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Scientific career

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|-------------------|--|
| since 03/2023 | Postdoctoral researcher
Department of Gastroenterology, Hepatology, Infectious Diseases and Endocrinology, Hannover Medical School |
| 10/2021 - 02/2023 | parental leave |
| 02/2021 - 09/2021 | Vertretungsprofessor
Zoology and Animal Physiology, TU Dresden |
| 03/2017 - 02/2020 | Principal Investigator
Institute of Physiological Chemistry, TiHo Hannover |
| 10/2015 - 03/2016 | Vertretungsprofessor
Division of General Zoology, TU Kaiserslautern |
| 04/2015 - 09/2015 | Akademischer Rat auf Zeit
Division of General Zoology, TU Kaiserslautern |
| 04/2009 - 03/2015 | Juniorprofessor
Division of Zoology / Membrane Transport, TU Kaiserslautern |
| 01/2009 - 03/2009 | Guest scientist
School of Biochemistry and Molecular Biology
Australian National University, Canberra |
| 07/2005 - 12/2008 | Postdoctoral researcher
Division of General Zoology, TU Kaiserslautern |

Scientific education

- 6/2015 **Habilitation** (*Venia Legendi* for Zoology/Cell physiology)
TU Kaiserslautern
- 01/2002 - 07/2005 **Ph.D. studies**
TU Kaiserslautern
Title of theses: „Funktionelle Interaktionen heterolog exprimierter Säure-/Base-Transporter in den Oozyten von *Xenopus laevis*“
- 04/2002 - 03/2005 **Post-graduate studies in economics for engineers and natural scientists** (Vordiplom)
Fernuniversität in Hagen
- 11/1999 - 07/2001 **Management assistant** (Zusatzausbildung Schlüsselqualifikationen)
Technische Akademie Südwest
- 10/1996 - 11/2001 **Study of Biology** (Diplom)
University of Kaiserslautern

Publications

Original publications in peer review journals

1. Combs J.E., Murray A.B., Lomelino C.L., Mboge M.Y., Mietzsch M., Horenstein N.A., Frost S.C., McKenna R.* & **Becker H.M.*** (2024) Disruption of the Physical Interaction Between Carbonic Anhydrase IX and the Monocarboxylate Transporter 4 Impacts Lactate Transport in Breast Cancer Cells. *Int. J. Mol. Sci.* 25:11994
2. Matulienė J., Žvinys G., Petrauskas V., Kvietkauskaitė A., Zakšauskas A., Shubin K., Zubrienė A., Baranauskienė L., Kačėnauskaitė L., Kopanchuk S., Veiksina S., Paketurytė-Latvė V., Smirnovienė J., Juozapaitienė V., Mickevičiūtė A., Michailovienė V., Jachno J., Stravinskienė D., Sližienė A., Petrošiūtė A., **Becker H.M.**, Kazokaitė-Adomaitienė J., Yaromina A., Čapkauskaitė E., Rinken A., Dudutienė V., Dubois L.J., Matulis D.* (2022) Picomolar fluorescent probes for compound affinity determination to carbonic anhydrase IX expressed in live cancer cells. *Sci. Rep.* 12(1):17644
3. Hertenstein H., McMullen E., Weiler A., Volkenhoff A., **Becker H.M.** & Schirmeier S.* (2021) Starvation-induced regulation of carbohydrate transport at the blood-brain barrier is TGF- β -signaling dependent. *eLife* 10:e62503
4. McMullen E. Weiler A., **Becker H.M.** & Schirmier S.* (2021) Plasticity of Carbohydrate Transport at the Blood-Brain Barrier. *Front. Behav. Neurosci.* 14:612430
5. Ames S., Andring J.T., McKenna R. & **Becker H.M.*** (2019) CAIX forms a transport metabolon with monocarboxylate transporters in human breast cancer cells. *Oncogene* 39:1710-1723

