Prof. Christoph Wilhelm, PhD

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Research Expertise

Prof. Wilhelm has long-term interest in studying mucosal immunology, innate lymphoid cells and immunometabolism. His scientific focus is to understand how immune cells protect the body's barrier sites such as the lung and gut and to understand how exogenous and endogenous metabolites control barrier immunity in health and disease. The overall aim of this research is to understand the metabolic, nutritional and physiological consequences of westernization on protective immunity and immune-mediated pathologies.

Education / Training

National Institute for Medical Research, London, UK, Immunology, PhD, 2011
University of Munich, Germany, Biology MSc (Diploma), 2007

Postgraduate professional career

2020 - pres.	Associate Professor for Immunopathology, University of Bonn, Germany
2015 - 2020	Assistant Professor for Immunopathology, University of Bonn, Germany
2011- 2015	Postdoctoral Fellow, National Institutes of Health, USA

Honors and awards

2018	Human Frontiers Science Program, Career development award
2015	NRW-Return Program, funding to establish an independent research programme
2014	NIH Fellow Award for Research Excellence
2014	The CIG best paper award, best publication in cytokine research for postdoctoral fellow working at the NIH and FDA
2012	NIH Fellow Award for Research Excellence
2012	Human Frontiers Science Program Postdoctoral fellowship
2007	Medical Research Council (MRC) Ph.D. studentship

Publications (version a)

1. Karagiannis F, Peukert K, Surace L, Michla M, Nikolka F, Fox M, Weiss P, Feuerborn C, Maier P, Schulz S, Al B, Seeliger B, Welte T, David S, Grondman I, de Nooijer AH, Pickkers P, Kleiner JL, Berger MM, Brenner T, Putensen C; Bonn COVIMMUNE Consortium, Kato H, Garbi N, Netea MG, Hiller K, Placek K*, Bode C*#, **Wilhelm C***#. Impaired ketogenesis ties metabolism to T cell dysfunction in COVID-19. ***Nature*** *2022*. *Equal contribution authors, #Corresponding authors
2. Pascal, M, Kazakov, A, Chevalier, G, Dubrule, L, Deyrat, J, Dupin, A, Saha, S, Jagot, F, Sailor, K, Dulauroy, S, Moigneu S, Belkaid Y, Lepousez G*, Lledo PM*, **Wilhelm C***, Eberl G*. The neuropeptide VIP potentiates intestinal innate type 2 and type 3 immunity in response to feeding. ***Mucosal Immunol*** *2022*. *Equal contribution authors.
3. Karagiannis F, Kharabi Masouleh S, Wunderling K, Surendar J, Schmitt V, Kazakov A, Michla M, Hölzel M, Thiele C & **Wilhelm C**. Lipid droplet formation drives pathogenic type 2 innate lymphoid cells in airway inflammation. ***Immunity*** *2020*.
4. Schaupp L, Muth S, Rogell L, Kofoed-Branzk M, Melchior F, Lienenklaus S, Ganal-Vonarburg SC, Klein M, Guendel F, Hain T, Schutze K, Grundmann U, Schmitt V, Dorsch M, Spanier J, Larsen PK, Schwanz T,

Jackel S, Reinhardt C, Bopp T, Danckwardt S, Mahnke K, Heinz GA, Mashreghi MF, Durek P, Kalinke U, Kretz O, Huber TB, Weiss S, **Wilhelm C**, Macpherson AJ, Schild H, Diefenbach A, Probst HC. Microbiota-Induced Type I Interferons Instruct a Poised Basal State of Dendritic Cells. ***Cell*** *2020*.

5. **Wilhelm C***#, Harrison OJ*, Pelletier M, Spencer SP, Urban JF Jr, Ploch M, Ramalingam TR, Siegel R, Belkaid Y#. Critical role of fatty acid metabolism in ILC2 mediated barrier protection during malnutrition and helminth infection. ***J Exp Med*** *2016*. *Equal contribution authors, #Corresponding authors.
6. Naik, S., N. Bouladoux, J.L. Linehan, S.J. Han, O.J. Harrison, C. Wilhelm, S. Conlan, S. Himmelfarb, A.L. Byrd, C. Deming, M. Quinones, J.M. Brenchley, H.H. Kong, R. Tussiwand, K.M. Murphy, M. Merad, J.A. Segre, and Y. Belkaid. Commensal-dendritic-cell interaction specifies a unique protective skin immune signature. ***Nature*** *2015*.
7. **Wilhelm C***, Spencer SP*, Yang Q, Hall JA, Bouladoux N, Boyd A, Nutman TB, Urban JF Jr, Wang J, Ramalingam TR, Bhandoola A, Wynn TA, Belkaid Y. Adaptation of innate lymphoid cells to a micronutrient deficiency promotes type 2 barrier immunity. ***Science*** *2014*. *Equal contribution authors,
8. Naik S, Bouladoux N, **Wilhelm C**, Molloy MJ, Salcedo R, Kastenmuller W, Deming C, Quinones M, Koo L, Conlan S, Spencer S, Hall JA, Dzutsev A, Kong H, Campbell DJ, Trinchieri G, Segre JA, Belkaid Y. Compartmentalized control of skin immunity by resident commensals. ***Science*** *2012*.
9. **Wilhelm C**, Hirota K, Stieglitz B, Van Snick J, Tolaini M, Lahl K, Sparwasser T, Helmby H and Stockinger B. An IL-9 fate reporter demonstrates the induction of an innate IL-9 response in lung inflammation. ***Nature Immunology*** *2011*.
10. Li Y, Innocentin S, Withers DR, Roberts NA, Gallagher AR, Grigorieva EF, **Wilhelm C** and Veldhoen M. Exogenous stimuli maintain intraepithelial lymphocytes via aryl hydrocarbon receptor activation. ***Cell*** *2011*.

