ACADEMIC PORTFOLIO

Dr. Michael Jeltsch

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Basic information

Personal data and contact information

Full name	Markku Michael Jeltsch
Date of birth	July 28, 1969
Nationalities	German, Finnish
Work address	Molecular/Cancer Biology Laboratory, Biomedicum Helsinki, Haartmaninkatu 8, P.O.B. 63, 00014 Helsinki, Finland, Phone: +358-9-1912 5114
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Education and degrees

2002 Ph. D. (Biochemistry, University of Helsinki, Finland)
1997 M. Sc. (Biochemistry, University of Helsinki, Finland)
1992 B. Sc. (Molecular Biology, University of Hamburg, Germany)
1989 Baccalaureate (Gymnasium An Der Stenner, Iserlohn, Germany)

Research and scientific actions

Experience from research work and scientific actions

Work experience

2003- Contract researcher for Vegenics Ltd./Circadian Technologies (via Licentia Oy)
2002- Postdoctoral fellow, Molecular/Cancer Biology Laboratory, Biomedicum Helsinki, Finland
2001-2003 Contract researcher for Lymphatix Oy (via Licentia Oy)
1997-2002 Researcher, Molecular/Cancer Biology Laboratory, Biomedicum Helsinki, Finland
1994-1995 Research Assistant, Heinrich-Pette-Institut für Experimentelle Virologie, University of Hamburg, Germany (Group Prof. Hans Will)

Selected talks

Oct 2007 Model organisms in lymphangiogenesis research (Gemeinsame Jahrestagung der deutschen, Österreichischen und Schweizerischen Gesellschaften für Hämatologie und Onkologie, Basel, Switzerland)
April 2007 Molecular features of the lymphangiogenic VEGFs (The endothelial cell and tumor angiogenesis, Timisoara, Romania)
June 2004 Lymphangiogenesis - aka VEGFs with novel receptor binding profiles (FEBS Conference, Warszawa, Poland)
Aug 2001 Dissecting Lymphangiogenesis and Angiogenesis (Gordon Research Conference on Angiogenesis and Microcirculation, RI, USA)
May 2000 Chimeric VEGFs pro angiogenesis (Novo Nordisk Foundation Consortium Conference: Vascular Biology in Diabetes Complications II, Saltsjöbaden, Sweden)
Oct 2000 Exploring the VEGF protein space (International Symposium of the German Priority Research Program SPP1069, Kloster Seeon, Germany)

Aug 1997 Hyperplasia of lymphatic vessels in VEGF-C transgenic mice (EMBO Conference on Mouse Molecular Genetics, Heidelberg, Germany)

Selected poster presentations

Nov 2008 Novo Nordisk Foundation 8th Annual Conference on Vascular Biology in Diabetes Complications (Stockholm, Sweden): Recombinant Production of Clinical Grade Native VEGF-C and VEGF-D

Sept 2007 5th ELSO Meeting (Dresden, Germany): Model Organisms in Lymphangiogenesis Research

May 2006 Novo Nordisk Foundation Workshop on Vascular Biology in Diabetes Complications (Uppsala, Sweden): Receptor Specificity Determinants of VEGF-C

Sept 2003 3rd ELSO Meeting (Dresden, Germany): Lymphangiogenesis

Oct 2001 1st Euroconference on Angiogenesis (Paris, France): Dissecting Lymphangiogenesis and Angiogenesis

List of publications

See attachment.

Significant publications

- by citation index (Jan 11, 2011)

701 **Jeltsch, M.**, Kaipainen, A., Joukov, V., Meng, X., Lakso, M., Rauvala, H., Swartz, M., Fukumura, D., Jain, R. K. & Alitalo, K. (1997): Hyperplasia of lymphatic vessels in VEGF-C transgenic mice. Science, 276, 1423-5.

Contribution: Creation and analysis of transgenic mice showing for the first time the lymphangiogenic potential of VEGF-C

618 Achen, M. G., **Jeltsch, M.**, Kukk, E., Mäkinen, T., Vitali, A., Wilks, A. F., Alitalo, K. & Stacker, S.A. (1998): Vascular endothelial growth factor D (VEGF-D) is a ligand for the tyrosine kinases VEGF receptor 2 (Flk1) and VEGF receptor 3 (Flt4). Proceedings of the National Academy of Sciences of the United States of America, 95, 548-53.

