

CV for site visit NKI-AVL October 2009

Peter J. Peters

PERSONAL HISTORY

Date of birth

August 22, 1957

Nationality

Dutch

Education and qualifications

Ph.D. Utrecht University, The Netherlands, thesis advisor Hans Geuze and Hidde Ploegh, 1991
M.Sc. Utrecht University, The Netherlands, 1987

Employment history

1998 – present	Group leader division of Cell Biology, NKI-AVL
1999 – July 2009 August 2009 - present	Professor of Cell Biology, Free University Amsterdam, Professor of Nanobiology, Technical University Delft (8 hrs / week)
1999 – present	Dean of postdoctoral fellows, NKI-AVL (2 hrs / week)
1994 – 1998 1991 – 1994	Junior Principal investigator, Utrecht University, The Netherlands Visiting fellow lab of Richard Klausner, National Institute of Child Health, USA

Biographic sketch

Peters obtained his PhD from Utrecht University, where he analyzed the ultrastructure of MHC class II antigen processing and discovered the 'MHC class II compartment' (MIIC) (Peters PJ et al., **Nature**, 1991, Peters PJ et al., **J Exp Med** 1995) and studied exocytosis of cytotoxic mediators in T cells. He established that secretory granules are of lysosomal nature (Peters PJ et al., **J Exp Med.** 1991). Peters joined the group of Rick Klausner at the National Institutes of Health in Bethesda, USA and identified ARF6 as a regulator for endocytosis (Peters PJ et al., **J Cell Biol.** 1995). In 1998, he became Principal Investigator at the Netherlands Cancer Institute and was appointed as professor at the Free University of Amsterdam.

His long-term focus is on understanding the molecular machinery and organization of molecular sorting within the endocytic membrane system of a cell (D'Souza-Schorey C et al., **J Cell Biol.** 1998, Peters PJ et al., **Nature Cell Biol.** 2002, van der Wel NN et al., **Mol Biol Cell.** 2003, Peters PJ et al., **J Cell Biol.** 2003 and Mironov A Jr et al, **J Neurosci.** 2003). Cryo immunogold-EM methods of aldehyde-fixed cells are the main techniques applied, allowing the subcellular detection of gene products at the highest resolution (Van der Wel N at al., **Cell.** 2007, Godsava SF et al., **J Neurosci.** 2008 and Peters PJ, Pierson J. **Methods Cell Biol.** 2008. Review). In addition, Peters' lab is currently improving the ultrathin cryosectioning of native unfixed cells for high-resolution 3D cryo-electron tomography to visualize molecular machines in the context of organelles. Peters' lab consist of 9 scientists and 4 technicians.

Summary of research interests

One focal point of our structural biology group is to reveal and manipulate the macromolecular organization of cells under normal and pathogenic conditions at the nano-scale level. We use cryo-electron tomography of vitreous sections, currently the only method that can obtain molecular resolution of macromolecular machines in cells in a near-native situation. The tomograms contain a 3D map of the cellular proteome at about 4 nm resolution and we are just beginning to explore its potential by placing high priority on developing methods for nanotechnology. The other central point of our group is to visualise gene products in cells by electron microscopy at the highest resolution with gold probes on cryo-sections.

Subcellular traffic of Mycobacteria and its importance for vaccine development

We published last year that after prolonged infection in macrophages and dendritic cells, *M. tuberculosis* translocates from phago-lysosomes to the cytosol (Cell. 2007). The BCG vaccine strain failed to translocate from the phago-lysosome. The translocation into the cytosol was totally unexpected. This difference in localization might give an explanation for the ineffectiveness of BCG as a MHC class I / CD8 triggered vaccine. Looking further into the difference in localization can bring us closer to a better vaccine against tuberculosis but perhaps also against virus induced tumors such as HPV. We are now looking at BCG with a knock-in of the extended RD1 region (BCG::RD1), as this region is now known to encode the ESX-1 secretion system recently identified by one of our group members as a novel type VII secretion system (Abdallah AM et al., Type VII secretion. Nat Rev Microbiol. 2007). We found that this bacterium can be seen in the cytosol of the cell after 7 days of infection and conclude that the ESX-1 system (in a BCG background) is sufficient for translocation.