Publications (version b)

1. Karagiannis F*, Peukert K*, Surace L*, Michla M, Nikolka F, Fox M, Weiss P, Feuerborn C, Maier P, Schulz S, Al B, Seeliger B, Welte T, David S, Grondman I, de Nooijer AH, Pickkers P, Kleiner JL, Berger MM, Brenner T, Putensen C; Bonn COVIMMUNE Consortium, Kato H, Garbi N, Netea MG, Hiller K, Placek K*, Bode C*#, **Wilhelm C***# (2022). Impaired ketogenesis ties metabolism to T cell dysfunction in COVID-19. ***Nature*** 609, 801–807 (*contributed equally, # corresponding authors).
2. Pascal, M, Kazakov, A, Chevalier, G, Dubrule, L, Deyrat, J, Dupin, A, Saha, S, Jagot, F, Sailor, K, Dulauroy, S, Moigneu S, Belkaid Y, Lepousez G*, Lledo PM*, **Wilhelm C***, Eberl G* (2022). The neuropeptide VIP potentiates intestinal innate type 2 and type 3 immunity in response to feeding. ***Mucosal Immunol*** 15, 629–641. *Equal contribution authors.
3. Karagiannis, F., Masouleh, S.K., Wunderling, K., Surendar, J., Schmitt, V., Kazakov, A., Michla, M., Holzel, M., Thiele, C., and **Wilhelm, C**. (2020). Lipid droplet formation drives pathogenic type 2 innate lymphoid cells in airway inflammation. ***Immunity*** 52, 620-634
4. Schaupp, L., Muth, S., Rogell, L., Kofoed-Branzk, M., Melchior, F., Lienenklaus, S., Ganal-Vonarburg, S.C., Klein, M., Guendel, F., Hain, T., Schutze, K., Grundmann, U., Schmitt, V., Dorsch, M., Spanier, J., Larsen, P.K., Schwanz, T., Jackel, S., Reinhardt, C., Bopp, T., Danckwardt, S., Mahnke, K., Heinz, G.A., Mashreghi, M.F., Durek, P., Kalinke, U., Kretz, O., Huber, T.B., Weiss, S., Wilhelm, C., Macpherson, A.J., Schild, H., Diefenbach, A., Probst, H.C. (2020). Microbiota-Induced Type I Interferons Instruct a Poised Basal State of Dendritic Cells. ***Cell*** 181, 1080-1096.
5. Glodde, N., Bald T., van den Boorn-Konijnenberg, D., Nakamura, K., O'Donnell, J.S., Szczepanski, S., Brandes, M., Eickhoff, S., Das, I., Shridhar, N., Hinze, D., Rogava, M., van der Sluis, T.C., Ruotsalainen, J.J., Gaffal, E., Landsberg, J., Ludwig, K.U., **Wilhelm, C.**, Riek-Burchardt, M., Müller, A.J., Gebhardt, C., Scolyer, R.A., Long, G.V., Janzen, V., Teng, M.W.L., Kastenmüller, W., Mazzone, M., Smyth, M.J., Tüting, T., Hölzel, M. (2017). Reactive Neutrophil Responses Dependent on the Receptor Tyrosine Kinase c-MET Limit Cancer Immunotherapy. ***Immunity*** 47, 789-802.
6. **Wilhelm, C.**, Harrison, O.J., Schmitt, V., Pelletier, M., Spencer, S.P., Urban, J.F., Jr., Ploch, M.,

Ramalingam, T.R., Siegel, R.M., and Belkaid, Y. (2016). Critical role of fatty acid metabolism in ILC2-mediated barrier protection during malnutrition and helminth infection. ***J Exp Med*** 213, 1409-1418.

7. Spencer, S.P., **Wilhelm, C.**, Yang, Q., Hall, J.A., Bouladoux, N., Boyd, A., Nutman, T.B., Urban, J.F., Jr., Wang, J., Ramalingam, T.R., Bhandoola, A., Wynn, T.A., and Belkaid, Y. (2014). Adaptation of innate lymphoid cells to a micronutrient deficiency promotes type 2 barrier immunity. ***Science*** 343, 432-437.
8. Naik, S., Bouladoux, N., **Wilhelm, C.**, Molloy, M.J., Salcedo, R., Kastenmuller, W., Deming, C., Quinones, M., Koo, L., Conlan, S., Spencer, S., Hall, J.A., Dzutsev, A., Kong, H., Campbell, D.J., Trinchieri, G., Segre, J.A., and Belkaid, Y. (2012). Compartmentalized control of skin immunity by resident commensals. ***Science*** 337, 1115-1119.
9. **Wilhelm, C.**, Hirota, K., Stieglitz, B., Van Snick, J., Tolaini, M., Lahl, K., Sparwasser, T., Helmby, H., and Stockinger, B. (2011). An IL-9 fate reporter demonstrates the induction of an innate IL-9 response in lung inflammation. ***Nat Immunol*** 12, 1071-1077.
10. Li, Y., Innocentin, S., Withers, D.R., Roberts, N.A., Gallagher, A.R., Grigorieva, E.F., **Wilhelm, C.**, and Veldhoen, M. (2011). Exogenous stimuli maintain intraepithelial lymphocytes via aryl hydrocarbon receptor activation. ***Cell*** 147, 629-640.