6. Renner K.*, Bruss C., Schnell A., Koehl G., **Becker H.M.**, Fante M., Menevse A.N., Kauer N., Blazquez R., Hacker L., Decking S.M., Bohn T., Faerber S., Evert K., Aigle L., Amslinger S., Landa M., Krijgsman O., Rozeman E.A., Brummer C., Siska P.J., Singer K., Pektor S., Miederer M., Peter K., Gottfried E., Herr W., Marchiq I., Pouyssegur J., Roush W.R., Ong S., Warren S., Pukrop T., Beckhove P., Lang S.A., Bopp T., Blank C.U., Cleveland J.L., Oefner P.J., Dettmer K., Selby M., Kreutz M. (2019) Restricting Glycolysis Preserves T Cell Effector Functions and Augments Checkpoint Therapy. *Cell Rep.* 29:135-150
7. Aspatwar A., Tolvanen M.E.E.*, Schneider H.-P., **Becker H.M.**, Narkilahti S., Parkkila S. & Deitmer J.W. (2019) Catalytically-inactive carbonic anhydrase-related proteins enhance transport of lactate by MCT1. *FEBS Open Bio* 9:1204-1211
8. Forero-Quintero L.S., Ames S., Schneider H.-P., Thyssen A., Boone C.D., Andring J., McKenna R., Casey J.R., Deitmer J.W. & **Becker H.M.*** (2018) Membrane-anchored carbonic anhydrase IV interacts with monocarboxylate transporters via their chaperones CD147 and GP70. *J. Biol. Chem.* 294:593-607
9. Hiremath S.A., Jamali S., Ames S., Deitmer J.W., Surulescu C. & **Becker H.M.*** (2018) Modeling of pH regulation in tumor cells: Direct interaction between proton-coupled lactate transporters and cancer-associated carbonic anhydrase. *Math. Biosci. Eng.* 16:320-337
10. O'Rourke K.M., Johnstone E.S., **Becker H.M.**, Pimlott S.L. & Sutherland A.* (2018) Exploring the functionalisation of the thieno[2,3-d]pyrimidinedione core: Late stage access to highly substituted 5-carboxamide-6-aryl scaffolds. *Tetrahedron* 74:4086-4094
11. Aspatwar A.*, **Becker H.M.**, Parvathaneni N.K., Hammaren M., Svorjova A., Barker H., Supuran C.T., Dubois L., Lambin P., Parikka M., Parkkila S. & Winum J.-Y. (2018) Nitroimidazole based inhibitors DTP338 and DTP348 are safe for zebrafish embryos and efficiently inhibit the activity of human CA IX in *Xenopus* oocytes. *J. Enzyme. Inhib. Med. Chem.* 33:1064-1073
12. Noor S.I., Jamali S., Ames S., Langer S., Deitmer J.W. & **Becker H.M.*** (2018) A surface proton antenna in carbonic anhydrase II supports lactate transport in cancer cells. *eLife* 7:35176
13. Ames S., Pastoreková S. & **Becker H.M.*** (2018) The proteoglycan-like domain of carbonic anhydrase IX mediates non-catalytic facilitation of lactate transport in cancer cells. *Oncotarget* 9:27940-27957
14. Kazokaitė J., Niemans R., Dudutienė V., **Becker H.M.**, Leitāns J., Zubrienė A., Baranauskienė L., Gondi G., Zeidler R., Matulienė J., Tārs K., Yaromina A., Lambin P., Dubois L.J. & Matulis D.* (2018) Novel fluorinated carbonic anhydrase IX inhibitors reduce hypoxia-induced acidification and clonogenic survival of cancer cells. *Oncotarget* 9:26800-26816
15. Corbet C.*, Bastien E., Draoui N, Doix B., Mignon L., Jordan B.F., Marchand A., Vanherck J.-C., Chaltin P., Schakman O., **Becker H.M.**, Riant O. & Feron O.* (2018) Interruption of lactate uptake by inhibiting mitochondrial pyruvate transport unravels direct antitumor and radiosensitizing effects. *Nat. Commun.* 9:1208
16. Silva L.S., Poschet G., Nonnenmacher Y., **Becker H.M.**, Sapcariu S., Gaupel A.-C., Schlotter M., Wu Y., Kneisel N., Seiffert M., Hell R., Hiller K., Lichter P. & Radlwimmer