Nanomachines in cells

Cryo electron tomography of vitreous sections is an emerging technique to study the three-dimensional structure of molecular machines in situ, and we have spent several years optimizing the technology. We have been looking at the 80S eukaryotic ribosome within the cell to validate the technological advances. Using high-resolution tomography of unfixed frozen hydrated cryo-sections the structure and relative orientation of the ribosome, in a cellular context, has been established by semi-automatic particle selection, volumetric alignment and averaging. With this template a 'molecular atlas' was constructed, mapping the ribosome over the entire cellular volume within a thin vitreous section of a cell. This study illustrates the possibilities of this nanotechnology towards visualizing cellular machinery in situ at macromolecular resolutions in large eukaryotic cells. Future challenges include visualizing individual conformations (imposed by drugs) of GFP tagged ribosomes and using volumetric classification algorithms based on maximum likelihood statistical approach. With new technologies being developed by us and others a resolution of 2.5 nm is being approached, allowing template matching with the X-ray crystal structure and with the ultimate goal of explaining the structures present in our averaged density maps.

Structure and conversion site of Prions

Prion diseases are caused by accumulation of an abnormally folded isoform (PrP^{Sc}) of the cellular prion protein (PrP^C). The subcellular site where PrP^{Sc} is formed is still unclear. We use quantitative cryo-immunogold electron microscopy to localise different populations of PrP on hippocampal sections from prion-infected mice (J. of Neuroscience 2008) and in the intestines of orally infected mice. We are now also performing cryo-electron tomography on prion preparations, in order to solve the 3D structure of prions.

Single intestinal stem cells

The intestinal epithelium is the most rapidly self-renewing tissue in adult mammals. In collaboration with the lab of Hans Clevers (Hubrecht Institute, Utrecht) we have recently demonstrated the presence of approximately six cycling Lgr5+ve stem cells at the bottom of a small intestinal crypt (Barker N, et al., Nature. 2007). Single sorted Lgr5+ve stem cells can also initiate these crypt-villus organoids in culture (Sato T, et al., Nature 2009).

Three most important papers as a group leader

Full reference plus abstract, not restricted to the period 2004 - 2008

1: *Cell*. 2007;129(7):1287-98. *M. tuberculosis* and *M. leprae* translocate from the phagolysosome to the cytosol in myeloid cells.

van der Wel N, Hava D, Houben D, Fluitsma D, van Zon M, Pierson J, Brenner M, **Peters PJ**.

M. tuberculosis and *M. leprae* are considered to be prototypical intracellular pathogens that have evolved strategies to enable growth in the intracellular phagosomes. In contrast, we show that lysosomes rapidly fuse with the virulent *M. tuberculosis*- and *M. leprae*-containing phagosomes of human monocyte-derived dendritic cells and macrophages. After 2 days, *M. tuberculosis* progressively translocates from phagolysosomes into the cytosol in nonapoptotic cells. Cytosolic entry is also observed for *M. leprae* but not for vaccine strains such as *M. bovis* BCG or in heat-killed mycobacteria and is dependent upon secretion of the mycobacterial gene products CFP-10 and ESAT-6. The cytosolic bacterial localization and replication are pathogenic features of virulent mycobacteria, causing significant cell death within a week. This may also reveal a mechanism for MHC-based antigen presentation that is lacking in current vaccine strains.

2: *J Neurosci*. 2008;28(47):12489-99. Cryo-immunogold electron microscopy for prions: toward identification of a conversion site.

Godsave SF, Wille H, Kujala P, Latawiec D, DeArmond SJ, Prusiner SB, **Peters PJ**.

