

Curriculum vitae, Carolina Wählby

PERSONAL INFORMATION

Born January 31, 1974. Swedish citizen. Married (Linnman prior to marriage), three children, born 2001, 2005 and 2007.

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CURRENT POSITIONS

20140401 – Professor in Quantitative Microscopy, Dept. of Information Technology, Uppsala University (UU), Sweden

20170101 – Facility director, National SciLifeLab BioImage Informatics facility.

<https://www.scilifelab.se/facilities/bioimage-informatics/>

20170101– Chairman of the Board of the Centre for Image Analysis (www.cb.uu.se), UU

20180101 – Professor, Head of research Program (PAP), Visual Information and Interaction (including research subjects Computerized Image Processing and Human Computer Interaction), Dept. IT, UU, Sweden (http://www.it.uu.se/research/visual_information_and_interaction?lang=en)

EDUCATION and PREVIOUS POSITIONS

1998 MSc in Molecular Biotechnology, UU

2003 PhD in Computerized Image Analysis, Dept. IT, UU

2005-2009 Postdoctoral fellow (50%) at the Dept. of Genetics & Pathology, UU

2004-2009 Assistant Professor in Digital Image Analysis (50%) the Centre for Image Analysis, UU

2009 Docent in Digital Image Processing at the Dept. of IT, UU

2009-2014 Principal Investigator, Imaging Platform, Broad Institute of Harvard and MIT, Cambridge, MA, USA (full time 20090501-20110630, part time 20110701-20141231).

2011-2014 Associate Professor (univesitetslektor) at the Div. of Visual Information and Interaction, Dept. of Information Technology, UU (part time 20110801-20140401)

2015-2017 Subject responsible Professor (FUAP), PhD studies in Computerized Processing and Analysis

FELLOWSHIPS, AWARDS, AND RESEARCH GRANTS (selected)

- ERC consolidator grant ‘TissueMaps’ 2016-2020. Role: PI (16M SEK). Focus: Integrating spatial and genetic information via automated image analysis and interactive visualization of tissue data.
- SSF Big Data grant on Hierarchical analysis methods, 2017-2022. Role: PI (29M SEK). Industrial partners: Astra Zeneca and Vironova AB. Focus: Improved information gain from temporal and spatial image data, capable of online prioritization of data acquisition, storage and computational resources.
- SSF Systems Biology grant on Systems Microscopy, 2017-2022. co-PI, with Staffan Strömblad, KI (35 M SEK). Industrial partners: Olink Bioscience AB and Sprint Bioscience AB. Focus: To develop technology and a systematic approach for understanding the molecular dynamics of cell migration tailored to identifying novel therapeutic targets in cancer.
- Vinnova Analytic Imaging Diagnostic Arena (AIDA), 2017-2019 + 2020, Role: board member and key contributor, PI: Claes Lundström, LiU/Sectra (20+16M SEK) + co-PI of sub-project ‘Image- and AI-based cytological cancer screening’, with PI Joakim Lindblad (0.4 M SEK). Industrial partners: Sectra AB, Spectronic Medical AB. Focus: To approach today’s care challenges within imaging diagnostics by use of modern AI technology aiming for broad benefit for healthcare.
- Swedish Research Council Collaboration Grant (2001-2010). co-PI, with M. Nilsson & NG. Larsson
- NordForsk PrivatePublicPartnership PhD Program Grant. (2009-2012) Role: Academic PI
- NIH, NIGMS, grant 1R01 GM095672-01 (2011-2015). Role: PI (10M SEK)
- ‘Strategic recruitment’ of SciLifeLab Sweden (2011-2015). Role: PI (9M SEK)
- AstraZeneca/SciLifeLab-Research Collab. Grant (2013-2019). co-PI, with S. Nelander (32.5M SEK)
- Swedish Research Council Young Investigator grant: (2013-2015). Role: PI (2.452M SEK)
- Grant from eSSSENCE for Large-scale analysis of live cells. (2012-2014). Role: PI (1M SEK)
- ISAC (International Society for the Advancement of Cytometry) Scholar 2014-2018
- President’s Innovation award 2014, Society of Biomolecular Imaging and Informatics
- Thuréus Prize 2015 from the Royal Society of Sciences at Uppsala. Personal prize of 0.1M SEK