Contribution: Determination of the receptor-specificities of the newly cloned growth factor VEGF-D

466 Gerhardt, H., Golding, M., Fruttiger, M., Ruhrberg, C., Lundkvist, A., Abramsson, A., **Jeltsch, M.**, Mitchell, C., Alitalo, K., Shima, D. & Betsholtz, C. (2003): VEGF guides angiogenic sprouting utilizing endothelial tip cell filopodia. The Journal of Cell Biology, 161, 1163-77.

Contribution: Production and purification of the proteins that were used to show that blood vessel growth is mechanistically similar to neuron growth

460 Mandriota, S. J., Jussila, L., **Jeltsch, M.**, Compagni, A., Baetens, D., Prevo, R., Banerji, S., Huarte, J., Montesano, R., Jackson, D. G., Orci, L., Alitalo, K., Christofori, G. & Pepper, M.S. (2001): vascular endothelial growth factor-C-mediated lymphangiogenesis promotes tumour metastasis. The EMBO Journal, 20, 672-82.

Contribution: Generation of the transgenic mice

- by own judgment

1. **Jeltsch, M.**, Kärpanen, T., Strandin, T., Aho, K., Lankinen, H. & Alitalo, K. (2006): Vascular endothelial growth factor (VEGF)/VEGF-C mosaic molecules reveal specificity determinants and feature novel receptor binding patterns. *The Journal of Biological Chemistry,* 281, 12187-95.
   Contribution: Creation of artificial growth factors using a novel in-vitro evolution approach.

2. **Jeltsch, M.**, Kaipainen, A., Joukov, V., Meng, X., Lakso, M., Rauvala, H., Swartz, M., Fukumura, D., Jain, R. K. & Alitalo, K. (1997): Hyperplasia of lymphatic vessels in VEGF-C transgenic mice. *Science,* 276, 1423-5.

   Contribution: Creation and analysis of transgenic mice showing for the first time the lymphangiogenic potential of VEGF-C.
3. Leppänen V-M*, **Jeltsch M***, Anisimov A, Tvorogov D, Aho K, Kalkkinen N, Toivanen P, Ylä-Herttuala S, Ballmer-Hofer K, Alitalo, K (2010): Structural determinants of vascular endothelial growth factor-D - receptor binding and specificity. *Blood,* in press. *shared first authorship

   Contribution: Crystallization of VEGF-D and identification of a form of VEGF-D, that is not lymphangiogenic.
4. Oh, S. J., **Jeltsch, M.**, Birkenhäger, R., McCarthy, J. E., Weich, H. A., Christ, B., Alitalo, K. & Wilting, J. (1997): VEGF and VEGF-C: specific induction of angiogenesis and lymphangiogenesis in the differentiated avian chorioallantoic membrane. *Developmental Biology,* 188, 96-109.

   Contribution: Production and purification of recombinant VEGF-C.

Assessments and awards from research work

Honors and awards

2002 Mandatum Award for best Ph.D. thesis in the field of biotechnology

2002 Laudatur PhD in biochemistry

1997 Medix Price for best biomedical publication

Patents and patent applications (US only)

Pat. No.	*Title*	*Inventors*	*Filing date*
7855178	Growth factor binding constructs materials and methods	Kari Alitalo, Michael Jeltsch	28.07.2008
7566566	Materials and methods involving hybrid vascular endothelial growth factor DNAs and proteins	Kari Alitalo, Michael Jeltsch	28.08.2007
7422741	VEGFR-3 fusion proteins	Kari Alitalo, Michael Jeltsch	07.05.2005
7309604	Materials and methods involving hybrid vascular endothelial growth factor DNAs and proteins	Kari Alitalo, Michael Jeltsch	24.02.2005
6965010	Materials and methods involving hybrid vascular endothelial growth factor DNAs and proteins	Kari Alitalo, Michael Jeltsch	26.01.2001
6958147	Use of VEGF-C to prevent restenosis	Kari Alitalo, Seppo Ylä-Herttuala, Mikko Hiltunen, Michael Jeltsch, Marc Achen	26.10.1999