Prion diseases are caused by accumulation of an abnormally folded isoform (PrP^{Sc}) of the cellular prion protein (PrP^C). The subcellular distribution of PrP^{Sc} and the site of its formation in brain are still unclear. We performed quantitative cryo-immunogold electron microscopy on hippocampal sections from mice infected with the Rocky Mountain Laboratory strain of prions. Two antibodies were used: R2, which recognizes both PrP^C and PrP^{Sc}; and F4-31, which only detects PrP^C in undenatured sections. At a late subclinical stage of prion infection, both PrP^C and PrP^{Sc} were detected principally on neuronal plasma membranes and on vesicles resembling early endocytic or recycling vesicles in the neuropil. The R2 labeling was approximately six times higher in the infected than the uninfected hippocampus and gold clusters were only evident in infected tissue. The biggest increase in labeling density (24-fold) was found on the early/recycling endosome-like vesicles of small-diameter neurites, suggesting these as possible sites of conversion. Trypsin digestion of infected hippocampal sections resulted in a reduction in R2 labeling of >85%, which suggests that a high proportion of PrP^{Sc} may be oligomeric, protease-sensitive PrP^{Sc}.

3: *J Cell Biol*. 1998;140(3):603-16. ARF6 targets recycling vesicles to the plasma membrane: insights from an ultrastructural investigation.

D'Souza-Schorey C, van Donselaar E, Hsu VW, Yang C, Stahl PD, **Peters PJ**.

We have shown previously that the ADP-ribosylation factor (ARF)-6 GTPase localizes to the plasma membrane and intracellular endosomal compartments. Expression of ARF6 mutants perturbs endosomal trafficking and the morphology of the peripheral membrane system. However, another study on the distribution of ARF6 in subcellular fractions of Chinese hamster ovary (CHO) cells suggested that ARF6 did not localize to endosomes labeled after 10 min of horseradish peroxidase (HRP) uptake, but instead was uniquely localized to the plasma membrane, and that its reported endosomal localization may have been a result of overexpression. Here we demonstrate that at the lowest detectable levels of protein expression by cryo-immunogold electron microscopy, ARF6 localized predominantly to an

intracellular compartment at the pericentriolar region of the cell. The ARF6-labeled vesicles were partially accessible to HRP only on prolonged exposure to the endocytic tracer but did not localize to early endocytic structures that labeled with HRP shortly after uptake. Furthermore, we have shown that the ARF6-containing intracellular compartment partially colocalized with transferrin receptors and cellubrevin and morphologically resembled the recycling endocytic compartment previously described in CHO cells. HRP labeling in cells expressing ARF6(Q67L), a GTP-bound mutant of ARF6, was restricted to small peripheral vesicles, whereas the mutant protein was enriched on plasma membrane invaginations. On the other hand, expression of ARF6(T27N), a mutant of ARF6 defective in GDP binding, resulted in an accumulation of perinuclear ARF6-positive vesicles that partially colocalized with HRP on prolonged exposure to the tracer. Taken together, our findings suggest that ARF activation is required for the targeted delivery of ARF6-positive, recycling endosomal vesicles to the plasma membrane.

Publications (2003 - 2008)