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

- Main supervisor for
 - Amalka Pinidiyaarachchi, PhD 2009, "[Digital Image Analysis of Cells](#)"
 - Amin Allalou, PhD 2011, "[Methods for 2D and 3D Quantitative Microscopy of Biological Samples](#)"
 - Milan Gavrilovic, PhD 2011, "[Spectral Image Processing with Applications in Biotechnology and Pathology](#)"
 - Omer Ishaq, PhD 2016 (nominated for Best Nordic thesis 2015-2016), "[Image Analysis and Deep Learning for Applications in Microscopy](#)"
 - Sajith Kecheril Sadanandan, PhD 2017, "[Deep Neural Networks and Image Analysis for Quantitative Microscopy](#)"
 - Gabriele Partele, PhD planned 2020
 - Leslie Solorzano, PhD planned 2021
 - Håkan Wieslander, PhD planned 2022
 - Nicolas Pielawski, PhD planned 2022
 - Ankit Gupta, PhD Planned 2023
 - Axel Andersson, PhD planned 2023
- Co-supervisor for
 - Patrick Karlsson, PhD 2008
 - Magnus Gedda, PhD 2010
 - Ali Korshidi (Dept. of Nano-biotechnology, KTH, main supervisor Helene Andersson-Svahn) PhD 2013
 - Andreas Kårsnäs, PhD 2014
 - Amit Suveer, PhD, 2019
 - Xiaoyan Qian (Dept. of Biochemistry and Biophysics, SU, main supervisor Mats Nilsson) PhD 2019
 - Damian Matuszewski, PhD 2019
 - Gabriella Edfeldt (Dept of Medicine, Karolinska Institutet, main supervisor Annelie Tjernlund) PhD planned 2020
 - Michele Simonetti (Dept of Medical Biochemistry and Biophysics at Karolinska Institutet, main supervisor Nicola Crosetto), PhD planned 2020
 - Philip Harrison (Dept of Pharmaceutical Biosciences, UU, main supervisor Ola Spjuth), PhD planned 2022.
 - Ebba Bergman (Dept of Pharmaceutical Biosciences, UU, main supervisor Ola Spjuth), PhD planned 2024.
- Main supervisor for postdoctoral fellows Martin Simonsson, 2011-2013, Alexandra Pacureanu, 2012-2014, Marco Mignardi, 2015-2017, Maxime Bombrun 2016-2018, André Liebscher 2016, Anindya Gupta 2018-2020.

COMMISSIONS OF TRUST

- Member of the Royal Academy of Engineering Sciences (IVA) www.iva.se, 2017-
- Member of the The Royal Society of Sciences at Uppsala, www.vetenskapssocietetenuppsala.se 2017-
- Head of research Program (PAP), Visual Information and Interaction, Dept. IT, 2018-
- Professor responsible for research education (FUAP), Digital Image Processing and Analysis, Dept IT, 2015-2017
- Chairman of the electoral board (elektorsförsamlingen) of the faculty of Science and Technology 2019-
- Chairman of the board of the Centre for Image Analysis www.cb.uu.se, 2017-
- Board member of AIDA, a national arena for research and innovation in artificial intelligence, AI, for medical image analysis, funded through Medtech4Health and Vinnova medtech4health.se/aida, 2017-
- Board member of Swedish Bioimaging www.bioimaging.se. 2015-2018
- Board member of the National Microscopy Infrastructure, nmi.scilifelab.se, 2016-
- Board member of Upptech (Uppsala School of Technology) <http://www.upptech.uu.se>, 2016-
- Board member of the Uppsala node of SciLifeLab, www.scilifelab.se, 2016-
- Member of the Docent committee of the Faculty of Science and Technology, UU, 2017-