- B.* (2017) Branched-chain ketoacids secreted by glioblastoma cells via MCT1 modulate macrophage phenotype. *EMBO Rep.* 18:2172-2185
17. Forero-Quintero L.S., Deitmer J.W. & **Becker H.M.*** (2017) Reduction of epileptiform activity in ketogenic mice: The role of monocarboxylate transporters. *Sci. Rep.* 7:4900
 18. Noor S.I., Pouyssegur J., Deitmer J.W. & **Becker H.M.*** (2016) Integration of a 'proton antenna' facilitates transport activity of the monocarboxylate transporter MCT4. *FEBS J.* 284:149-162
 19. Kazokaite J., Ames S., **Becker H.M.**, Deitmer J.W. & Matulis D.* (2016) Selective inhibition of human carbonic anhydrase IX in *Xenopus* oocytes and MDA-MB-231 breast cancer cells. *J. Enzyme. Inhib. Med. Chem.* 31:38-44
 20. Klier M., Jamali S., Ames S., Schneider H.-P., **Becker H.M.** & Deitmer J.W.* (2016) Catalytic activity of human carbonic anhydrase isoform IX is displayed extra- and intracellularly. *FEBS J.* 283:191-200
 21. Jamali S., Klier M., Ames S., Barros L.F., McKenna R., Deitmer J.W. & **Becker H.M.*** (2015) Hypoxia-induced carbonic anhydrase IX facilitates lactate flux in human breast cancer cells by non-catalytic function. *Sci. Rep.* 5:13605
 22. Wandernoth P.M., Mannowetz N., Szczyrba J., Grannemann L., Wolf A., **Becker H.M.**, Sly W.S. & Wennemuth G.* (2015) Title: Normal Fertility Requires Expression of Carbonic Anhydrases II and IV in Sperm. *J. Biol. Chem.* 290:29202-16
 23. Noor I.S., Dietz S., Heidtmann S., Boone C.D., McKenna R., Deitmer J.W. & **Becker H.M.*** (2015) Analysis of the Binding Moiety mediating the Interaction between Monocarboxylate Transporters and Carbonic Anhydrase II. *J. Biol. Chem.* 290:4476-86
 24. Valdebenito R., Ruminot I., Garrido-Gerter P., Fernández-Moncada I., Forero-Quintero L., Alegría K., **Becker H.M.**, Deitmer J.W. & Barros L.F.* (2015) Targeting of astrocytic glucose metabolism by beta-hydroxybutyrate. *J. Cereb. Blood Flow Metab.* 36:1813-1822
 25. Heidtmann H., Ruminot I., **Becker H.M.** & Deitmer J.W.* (2015) Inhibition of monocarboxylate transporter by N-cyanosulphonamide S0859. *Eur. J. Pharmacol.* 5:344-9
 26. Peetz J., Barros L.F., San Martín A. & **Becker H.M.*** (2014) Functional interaction between bicarbonate transporters and carbonic anhydrase modulates lactate uptake into mouse cardiomyocytes. *Pflügers Arch.* 467:1469-80
 27. Klier M., Andes F., Deitmer J.W. & **Becker H.M.*** (2013) Intracellular and Extracellular Carbonic Anhydrases Cooperate Non-Enzymatically to Enhance Activity of Monocarboxylate Transporters. *J. Biol. Chem.* 289:2765-75
 28. Bonar P., Schneider H.-P., **Becker H.M.**, Deitmer J.W. & Casey J.R.* (2013) Three-Dimensional Model for the Human $\text{Cl}^-/\text{HCO}_3^-$ Exchanger, AE1, by Homology to the *E. coli* CIC Protein. *J. Mol. Biol.* 425:2591-608
 29. Schneider H.-P., Alt M.D., Klier M., Spiess A., Andes F.T., Waheed A., Sly W.S., **Becker H.M.** & Deitmer J.W.* (2013) Carbonic anhydrase isoform IV displays extra- and intracellular catalytic activity both in cRNA-injected oocytes and in mouse neurons. *Proc. Natl. Acad. Sci. U. S. A.* 110:1494-9