Pub. App. No.	*Title*	*Inventors*	*Filing date*
20090318352	Materials and methods involving hybrid vascular endothelial growth factor DNAs and proteins	Kari Alitalo, Michael Jeltsch	10.04.2009
20090155268	Growth factor binding constructs, materials and methods	Kari Alitalo, Michael Jeltsch	28.07.2008
20080058263	Materials and Methods Involving Hybrid Vascular Endothelial Growth Factor DNAs and Proteins	Kari Alitalo, Michael Jeltsch	28.08.2007
20070142282	Modified VEGF-A with improved angiogenic properties	Kari Alitalo, Tuomas Tammela, Salla Keskitalo, Katri Pajusola, Michael Jeltsch, Seppo Ylä-	15.08.2006

		Herttuala, Terhi Kärpanen, Ulf Eriksson, Marko Uutela	
20060030000	Growth factor binding constructs materials and methods	Kari Alitalo, Michael Jeltsch	07.03.2005
20050267024	Materials and methods involving hybrid vascular endothelial growth factor DNAs and proteins	Kari Alitalo, Michael Jeltsch	24.02.2005
20050256075	Use of VEGF-C or VEGF-D gene or protein to prevent restenosis	Kari Alitalo, Seppo Ylä-Herttuala, Mikko Hiltunen, Michael Jeltsch, Marc Achen	24.02.2005
20020151680	Materials and methods involving hybrid vascular endothelial growth factor DNAs and proteins	Kari Alitalo, Michael Jeltsch	26.02.2001
20020068694	Glycosylated VEGF-B and method for increasing the amount of soluble VEGF-B	Michael Jeltsch, Kari Alitalo, Birgitta Olofsson, Ulf Eriksson	26.07.2001

Activity in the academic community

My scientific activities have been split since 2001 into an academic part at the University of Helsinki and a commercial part for two different Biotech startup companies (Lymphatix Oy and Vegenics Ltd.) with a current workload distribution of 25% academic to 75% commercial activities. However, the research field is the same: angiogenesis and lymphangiogenesis research.

On the academic side I work as a postdoc in Prof. Kari Alitalo's laboratory with presently two independent projects (see research plan). In addition I perform research-supporting tasks as:

- maintainer of the FPLC core facility (http://mcblserver.ltdk.helsinki.fi/akta).
- maintainer of the MCBL intranet server (http://mcblserver.ltdk.helsinki.fi): oligonucleotide database, cell database, protocol database, protein database & various other computational services.

Time permitting, I am active in several privately initiated, bioinformatics-related activities as:

- co-developer/programmer of the phplabdb software (http://phplabdb.sourceforge.net), an Open Source Laboratory Information Management System (LIMS), developed used PHP and MySQL (LAMP).
- blogger with occasional science-related postings (http://jeltsch.org).
- designer and maintainer of a collaborator's lab web site http://lammertlab.org/.

Ongoing collaborations

1. Nathan Lawson & Jacques Villefranc (University of Massachusetts Medical School, Program in Gene Function and Expression): **Characterisation of the novel zebrafish VEGF-C mutant um18**
2. Mark M. Fuster (Division of Pulmonary & Critical Care, Department of Medicine, VA San Diego Healthcare System and University of California, San Diego): **Characterisation of the heparin binding properties of VEGF-C and their significance for VEGF-C function**
3. Jörg Wilting (Universitätsmedizin Göttingen, Zentrum Anatomie, Abteilung Anatomie und Zellbiologie): [redacted]
4. Eckhard Lammert (Institute of Metabolic Physiology, Heinrich-Heine-University of Düsseldorf): [redacted]

Memberships in professional communities

- Societas biochemica, biophysica et microbiologica Fenniae (http://www.biobio.org/)

- The Science Advisory Board (http://www.scienceboard.net/)

Visions and future plans

Having been working in the same academic laboratory for a long time, I realized how much know-how and valuable research material is lost when researchers (especially postdocs) leave the laboratory. Documentation of know-how and materials has sadly been a stepchild of many academic researchers, partly due to the fact that it takes valuable time which is a scarce resource in the lab. Thus, I have started to implement a web-based database for information storage and retrieval, which ensured that a certain minimal documentation is created for laboratory assets like oligonucleotides, DNA constructs, proteins, etc. However, even though this system (based on the open source software *phplabdb*) is already functioning several years, there is much to improve (e.g. expanding the scope to other assets, making the interface more user-friendly, implementing security and axiomatization features). Although I spend only a few minutes every week on improving the system, I find satisfaction in the results of this endeavor as it has proven to be an invaluable resource within our own lab and for collaboration purposes. Similar systems (LIMS) have been developed commercially, but are financially out of reach for the typical academic laboratory resulting in huge waste of resources. This is an area that I would like to expand into in the future if I can allocate the necessary funding.