- Member of the scientific advisory board of EU H2020 EU MULTIMOT project (multimot.org) 2015-2018
- Member of the IEEE Bio Imaging and Signal Processing Technical Committee 2015-
- Area editor of the IEEE International Symposium on Biomedical Imaging ISBI 2018-2019 <https://biomedicalimaging.org/2018/>
- Member of the scientific advisory board of French Bioimaging 2016-
- Member of the scientific advisory board of Leibniz-ScienceCampi (LSC) [InfectoOptics](#), Germany
- Swedish representative of the Management Committee for COST Action CA15124, NEUBIAS on bioimage analysis, neubias.org, 2016-
- Board member of the Nobel family association 2012-
- Scientific Program Chair at [BioImage Informatics 2015](#), at NIST, Gaithersburg, MD, USA.
- Associate Editor at the [IEEE International Symposium on Biomedical Imaging, ISBI 2016](#) in Prague, Czech Republic, 2016.
- Organizer of a [Special Session on Advances in Computer-Aided Histopathology](#) at [ISBI 2014](#) in Beijing, China, 2014.
- Thesis opponent (C. Stadler, KTH, F. Nellros, LTH, Q. Mahmood, Chalmers, A. Lehmußola, TUT, V. Kovacheva, University of Warwick, UK, B. Mayurathan, University of Peredeniya, Sri Lanka, Eero Lihavainen, Tampere University of Technology, Hanna Källén, Lund University, Frida Danielsson, KTH, Ali Sharif Razavian, KTH, Virginie Uhlmann, EPFL).
- Member of thesis grading committee of approximately 4 PhD thesis/year since 2011.
- Evaluator of junior- and project grant applications for the Swedish Research Council VR-NT19, 2015-2016. Vice chairman 2019.
- Reviewer for a number of journals and conferences, including BMC Bioinformatics, Cytometry, Journal of Microscopy, Nature Methods, PlosONE, ICPR, ISBI, IEEE TMI, IEEE PRL.

TEACHING ACTIVITIES AND MERITS

Lecturer and administrator of graduate and PhD-level courses and workshops in digital image analysis, application oriented image analysis, and quantitative microscopy, in Sweden and abroad on a regular basis. A large part of the teaching includes invited lectures and workshops in courses organized by others, as part of our outreach activities within SciLifeLab and the BioImage Informatics facility (<https://www.scilifelab.se/facilities/bioimage-informatics/>), and organizing training sessions for early career bioimage analysis via the EU COST project NEUBIAS (<http://eubias.org/NEUBIAS/>) I have also engaged in educational activities outside the university, such as being the organizer of the ‘Research school at Nobel’s Karlskoga’ (<http://www.fsik.se>) for college-level students, lecturing at the Ångström teachers days for high school teachers, and organizing activities for children at TomTits experiments and Uppsala SciFest. I also initiated the CYTO2017 Image Analysis Challenge, in collaboration with the Human Protein Atlas www.proteinatlas.org.

PUBLICATIONS (selected, a full linked list can be found at http://user.it.uu.se/~cli05194/carolina_publications.html)