Papers

1. Pierson, J, Sani M, Tomova C, Godsave S, and **Peters PJ**, (2009). Towards visualization of Nanomachines in their native cellular environment. *Histochem Cell Biol.* in press
2. Gregorieff A, Stange DE, Kujala P, Begthel H, Born MV, Korving J, **Peters PJ**, Clevers H.(2009). The Ets-domain transcription factor Spdef promotes maturation of Goblet and Paneth cells in the intestinal epithelium. *Gastroenterology*. [Epub ahead of print]
3. Herz J, Pardo J, Kashkar H, Schramm M, Kuzmenkina E, Bos E, Wiegmann K, Wallich R, **Peters PJ**, Herzig S, Schmelzer E, Krönke M, Simon MM, Utermöhlen O. (2009). Acid sphingomyelinase is a key regulator of cytotoxic granule secretion by primary T lymphocytes. *Nature Immunol.* 10(7):761-8.
4. Sato,T., Vries,R.G., Snippert,H.J., van de Wetering,M., Barker,N., Stange,D.E., van Es,J.H., Abo,A., Kujala,P., **Peters, P.J.**, and Clevers,H. (2009). Single Lgr5 stem cells build crypt-villus structures in vitro without a mesenchymal niche. *Nature* 459, 262-265.
5. van der Flier,L.G., van Gijn,M.E., Hatzis,P., Kujala,P., Haegerbarth,A., Stange,D.E., Begthel,H., van den Born,M., Guryev,V., Oving,I., van Es,J.H., Barker,N., **Peters, P.J.**, van de Wetering,M., and Clevers,H. (2009). Transcription factor achaete scute-like 2 controls intestinal stem cell fate. *Cell* 136, 903-912.
6. Zhang,L., Lee,S.Y., Beznoussenko,G.V., **Peters, P.J.**, Yang,J.S., Gilbert,H.Y., Brass,A.L., Elledge,S.J., Isaacs,S.N., Moss,B., Mironov,A., and Hsu,V.W. (2009). A role for the host coatomer and KDEL receptor in early vaccinia biogenesis. *Proc. Natl. Acad. Sci. U S A* 106, 163-168.
7. *Godsave,S.F., Wille,H., Kujala,P., Latawiec,D., DeArmond,S.J., Serban,A., Prusiner,S.B., and **Peters,P.J.** (2008). Cryo-immunogold electron microscopy for prions: toward identification of a conversion site. *J. Neurosci.* 28, 12489-12499.
8. Hava,D.L., van der Wel,N., Cohen,N., Dascher,C.C., Houben,D., Leon,L., Agarwal,S., Sugita,M., van Zon,M., Kent,S.C., Shams,H., **Peters, P.J.**, and Brenner,M.B. (2008). Evasion of peptide, but not lipid antigen presentation, through pathogen-induced dendritic cell maturation. *Proc. Natl. Acad. Sci. U S A* 105, 11281-11286.
9. Verbrugghe,P., Kujala,P., Waelpuut,W., **Peters, P.J.**, and Cuvelier,C.A. (2008). Clusterin in human gut-associated lymphoid tissue, tonsils, and adenoids: localization to M cells and follicular dendritic cells. *Histochem. Cell Biol.* 129, 311-320.
10. Barker,N., van Es,J.H., Kuipers,J., Kujala,P., van den Born,M., Cozijnsen,M., Haegerbarth,A., Korving,J., Begthel,H., **Peters, P.J.**, and Clevers,H. (2007). Identification of stem cells in small intestine and colon by marker gene Lgr5. *Nature* 449, 1003-1007.
11. Knoll,R., Postel,R., Wang,J., Kratzner,R., Hennecke,G., Vacaru,A.M., Vakeel,P., Schubert,C., Murthy,K., Rana,B.K., Kube,D., Knoll,G., Schafer,K., Hayashi,T.,