Research plan

Teaching and tutoring

Experience in teaching and tutoring in basic and post- graduate education

Supervision of MSc theses:

Jarno Ronkainen (ongoing)	Development of stable S2 cell lines for the expression of different mouse VEGF-C forms, production and purification of these forms and comparison of their bioactivities (Department of Biochemistry and Food chemistry, University of Turku)
Kukka Aho (2007)	Production and Purification of Recombinant Human Vascular Endothelial Growth Factor D (Department of Bio- and Environmental sciences,

	University of Helsinki)
Tanja Pyy (2001)	Recombinant Production of N-glycosylated VEGF-B (EVTEK Institute of Technology)

Post-graduate courses

HBGS Course (May 10-14, 2010): Tags in protein expression, detection and purification

Production of teaching material

(Physical) materials for laboratory courses has never been produced for the sole purpose of teaching. Real-life material from ongoing projects in the laboratory is used with the aim of utilizing the course results (e.g. purified proteins) for further research.

Presentations, protocols and related material for teaching is licensed under the Creative Commons and made available freely online (http://jeltsch.org/presentations_teaching). Whenever possible I use open and non-proprietary file formats (mostly ODF for editable and PDF for finalized versions) in order to allow access to anybody. Teaching resources involving copyrights or other IP are available from http://mcblserver.ltdk.helsinki.fi.

Exploitation teaching technology

See http://jeltsch.org/science

Administration and other actions

Administration and leadership tasks

Establishment of the FPLC core facility within the Molecular Cancer Biology Program. Presently acting as maintainer, instructor and contact person. Presently enlarging the core facility's activity to include a cell factory (WAVE system) for large scale production of cells/proteins.

Assignments in ones' own field outside the university

Contract research and consulting for two Biotech startup companies: Lymphatix Oy (now acquired by Ark Therapeutics Group plc) and Circadian Technologies-owned Vegenics Ltd. The projects which I spearhead in my work for Vegenics Ltd. center around the development, production and preclinical characterisation pro- and antiangiogenic/lymphangiogenic biopharmaceuticals (see research plan).

Societal tasks and confidential posts

1994-1995 Chair person of *The Finland Alumni Association R.Y.* (Association of Foreign Scholarship Holders in Finland)

Publications, lectures and other scientific communication

See http://jeltsch.org/presentations_teaching

Other significant tasks

Being a father of two children.

List of Publications

I. Original Publications (33)

LEPPÄNEN, V-M.*, **JELTSCH, M.***, ANISIMOV, A., TVOROGOV, D., AHO, K., KALKKINEN, N., TOIVANEN, P., YLÄ-HERTTUALA, S., BALLMER-HOFER, K. & ALITALO, K. (2010): *Structural determinants of vascular endothelial growth factor-D - receptor binding and specificity*. *Blood*, in press. *shared first authorship

SAHARINEN, P., HELOTERA, H., MIETTINEN, J., NORRMEN, C., D'AMICO, G., **JELTSCH, M.**, LANGENBERG, T., VANDEVELDE, W., NY, A., DEWERCHIN, M., CARMELIET, P. & ALITALO, K. (2010): *Claudin-like protein 24 interacts with the VEGFR-2 and VEGFR-3 pathways and regulates lymphatic vessel development*. *Genes & Development*, *24*, 875-80.

LEPPÄNEN, V-M., PROTA, A. E., **JELTSCH, M.**, ANISIMOV, A., KALKKINEN, N., STRANDIN, T., LANKINEN, H., GOLDMAN, A., BALLMER-HOFER, K. & ALITALO, K. (2010): *Structural determinants of growth factor binding and specificity by VEGF receptor 2*. *Proceedings of the National Academy of Sciences of the United States of America*, *107*, 2425-30.