- *P. Ström, K. Kartasalo, H. Olsson, L. Solorzano, B. Delahunt, D.M. Berney, D.G. Bostwick, A.J. Evans, D.J. Grignon, P.A. Humphrey, K.A. Iczkowski, J.G. Kench, G. Kristiansen, T.H. van der Kwast, K.R.M. Leite, J.K. McKenney, J. Oxley, C-C. Pan, H. Samaratunga, J.R. Srigley, H. Takahashi, T. Tsuzuki, M. Varma, M. Zhou, J. Lindberg, C. Bergström, P. Ruusuvoori, C. Wählby, H. Grönberg, M. Rantalainen, L. Egevad and M. Eklund. **Artificial intelligence for diagnosis and grading of prostate cancer in biopsies: a population-based, diagnostic study**, *Lancet Oncology* doi: [https://doi.org/10.1016/S1470-2045\(19\)30738-7](https://doi.org/10.1016/S1470-2045(19)30738-7) Jan 8 2020.*
- *Gupta, P.J. Harrison, H. Wieslander, N. Pielawski, K. Kartasalo, G. Partel, L. Solorzano, A. Suveer, A. H. Klemm, O. Spjuth, I-M. Sintorn, and C. Wählby. **Deep Learning in Image Cytometry: A Review**. *Cytometry A*. doi: 10.1002/cyto.a.23701, Dec 19 2018.*
- *K. Holzwarth, R. Köhler, L. Philipsen, K. Tokoyoda, V. Ladyhina, C. Wählby, R.A. Niesner, and A.E. Hauser. **Multiplexed fluorescence microscopy reveals heterogeneity among stromal cells in mouse bone marrow sections**. *Cytometry A* 2018 Jul;93(9):876-888. doi: 10.1002/cyto.a.23526, Aug 14 2018.*