- Holm,T., Kimura,A., Schork,N., Toliat,M.R., Nurnberg,P., Schultheiss,H.P., Schaper,W., Schaper,J., Bos,E., Den Hertog,J., van Eeden,F.J., **Peters, P.J.**, Hasenfuss,G., Chien,K.R., and Bakkers,J. (2007). Laminin-alpha4 and integrin-linked kinase mutations cause human cardiomyopathy via simultaneous defects in cardiomyocytes and endothelial cells. *Circulation* 116, 515-525.
12. Li,J., **Peters,P.J.**, Bai,M., Dai,J., Bos,E., Kirchhausen,T., Kandror,K.V., and Hsu,V.W. (2007). An ACAP1-containing clathrin coat complex for endocytic recycling. *J. Cell Biol.* 178, 453-464.
 13. * van der Wel,N., Hava,D., Houben,D., Fluitsma,D., van Zon,M., Pierson,J., Brenner,M., and **Peters, P.J.** (2007). M. tuberculosis and M. leprae translocate from the phagolysosome to the cytosol in myeloid cells. *Cell* 129, 1287-1298.
 14. Klingenstein,R., Lober,S., Kujala,P., Godsave,S., Leliveld,S.R., Gmeiner,P., **Peters, P.J.**, and Korth,C. (2006). Tricyclic antidepressants, quinacrine and a novel, synthetic chimera thereof clear prions by destabilizing detergent-resistant membrane compartments. *J. Neurochem.* 98, 748-759.
 15. Korth,C. and **Peters, P.J.** (2006). Emerging pharmacotherapies for Creutzfeldt-Jakob disease. *Arch. Neurol.* 63, 497-501.
 16. **Peters, P.J.**, Bos,E., and Griekspoor,A. (2006). Cryo-immunogold electron microscopy. *Curr. Protoc. Cell Biol.* Chapter 4, Unit.
 17. Boes,M., van der Wel,N., Peperzak,V., Kim,Y.M., **Peters, P.J.**, and Ploegh,H. (2005). In vivo control of endosomal architecture by class II-associated invariant chain and cathepsin S. *Eur. J. Immunol.* 35, 2552-2562.
 18. Touret,N., Paroutis,P., Terebiznik,M., Harrison,R.E., Trombetta,S., Pypaert,M., Chow,A., Jiang,A., Shaw,J., Yip,C., Moore,H.P., van der Wel,N., Houben,D., **Peters, P.J.**, de Chastellier,C., Mellman,I., and Grinstein,S. (2005). Quantitative and dynamic assessment of the contribution of the ER to phagosome formation. *Cell* 123, 157-170.
 19. van der Wel,N.N., Fluitsma,D.M., Dascher,C.C., Brenner,M.B., and **Peters, P.J.** (2005). Subcellular localization of mycobacteria in tissues and detection of lipid antigens in organelles using cryo-techniques for light and electron microscopy. *Curr. Opin. Microbiol.* 8, 323-330.
 20. Baas,A.F., Kuipers,J., van der Wel,N.N., Battle,E., Koerten,H.K., **Peters, P.J.**, and Clevers,H.C. (2004). Complete polarization of single intestinal epithelial cells upon activation of LKB1 by STRAD. *Cell* 116, 457-466.
 21. Catalfamo,M., Karpova,T., McNally,J., Costes,S.V., Lockett,S.J., Bos,E., **Peters, P.J.**, and Henkart,P.A. (2004). Human CD8+ T cells store RANTES in a unique secretory compartment and release it rapidly after TcR stimulation. *Immunity* 20, 219-230.
 22. Dai,J., Li,J., Bos,E., Porcionatto,M., Premont,R.T., Bourgoin,S., **Peters, P.J.**, and Hsu,V.W. (2004). ACAP1 promotes endocytic recycling by recognizing recycling sorting signals. *Dev. Cell* 7, 771-776.
 23. Griparic,L., van der Wel,N.N., Orozco,I.J., **Peters, P.J.**, and van der Blik,A.M. (2004). Loss of the intermembrane space protein Mgm1/OPA1 induces swelling and localized constrictions along the lengths of mitochondria. *J. Biol. Chem.* 279, 18792-18798.
 24. Lefman,J., Zhang,P., Hirai,T., Weis,R.M., Juliani,J., Bliss,D., Kessel,M., Bos,E., **Peters, P.J.**, and Subramaniam,S. (2004). Three-dimensional electron microscopic imaging of membrane invaginations in Escherichia coli overproducing the chemotaxis receptor Tsr. *J. Bacteriol.* 186, 5052-5061.
 25. Zhang,P., Bos,E., Heymann,J., Gnaegi,H., Kessel,M., **Peters, P.J.**, and Subramaniam,S. (2004). Direct visualization of receptor arrays in frozen-hydrated sections and plunge-frozen specimens of E. coli engineered to overproduce the chemotaxis receptor Tsr. *J. Microsc.* 216, 76-83.
 26. Högemann-Savellano D, Bos E, Blondet C, Sato F, Abe T, Josephson L, Weissleder R, Gaudet J, Sgroi D, **Peters PJ**, Basilion JP. (2003). The transferring receptor: a potential molecular imaging marker for human cancer. *Neoplasia.* 5, 495-506.