ALBRECHT, I., KOPFSTEIN, L., STRITTMATTER, K., SCHOMBER, T., FALKEVALL, A., HAGBERG, C. E., LORENTZ, P., **JELTSCH, M.**, ALITALO, K., ERIKSSON, U., CHRISTOFORI, G. & PIETRAS, K. (2010): *Suppressive effects of vascular endothelial growth factor-B on tumor growth in a mouse model of pancreatic neuroendocrine tumorigenesis*. *PLoS ONE*, *5*, e14109.

BRY, M., KIVELÄ, R., HOLOPAINEN, T., ANISIMOV, A., TAMMELA, T., SORONEN, J., SILVOLA, J., SARASTE, A., **JELTSCH, M.**, KORPISALO, P., CARMELIET, P., LEMSTRÖM, K. B., SHIBUYA, M., YLÄ-HERTTUALA, S., ALHONEN, L., MERVAALA, E., ANDERSSON, L. C., KNUUTI, J. & ALITALO, K. (2010): *Vascular endothelial growth factor-B acts as a coronary growth factor in transgenic rats without inducing angiogenesis, vascular leak, or inflammation*. *Circulation*, *122*, 1725-33.

TVOROGOV, D., ANISIMOV, A., ZHENG, W., LEPPÄNEN, V., TAMMELA, T., LAURINAVICIUS, S., HOLNTHONER, W., HELOTERÄ, H., HOLOPAINEN, T., **JELTSCH, M.**, KALKKINEN, N., LANKINEN, H., OJALA, P. M. & ALITALO, K. (2010): *Effective suppression of vascular network formation by combination of antibodies blocking VEGFR ligand binding and receptor dimerization*. *Cancer Cell*, *18*, 630-40.

ANISIMOV, A., ALITALO, A., KORPISALO, P., SORONEN, J., KAIJALAINEN, S., LEPPÄNEN, V., **JELTSCH, M.**, YLÄ-HERTTUALA, S. & ALITALO, K. (2009): *Activated forms of VEGF-C and VEGF-D provide improved vascular function in skeletal muscle*. *Circulation Research*, *104*, 1302-12.

KARPANEN, T., BRY, M., OLLILA, H. M., SEPPÄNEN-LAAKSO, T., LIIMATTA, E., LESKINEN, H., KIVELÄ, R., HELKAMAA, T., MERENTIE, M., **JELTSCH, M.**, PAAVONEN, K., ANDERSSON, L. C., MERVAALA, E., HASSINEN, I. E., YLÄ-HERTTUALA, S., ORESIC, M. & ALITALO, K. (2008): *Overexpression of vascular endothelial growth factor-B in mouse heart alters cardiac lipid metabolism and induces myocardial hypertrophy*. *Circulation Research*, *103*, 1018-26.

HECKMAN, C. A., HOLOPAINEN, T., WIRZENIUS, M., KESKITALO, S., **JELTSCH, M.**, YLÄ-HERTTUALA, S., WEDGE, S. R., JÜRGENSMEIER, J. M. & ALITALO, K. (2008): *The tyrosine kinase inhibitor cediranib blocks ligand-induced vascular endothelial growth factor receptor-3 activity and lymphangiogenesis*. *Cancer Research*, *68*, 4754-62.

LI, X., TJWA, M., VAN HOVE, I., ENHOLM, B., NEVEN, E., PAAVONEN, K., **JELTSCH, M.**, JUAN, T. D., SIEVERS, R. E., CHORIANOPOULOS, E., WADA, H., VANWILDEMEERSCH, M., NOEL, A., FOIDART, J., SPRINGER, M. L., VON DEGENFELD, G., DEWERCHIN, M., BLAU, H. M., ALITALO, K., ERIKSSON, U., CARMELIET, P. & MOONS, L. (2008): *Reevaluation of the role of VEGF-B suggests a restricted role in the revascularization of the ischemic myocardium*. *Arteriosclerosis, Thrombosis, and Vascular Biology*, *28*, 1614-20.

KESKITALO, S., TAMMELA, T., LYYTIKKA, J., KARPANEN, T., **JELTSCH, M.**, MARKKANEN, J., YLA-HERTTUALA, S. & ALITALO, K. (2007): *Enhanced capillary formation stimulated by a chimeric vascular endothelial growth factor/vascular endothelial growth factor-C silk domain fusion protein*. *Circulation Research*, *100*, 1460-7.