- D.J. Matuszewski, C. Wählby, C. Krona, S. Nelander, and I-M. Sintorn. **Image-based detection of patient-specific drug-induced cell-cycle effects in glioblastoma.** *SLAS Discovery* 2018 Dec;23(10):1030-1039. doi: 10.1177/2472555218791414, Aug 3 2018.
- N. Schizas, S. Perry, B. Andersson, C. Wählby, K. Kullander, and N.P. Hailer. **Differential Neuroprotective Effects of Interleukin-1 Receptor Antagonist on Spinal Cord Neurons after Excitotoxic Injury.** *Neuroimmunomodulation*. doi: 10.1159/000484607, Jan 2018.
- A. Gibbs, M. Buggert, G. Edfeldt, P. Ranefall, A. Introini, S. Cheuk, E. Martini, L. Eidsmo, T.B. Ball, J. Kimani, R. Kaul, A. Karlsson, C. Wählby, K. Broliden, and A. Tjernlund. **HIV-infected women have high numbers of CD103-CD8+ T cells residing close to the basal membrane of the ectocervical epithelium.** *Journal of Infectious Diseases* doi: 10.1093/infdis/jix661, Dec 2017.
- D.J. Matuszewski, A. Hast, C. Wählby, and I-M. Sintorn **A short feature vector for image matching: The Log-Polar Magnitude feature descriptor.** *PLoS One*. 12(11) doi: 10.1371/journal.pone.0188496, Nov 2017.
- J. Carreras-Puigvert, M. Zitnik, A.-S. Jemth, M. Carter, J.E. Unterlass, B. Hallström, O. Loseva, Z. Kareem, J.M. Calderon-Montano, C. Lindskog, P.-H. Edqvist, D.J. Matuszewski, H. Ait Blal, R.P.A. Berntsson, M. Häggblad, U. Martens, M. Studham, B. Lundgren, C. Wählby, E.L.L. Sonnhammer, E. Lundberg, P. Stenmark, B. Zupan, and T. Helleday. **A comprehensive structural, biochemical and biological profiling of the human NUDIX hydrolase family.** *Nature Communications* 8:1541 doi:10.1038/s41467-017-01642-w, Nov 2017.
- H. Zhang, M. Ericsson, M. Virtanen, S. Weström, C. Wählby, A. Vahlquist and H. Törmä. **Quantitative image analysis of protein expression and colocalization in skin sections** *Experimental Dermatology* doi: 10.1111/exd.13457, Nov 2017.
- M. Bombrun, H. Gao, P. Ranefall, N. Mejhert, P. Arner and C. Wählby. **Quantitative high-content/high-throughput microscopy analysis of lipid droplets in subject-specific adipogenesis models** *Cytometry A* doi: 10.1002/cyto.a.23265, Oct 2017.
- H. Wieslander, G. Forslid, E. Bengtsson, C. Wählby, J.-M. Hirsch, C. Runow Stark and S.K. Sadanandan. **Deep Convolutional Neural Networks For Detecting Cellular Changes Due To Malignancy** *Proceedings of the IEEE International Conference on Computer Vision (ICCV), Bioimage Computing Workshop, pp. 82-89, 2017, Venice, Oct 2017.*
- S.K. Sadanandan, P. Ranefall, S. Le Guyader and C. Wählby. **Automated Training of Deep Convolutional Neural Networks for Cell Segmentation.** *Nature Scientific Reports* 7:7860 doi:10.1038/s41598-017-07599-6, August 2017.
- N. Talebizadeh, N. Zhou Hagström, Z. Yu, M. Kronschräger, P. Söderberg, and C. Wählby **Objective automated quantification of fluorescence signal in histological sections of rat lens.** To appear in *Cytometry* doi: 10.1002/cyto.a.23131, May 2017.
- M. Bombrun, P. Ranefall, J. Lindblad, A. Allalou, G. Partel, L. Solorzano, X. Qian, M. Nilsson, and C. Wählby **Decoding gene expression in 2D and 3D.** Published at SCIA 2017, Lecture Notes in Computer Science LNCS June 2017.
- S.K. Sadanandan, P. Ranefall, and C. Wählby. **Feature Augmented Deep Neural Networks for Segmentation of Cells.** *Lecture Notes in Computer Science Computer Vision - ECCV 2016 Workshops, Volume 9913, pp 231-243, Sept 2016.*
- O. Ishaq, S.K. Sadanandan, and C. Wählby. **Deep Fish: Deep Learning-Based Classification of Zebrafish Deformation for High-Throughput Screening.** *Journal of Biomolecular Screening* pii: 1087057116667894 (2016) doi:10.1177/1087057116667894, Sept 2016.
- C. Wählby. **The quest for multiplexed spatially resolved transcriptional profiling.** *Nature Methods* 13, 623-624 (2016) doi:10.1038/nmeth.3924, July 2016.
- M. Mignardi, O. Ishaq, X. Qian, and C. Wählby. **Bridging Histology and Bioinformatics - Computational Analysis of Spatially Resolved Transcriptomics.** *Proceedings of the IEEE* 99, doi: 10.1109/JPROC.2016.2538562, April 2016.
- D. J. Matuszewski, C. Wählby, J. C. Puigvert, and I-M. Sintorn. **PopulationProfiler: A Tool for Population Analysis and Visualization of Image-Based Cell Screening Data.** *PLoS ONE* 17;11(3):e0151554. doi: 10.1371/journal.pone.0151554, March 2016.
- P. Ranefall and C. Wählby. **Global gray-level thresholding based on object size.** *Cytometry A*, online version DOI: 10.1002/cyto.a.22806, Jan 2016.