27. Cernadas M, Sugita M, van der Wel N, Cao X, Gumperz JE, Maltsev S, Besra GS, Behar SM, Peters PJ, Brenner MB. (2003). Lysosomal localization of murine CD1d mediated by AP-3 is necessary for NK T cell development. *J Immunol.* 15,4149-55.
28. van der Wel NN, Sugita M, Fluitsma DM, Cao X, Schreibelt G, Brenner MB, **Peters PJ.** (2003). CD1 and major histocompatibility complex II molecules follow a different course during dendritic cell maturation. *Mol Biol Cell.* 14, 3378-88.
29. **Peters PJ,** Mironov A Jr, Peretz D, van Donselaar E, Leclerc E, Erpel S, DeArmond SJ, Burton DR, Williamson RA, Vey M, Prusiner SB. (2003). Trafficking of prion proteins through a caveolae-mediated endosomal pathway. *J Cell Biol.* 162, 703-17.
30. Mironov A Jr, Latawiec D, Wille H, Bouzamondo-Bernstein E, Legname G, Williamson RA, Burton D, DeArmond SJ, Prusiner SB, **Peters PJ.** (2003). Cytosolic prion protein in neurons. *J Neurosci.* 23,7183-93.
31. Weis RM, Hirai T, Chalah A, Kessel M, **Peters PJ,** Subramaniam S. (2003). Electron microscopic analysis of membrane assemblies formed by the bacterial chemotaxis receptor Tsr. *J Bacteriol.* 185, 3636-43.
32. Puertollano R, van der Wel NN, Greene LE, Eisenberg E, **Peters PJ,** Bonifacino JS. (2003). Morphology and dynamics of clathrin/GGA1-coated carriers budding from the trans-Golgi network. *Mol Biol Cell.* 14,1545-57.

* 3 most important papers from this period

Reviews and editorials

1. Zhang,P., Weis,R.M., **Peters,P.J.**, and Subramaniam,S. (2007). Electron tomography of bacterial chemotaxis receptor assemblies. *Methods Cell Biol.* 79, 373-384.
2. Peters,P.J. and **Pierson,J.** (2008). Immunogold labeling of thawed cryosections. *Methods Cell Biol.* 88, 131-149.
3. Peters PJ, Bos E, Griekspoor A. Cryo-immunogold electron microscopy. *Curr Protoc Cell Biol.* 2006; Chapter 4.

Patent filings

WO/2008/007953, Van der Wel NN, Brenner MB, **Peters PJ.** Means and methods for manipulating sequential phagolysosomal-cytosolic translocation of mycobacteria, and uses thereof, filed 2007.

PROFESSIONAL ACTIVITIES (2004 - 2008)

Educational activities outside the Institute

Lecturing 20 hours / year Cell Biology at the medical faculty of the Free University Amsterdam, and 10 hours / year at the Technical University of Delft

At the Institute

Since 1998, Peters has been dean of postdoctoral affairs and built a 'postdoc career development organization' that helps young scientists to make the right moves for their next career step by providing training in transferable skills and offering annual, 3 day retreats for 120 postdocs, with workshops on topics including: Laboratory Leadership in Science, Mentoring and Being Mentored, Time Management, Project Management, Data Management, Getting Funded, Getting Published and Increasing Your Visibility, Understanding Technology Transfer, Setting Up Collaborations, Teaching and Course Design, Obtaining and Negotiating a Faculty Position, Staffing Your Laboratory.

The NKI-AVL ranked over the last years among the top 10 as the best place to work as a postdoc outside the USA (the Scientist). Peters recently obtained 600.000 Euro from

the Dutch government to professionalize the organization (www.postdoc-development.eu). With this new organization two successful retreats have been organized with an average rating of 8.5 (out of 10). Currently he seeks EU funding to initiate European wide collaborations with other research institutions. This initiative not only benefits postdocs but also the research institutes. The work received attention in: **Cell.** 2006;125(3):407 Aschwanden C. Learning to lead; **Cell.** 2006;124(3):445 Aschwanden C., Professionalizing the postdoctoral experience; **The Scientist** 2008; 22 (3): 53, The best places to work as postdoc; and **Nature** 2007;445: 948 Griekspoor A., Torn between two ladders.