TAMMELA, T., HE, Y., LYYTIKKÄ, J., **JELTSCH, M.**, MARKKANEN, J., PAJUSOLA, K., YLÄ-HERTTUALA, S. & ALITALO, K. (2007): *Distinct architecture of lymphatic vessels induced by chimeric vascular endothelial growth factor-C/vascular endothelial growth factor heparin-binding domain fusion proteins*. *Circulation Research*, *100*, 1468-75.

KÄRPÄNEN, T., HECKMAN, C. A., KESKITALO, S., **JELTSCH, M.**, OLLILA, H., NEUFELD, G., TAMAGNONE, L. & ALITALO, K. (2006): *Functional interaction of VEGF-C and VEGF-D with neuropilin receptors*. *The FASEB Journal : Official Publication of the Federation of American Societies for Experimental Biology*, *20*, 1462-72.

JELTSCH, M., KARPANEN, T., STRANDIN, T., AHO, K., LANKINEN, H. & ALITALO, K. (2006): *Vascular endothelial growth factor (VEGF)/VEGF-C mosaic molecules reveal specificity determinants and feature novel receptor binding patterns*. *The Journal of Biological Chemistry*, *281*, 12187-95.

HE, Y., RAJANTIE, I., PAJUSOLA, K., **JELTSCH, M.**, HOLOPAINEN, T., YLA-HERTTUALA, S., HARDING, T., JOOSS, K., TAKAHASHI, T. & ALITALO, K. (2005): *Vascular endothelial cell growth factor receptor 3-mediated activation of lymphatic endothelium is crucial for tumor cell entry and spread via lymphatic vessels*. *Cancer Research*, *65*, 4739-46.

BALUK, P., TAMMELA, T., ATOR, E., LYUBYNSKA, N., ACHEN, M. G., HICKLIN, D. J., **JELTSCH, M.**, PETROVA, T. V., PYTOWSKI, B., STACKER, S. A., YLÄ-HERTTUALA, S., JACKSON, D. G., ALITALO, K. & MCDONALD, D.M. (2005): *Pathogenesis of persistent lymphatic vessel hyperplasia in chronic airway inflammation*. *The Journal of Clinical Investigation*, *115*, 247-57.

KREBS, R., TIKKANEN, J. M., NYKÄNEN, A. I., WOOD, J., **JELTSCH, M.**, YLÄ-HERTTUALA, S., KOSKINEN, P. K. & LEMSTRÖM, K.B. (2005): *Dual role of vascular endothelial growth factor in experimental obliterative bronchiolitis*. *American Journal of Respiratory and Critical Care Medicine*, *171*, 1421-9.

KARKKAINEN, M. J., HAIKO, P., SAINIO, K., PARTANEN, J., TAIPALE, J., PETROVA, T. V., *JELTSCH, M.*, JACKSON, D. G., TALIKKA, M., RAUVALA, H., BETSHOLTZ, C. & ALITALO, K. (2004): *Vascular endothelial growth factor C is required for sprouting of the first lymphatic vessels from embryonic veins*. *Nature Immunology*, *5*, 74-80.

VEIKKOLA, T., LOHELA, M., IKENBERG, K., MÄKINEN, T., KORFF, T., SAARISTO, A., PETROVA, T., **JELTSCH, M.**, AUGUSTIN, H. G. & ALITALO, K. (2003): *Intrinsic versus microenvironmental regulation of lymphatic endothelial cell phenotype and function*. *The FASEB Journal : Official Publication of the Federation of American Societies for Experimental Biology*, *17*, 2006-13.

GERHARDT, H., GOLDING, M., FRUTTIGER, M., RUHRBERG, C., LUNDKVIST, A., ABRAMSSON, A., JELTSCH, M., MITCHELL, C., ALITALO, K., SHIMA, D. & BETSHOLTZ, C. (2003): *VEGF guides angiogenic sprouting utilizing endothelial tip cell filopodia*. *The Journal of Cell Biology*, *161*, 1163-77.

SAARISTO, A., VEIKKOLA, T., ENHOLM, B., HYTÖNEN, M., AROLA, J., PAJUSOLA, K., TURUNEN, P., **JELTSCH, M.**, KARKKAINEN, M. J., KERJASCHKI, D., BUELER, H., YLÄ-HERTTUALA, S. & ALITALO, K. (2002): *Adenoviral VEGF-C overexpression induces blood vessel enlargement, tortuosity, and leakiness but no sprouting angiogenesis in the skin or mucous membranes*. *The FASEB Journal : Official Publication of the Federation of American Societies for Experimental Biology*, *16*, 1041-9.