- C. Wählby. **Image Segmentation, Processing and Analysis in Microscopy and Life Science.** Book chapter, pages 1-16, in [Mathematical Models in Biology: Bringing Mathematics to Life](#), Springer December 2015, Editors: V. Zazzu, M.B. Ferraro and M.R. Guarracino, ISBN 978-3-319-23496-0.
- S.K. Sadanandan, Ö. Baltekin, K.E.G. Magnusson, A. Boucharin, P. Ranefall, J. Jaldén, J. Elf, and C. Wählby. **Segmentation and track-analysis in time-lapse imaging of bacteria.** [IEEE Journal of Selected Topics in Signal Processing](#), October 15, 2015, 10(1):174-184
- C.-M. Clausson, L. Arngården, O. Ishaq, A. Klaesson, M. Kühnemund, K. Grannas, B. Koos, X. Qian, P. Ranefall, T. Krzywkowski, H. Brismar, M. Nilsson, C. Wählby and O. Söderberg. **Compaction of rolling circle amplification products increases signal integrity and signal-to-noise ratio.** [Nature Scientific Reports](#) 5, 12317, June 2015.
- B. Koos, M. Kamali-Moghaddam, L. David, M. Sobrinho-Simões, A. Dimberg, M. Nilsson, C. Wählby, and O. Söderberg. **Next generation Pathology - surveillance of tumor microecology.** [J Mol Biol.](#) 2015 June 5, 427(11):2013-22.
- C. Wählby, A.L. Conery, M.A. Bray, L. Kamentsky, J Larkins-Ford, KL Sokolnicki, M Veneskey, K Michaels, A.E. Carpenter, and E.J. O'Rourke. **High- and low-throughput scoring of fat mass and body fat distribution in *C. elegans*.** [Methods](#), 2014 Aug 1;68(3):492-9.
- M.A. Khorshidi, P.K. Periyannan Rajeswari, C. Wählby, H.N. Joensson, and H. Andersson Svahn. **Automated analysis of dynamic behavior of single cells in picoliter droplets.** [Lab on a Chip](#), 2014 (14), 931-937.
- R. Ke, M. Mignardi, A. Pacureanu, J. Svedlund, J. Botling, C. Wählby, and M. Nilsson. **In situ sequencing for RNA analysis in preserved tissue and cells.** [Nature Methods](#), 2013 (10), 857-860.
- N.V. Kirienko, D.R. Kirienko, J. Larkins-Ford, C. Wählby, G. Ruvkun, and F.M. Ausubel. **Pseudomonas aeruginosa disrupts Caenorhabditis elegans iron homeostasis, causing a hypoxic response and death.** [Cell Host and Microbe](#), 2013 Apr 17;13(4):406-16.
- C. Pardo-Martin, A. Allalou, J. Medina, P.M. Eimon, C. Wählby, and M.F. Yanik. **High-throughput hyperdimensional vertebrate phenotyping.** [Nature Communications](#), 2013 Feb 12; 4:1467.
- M. Gavrilovic, J.C. Azar, J. Lindblad, C. Wählby, E. Bengtsson, C. Busch, and I.B. Carlbom. **Blind color decomposition of histological images.** [IEEE Transactions on Medical Imaging](#), 2013 Jun; 32(6):983-94.
- A.K. Raap, R.S. Jahangir Tafrechi, F.M. van de Rijke, A. Pyle, C. Wählby, et al. **Non-random mtDNA segregation patterns indicate a metastable heteroplasmic segregation unit in m.3243A>G cybrid cells.** [PLoS One](#), 2012, 7(12):e52080.
- C. Wählby, L. Kamentsky L, Z.H. Liu, T. Riklin-Raviv, A.L. Conery, E.J. O'Rourke, K.L. Sokolnicki, O. Visvikis, V. Ljosa, J.E. Irazoqui, P. Golland, G. Ruvkun G, F.M. Ausubel, and A. E. Carpenter. **An image analysis toolbox for high-throughput *C. elegans* assays.** [Nature Methods](#), 2012 Apr 22; 9(7): 714-716.
- T.Y. Chang, C. Pardo-Martin, A. Allalou, C. Wählby and M.F. Yanik. **Fully automated cellular-resolution vertebrate screening platform with parallel animal processing.** [Lab on a Chip](#), 2012 Feb 21;12(4):711-6
- C.-M. Clausson, A. Allalou, I. Weibrecht, S. Mahmoudi, M. Farnebo, U. Landegren, C. Wählby and O. Söderberg. **Increasing the dynamic range of *in situ* PLA.** [Nature Methods](#), 2011;8(11):892-3.
- Weibrecht, M. Gavrilovic, L. Lindbom, U. Landegren, C. Wählby and O. Söderberg. **Visualising individual sequence-specific protein-DNA interactions *in situ*.** [New Biotechnology](#), 2012 Jun 15;29(5):589-98.
- M. Gavrilovic, I. Weibrecht, T. Conze, O. Söderberg and C. Wählby. **Automated Classification of Multi-Colored Rolling Circle Products in Dual-channel Wide-field Fluorescence Microscopy.** [Cytometry A](#). 2011, ;79(7):518-27.
- Zieba, C. Wählby, F. Hjälml, L. Jordan, J. Berg, U. Landegren, K. Pardali. **Bright-field microscopic visualization of proteins and protein complexes by *in situ* proximity ligation with peroxidase detection.** [Clinical Chemistry](#). 2010 Jan;56(1):99-110.
- A. Allalou, A. Pinidiyaarachchi, C. Wählby. **Robust signal detection in 3D fluorescence microscopy.** [Cytometry A](#). 2009 Sep; 77A(1):86-96. PMID: 19760746