Coordinator of a Dutch Roadmap Large Research Infrastructure Plan (38 million Euro). Selected and placed on the roadmap in October 2008. For more information see the Netherlands Centre for Electron Nanoscopy www.necen.nl

Coordinator of 1 EU project <http://anteprion.vitamib.com/>

Co-workers

- Nicole van der Wel PhD Associate Staff Scientist
- Sue Godsave PhD Post-doc / EU project manager
- Pekka Kujala PhD Post-doc
- Musa Sani PhD Post-doc
- Cveta B. Tomova PhD Post-doc
- Abdallah M. Abdallah Post-doc (and at VUmc Amsterdam)
- Ulrike Ziese PhD EM technician (and at TU Delft)
- Matthijn Vos PhD Post-doc (part-time) and at FEI company Eindhoven
- Diane Houben MSc Graduate student
- Jason Pierson MSc Graduate student
- Hans Jansen BSc Technical staff
- Maaïke van Zon BSc Technical staff
- Karin de Punder MSc Technical staff
- Nico Ong Research assistant

Prizes

Feulgen Lecture 2009 symposium of the Society for Histochemistry (www.histochemistry.eu)

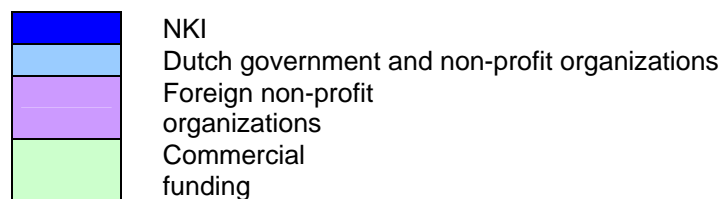
EXTERNAL FUNDING

Title	Funding source (fellow name)	Total value (€)	Time period
Grants			
Understanding prion strains and species barriers and devising novel diagnostic approaches	European Union	320,000	2006 - 2010
Development of a pre-clinical blood test for prion diseases	European Union	420,000	2007 – 2010
Public Private Partnership for research into and development of medicines, vaccines and diagnostic aids in the domain of AIDS, tuberculosis and malaria	Areas Global TB Vaccine Foundation	1,300,000	2007 – 2011
Pathways of antigen presentation by CD 1 a, b and c	National Institute of Health	120,000	2007 – 2011
Pre-clinical improvement of combined immunotherapy and chemotherapy for new variant Creutzfeldt-Jakob disease.	European Union	239,000	2002 – 2006
Passage from intestine to brain: assessing the role of dendritic cells in capturing, expanding and disseminating prions.	European Union	200,000	2002 – 2005
CD1 trafficking and loading of Mycobacterium leprae lipids in maturing dendritic cells of	Dutch Leprosy Foundation	320,000	2003 - 2010

STAFF CHART

	2003	2004	2005	2006	2007	2008	gender	national
Group Leader Peter Peters	[Blue bar]						male	Dutch
Associate Staff Scientist Nicole van der Wel								
Postdoc Nicole van der Wel Piet Res Hongjun Wang Sue Godsave Pekka Kujala Musa Sani Marthijn Vos	[NSL bar] [EU bar] [EU bar] [EU bar] [EU bar] [AERAS bar] [EU bar]						female male male female male male male	Dutch Dutch Chinese British Finnish Nigeria Dutch
PhD Student Diane Houben Jason Pierson	[NIH bar] [EU bar]						female male	Dutch American
Technician Erik Bos Hans Janssen Nico Ong Martijn Romeijn Maaike van Zon	[Blue bar] [Blue bar] [Blue bar] [EU bar] [EU bar]						male male male male female	Dutch Dutch Dutch Dutch Dutch
Project Manager Bea Krenn	[EU bar]						female	Dutch
Number of staff	7.25	11	11.25	11.5	9.5			

Funding:



EU European Union
 NSL Dutch Leprosy Foundation
 NIH National Institute of health, USA
 AERAS AERAS global TB vaccine foundation