ENHOLM, B., KARPANEN, T., **JELTSCH, M.**, KUBO, H., STENBACK, F., PREVO, R., JACKSON, D. G., YLA-HERTTUALA, S. & ALITALO, K. (2001): *Adenoviral expression of vascular endothelial growth factor-C induces lymphangiogenesis in the skin*. *Circulation Research*, *88*, 623-9.

VEIKKOLA, T., JUSSILA, L., MAKINEN, T., KARPANEN, T., **JELTSCH, M.**, PETROVA, T. V., KUBO, H., THURSTON, G., MCDONALD, D. M., ACHEN, M. G., STACKER, S. A. & ALITALO, K. (2001): *Signalling via vascular endothelial growth factor receptor-3 is sufficient for lymphangiogenesis in transgenic mice*. *The EMBO Journal*, *20*, 1223-31.

MANDRIOTA, S. J., JUSSILA, L., **JELTSCH, M.**, COMPAGNI, A., BAETENS, D., PREVO, R., BANERJI, S., HUARTE, J., MONTESANO, R., JACKSON, D. G., ORCI, L., ALITALO, K., CHRISTOFORI, G. & PEPPER, M.S. (2001): *Vascular endothelial growth factor-C-mediated lymphangiogenesis promotes tumour metastasis*. *The EMBO Journal*, *20*, 672-82.

HILTUNEN, M. O., LAITINEN, M., TURUNEN, M. P., **JELTSCH, M.**, HARTIKAINEN, J., RISSANEN, T. T., LAUKKANEN, J., NIEMI, M., KOSSILA, M., HÄKKINEN, T. P., KIVELÄ, A., ENHOLM, B., MANSUKOSKI, H., TURUNEN, A. M., ALITALO, K. & YLÄ-HERTTUALA, S. (2000): *Intravascular adenovirus-mediated VEGF-C gene transfer reduces neointima formation in balloon-denuded rabbit aorta*. *Circulation*, *102*, 2262-8.

PEPPER, M. S., MANDRIOTA, S. J., **JELTSCH, M.**, KUMAR, V. & ALITALO, K. (1998): *Vascular endothelial growth factor (VEGF)-C synergizes with basic fibroblast growth factor and VEGF in the induction of angiogenesis in vitro and alters endothelial cell extracellular proteolytic activity*. *Journal of Cellular Physiology*, *177*, 439-52.

OLOFSSON, B., KORPELAINEN, E., PEPPER, M. S., MANDRIOTA, S. J., AASE, K., KUMAR, V., GUNJI, Y., **JELTSCH, M**., SHIBUYA, M., ALITALO, K. & ERIKSSON, U. (1998): *Vascular endothelial growth factor B*

(VEGF-B) binds to VEGF receptor-1 and regulates plasminogen activator activity in endothelial cells. *Proceedings of the National Academy of Sciences of the United States of America*, *95*, 11709-14.

ACHEN, M. G., **JELTSCH, M.**, KUKK, E., MÄKINEN, T., VITALI, A., WILKS, A. F., ALITALO, K. & STACKER, S.A. (1998): *Vascular endothelial growth factor D (VEGF-D) is a ligand for the tyrosine kinases VEGF receptor 2 (Flk1) and VEGF receptor 3 (Flt4)*. *Proceedings of the National Academy of Sciences of the United States of America*, *95*, 548-53.

CHILOV, D., KUKK, E., TAIRA, S., **JELTSCH, M.**, KAUKONEN, J., PALOTIE, A., JOUKOV, V. & ALITALO, K. (1997): *Genomic organization of human and mouse genes for vascular endothelial growth factor C*. *The Journal of Biological Chemistry*, *272*, 25176-83.

OH, S. J., **JELTSCH, M.**, BIRKENHÄGER, R., MCCARTHY, J. E., WEICH, H. A., CHRIST, B., ALITALO, K. & WILTING, J. (1997): *VEGF and VEGF-C: specific induction of angiogenesis and lymphangiogenesis in the differentiated avian chorioallantoic membrane*. *Developmental Biology*, *188*, 96-109.

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