- *M. Gavrilovic and C. Wählby. Quantification of colocalization and cross-talk based on spectral angles. [Journal of Microscopy](#). 2009 Jun;234(3):311-24.*
- *Pinidiyaarachchi, A. Allalou, A. Zieba, K. Pardali and C. Wählby. A detailed analysis of 3D subcellular signal localization. [Cytometry A](#). 2009 Apr; 75(4):319-28.*
- *J. Göransson, C. Wählby, M. Isaksson, M. Howell, J. Jarvius and M. Nilsson. A single molecule array for digital targeted molecular analyses. [Nucleic Acids Res](#). 2009 Jan;37(1):e7.*
- *Allalou and C. Wählby. BlobFinder; a tool for fluorescence microscopy image cytometry. [Computer Methods and Programs in Biomedicine](#), 2009 Apr;94(1):58-65. Epub 2008 Oct 23.*
- *R.S. Jahangir Tafrechi, F.M. van de Rijke, A. Allalou, C. Larsson, W.C.R. Sloos, M. van de Sande, C. Wählby, G.M.C. Janssen, and A.K. Raap. Single-cell A3243G Mitochondrial DNA Mutation Load Assays for Segregation Analysis. [J. of Histochemistry and Cytochemistry](#), 55: 1159-66, 2007*
- *M. Jarvius, J. Paulsson, I. Weibrecht, K-J. Leuchowius, A-C. Andersson, C. Wählby, M. Gullberg, J. Botling, T. Sjöblom, B. Markova, A. östman, U. Landegren and O. Söderberg. In situ detection of phosphorylated PDGF receptor beta using a generalized proximity ligation method. [Molecular and Cellular Proteomics](#), 6:1500-1509, 2007.*
- *C. Wählby, I.-M. Sintorn, F. Erlandsson, G. Borgefors and E. Bengtsson. Combining intensity, edge, and shape information for 2D and 3D segmentation of cell nuclei in tissue sections. [Journal of Microscopy](#), 215(1):67-76, July 2004. PMID: 15230877*
- *J. Lindblad, C. Wählby, E. Bengtsson and A. Zaltsman. Image analysis for automatic segmentation of cells and classification of Rac1 activation. [Cytometry](#), 57A(1):22-33, 2004.*
- *F. Erlandsson, C. Wählby, S. Ekholm-Reed, A-C. Hellström, E. Bengtsson and A. Zetterberg. Abnormal expression of cyclin E in tumor cells. [International Journal of Cancer](#), 104(3):369-75, Apr 1, 2003.*
- *C. Wählby, J. Lindblad, M. Vondrus, E. Bengtsson and L. Björkesten. Algorithms for cytoplasm segmentation of fluorescence labeled cells. [Analytical Cellular Pathology](#), 24(2,3):101-111, 2002.*
- *C. Wählby, F. Erlandsson, A. Zetterberg, and E. Bengtsson. Sequential immunofluorescence staining and image analysis for detection of large numbers of antigens in individual cell nuclei. [Cytometry](#), 47(1):32-41, 2002.*

PATENT APPLICATION

- Pending European patent application (filed 20190118 by collaborator Q-Linea AB) on Analysis of images of biological material (17731862.3 – 1210).