth through vitro models. In a complementary approach, we investigate the role of VEGF and its receptors in the patterning of the nervous system, and the synergism of VEGF and semaphorins in this process.

### Key achievements

- First demonstration of angiogenic VEGF gradients in vivo
- First demonstration that VEGF164 signals through neuropilin 1 in neurons in vivo
- First demonstration that VEGF164 regulates neuronal migration and survival in vivo
- First demonstration that VEGF164 promotes commissural axon guidance
- First demonstration that tissue macrophages promote vessel fusion during angiogenesis

### Prizes and Awards

- Junior Investigator Award (2011; Wellcome Trust)
- Career Development Award (2003-2007; MRC)
- Werner-Risau-Prize for outstanding contributions to endothelial cell biology (2003; German Society for Cell Biology)
- Young Cell Biologist of the Year (1996, British Society for Cell Biology)

### Research Projects

- VEGF signalling in angiogenesis and vascular permeability
- VEGF and semaphorin signalling in neuronal migration, survival and axon guidance
- Neural crest cell guidance by VEGF and semaphorins
- Role of macrophages in physiological and pathological angiogenesis
- Relationship of angiogenesis and neurogenesis

### Publications [Click here for complete publications list](#)

Erskine, L., Reijntjes, S., Pratt, T., Denti, L., Schwarz, Q., Vieira, J. M. V., Alakakone, B., Shewan, D., Ruhrberg, C. (2011). VEGF signalling through neuropilin 1 guides commissural axon crossing at the optic chiasm. *Neuron* (70:951-965).

Cariboni, A., Davidson, K., Maggi, R., Rakic, S., Parnavelas, J. G., Ruhrberg, C. (2011). Defective GnRH neuron migration in mice lacking SEMA3A signalling through NRP1 and NRP2: implications for Kallmann Syndrome. *Human*

*Molecular Genetics* 20:336-344

Fantin, A., Vieira, J. M., Gestri, G., Denti, L., Schwarz, Q., Prykhozhiy, S., Peri, F., Wilson S. W., Ruhrberg, C. (2010). Tissue macrophages act as cellular chaperones for vascular anastomosis downstream of VEGF-mediated endothelial tip cell induction. *Blood* 116 (5): 829-840.

Schwarz, Q., Maden C., Davidson, K., Ruhrberg, C. (2009). Neuropilin-mediated neural crest cell guidance is essential to organise sensory neurons into segmented dorsal root ganglia. *Development*: 136: 1755-1789.

Schwarz, Q., Maden C., Vieira, J. M., Ruhrberg, C. (2009). Neuropilin 1 signalling guides neural crest cells to coordinate pathway choice with cell specification. *Proc Natl Acad Sci U S A* 106:6164-6169.

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#### Collaborators:

- University of Aberdeen:  
Lynda Erskine
- UCL:  
James Bainbridge, John Parnavelas, Stephen Wilson, Kristjan Jessen

#### Staff Members:

- Dr Kathryn Davidson
- Ms Laura Denti
- Dr Alessandro Fantin
- Dr Charlotte Maden
- Dr Francesca Mackenzie
- Ms Alice Plein
- Mr Miguel Tillo