30. Stridh M.H., Alt M.D., Wittmann S., Heidtmann H., Aggarwal M., Riederer B., Seidler U., Wennemuth G., McKenna R., Deitmer J.W. & **Becker H.M.*** (2012) Lactate flux in astrocytes is enhanced by a non-catalytic action of carbonic anhydrase II. *J Physiol.* 590:2333-51
31. Schüler C., **Becker H.M.**, McKenna R. & Deitmer J.W.* (2011) Transport Activity of the Sodium Bicarbonate Cotransporter NBCe1 Is Enhanced by Different Isoforms of Carbonic Anhydrase. *PLoS One* 6:e27167
32. Klier M., Schüler C., Halestrap A.P., Sly W.S., Deitmer J.W. & **Becker H.M.*** (2011) Transport Activity of the High-affinity Monocarboxylate Transporter MCT2 Is Enhanced by Extracellular Carbonic Anhydrase IV but Not by Intracellular Carbonic Anhydrase II. *J. Biol. Chem.* 286:27781-27791
33. **Becker H.M.***, Klier M., Schüler C., McKenna R. & Deitmer J.W. (2011) Intramolecular proton shuttle supports not only catalytic but also noncatalytic function of carbonic anhydrase II. *Proc. Natl. Acad. Sci. U. S. A.* 108:3071-6
34. Wandernoth P.M., Raubuch M., Mannowetz N., **Becker H.M.**, Deitmer J.W., Sly W.S. & Wennemuth G.* (2010) Role of carbonic anhydrase IV in the bicarbonate-mediated activation of murine and human sperm. *PLoS One* 5:e15061
35. **Becker H.M.***, Klier M. & Deitmer J.W. (2010) Nonenzymatic augmentation of lactate transport via monocarboxylate transporter isoform 4 by carbonic anhydrase II. *J. Membr. Biol.* 232:125-135
36. **Becker H.M.*** & Deitmer J.W. (2008) Non-enzymatic proton handling by carbonic anhydrase II during H⁺-lactate cotransport via monocarboxylate transporter 1. *J. Biol. Chem.* 283:21655-21667
37. Wendel C., **Becker H.M.** & Deitmer J.W.* (2008) The sodium-bicarbonate cotransporter NBCe1 supports glutamine efflux via SNAT3 (SLC38A3) co-expressed in *Xenopus* oocytes. *Pflügers Arch.* 455:885-93
38. Weise A., **Becker H.M.** & Deitmer J.W.* (2007) Enzymatic suppression of the membrane conductance associated with the glutamine transporter SNAT3 expressed in *Xenopus* oocytes by carbonic anhydrase II. *J. Gen. Physiol.* 130:203-15
39. **Becker H.M.*** & Deitmer J.W. (2007) Carbonic anhydrase II increases the activity of the human electrogenic Na⁺/HCO₃⁻ cotransporter. *J. Biol. Chem.* 282:13508-21
40. **Becker H.M.**, Hirnet D., Fecher-Trost C., Sültemeyer D. & Deitmer J.W.* (2005) Transport activity of MCT1 expressed in *Xenopus* oocytes is increased by interaction with carbonic anhydrase. *J. Biol. Chem.* 280:39882-39889
41. **Becker H.M.** & Deitmer J.W.* (2004) Voltage dependence of H⁺ buffering mediated by sodium bicarbonate cotransport expressed in *Xenopus* oocytes. *J. Biol. Chem.* 279:28057-62
42. **Becker H.M.**, Bröer S. & Deitmer J.W.* (2004) Facilitated lactate transport by MCT1 when coexpressed with the sodium bicarbonate cotransporter (NBC) in *Xenopus* oocytes. *Biophys. J.* 86:235-247

Review articles in peer review journals

1. **Becker H.M.** & Seidler U.* (2024) Bicarbonate secretion and acid/base sensing by the intestine. *Eur. J. Physiol.* 476:593-610
2. **Becker H.M.*** & Deitmer J.W. (2021) Proton Transport in Cancer Cells: The Role of Carbonic Anhydrases. *Int. J. Mol. Sci.* 22:317 *Invited Review*
3. **Becker H.M.*** & Deitmer J.W. (2020) Transport Metabolons and Acid/Base Balance in Tumor Cells. *Cancers* 12:E899 *Invited Review*
4. Kazokaitė-Adomaitienė J., **Becker H.M.**, Smirnovienė J., Dubois L.J., Matulis D.* (2020) Experimental approaches to identify selective picomolar inhibitors for carbonic anhydrase IX. *Curr. Med. Chem.* 28:3361-3384
5. Deitmer J.W.*, Theparambil M.S, Ruminot I., Noor S.I. & **Becker H.M.** (2019) Energy dynamics in the brain: Contributions of astrocytes to metabolism and pH homeostasis. *Front. Neurosci.* 13:1301 *Invited Review*
6. **Becker H.M.*** (2019) Carbonic Anhydrase IX and acid transport in cancer. *Br. J. Cancer* 122:157-167 *Invited Review*
7. Deitmer J.W.*, Theparambil M.S., Ruminot I. & **Becker H.M.** (2017) Our hungry brain: Which role do glial cells play for the energy supply? *Neuroforum* 23:A1-A8. *Invited Review*
8. Deitmer J.W.*, Theparambil S.M., Ruminot I. & **Becker H.M.** (2015) The role of membrane acid/base transporters and carbonic anhydrases for cellular pH and metabolic processes. *Front. Neurosci.* 8:430. *Invited Review*
9. Deitmer J.W.* & **Becker H.M.** (2013) Transport metabolons with carbonic anhydrases. *Front. Physiol.* 4:291. *Invited Review*

Book chapter and articles in non-peer review journals

1. Kazokaitė J., **Becker H.M.**, Barker H.R., Aspatwar A., Parkkila S., Dubois L.J. & Matulis D.* (2019) Efficacy of Novel CA IX Inhibitors in Biological Models. In Carbonic Anhydrase as Drug Target, (Cham: Springer International Publishing), pp. 265-287. *Invited Review.*
2. Hemme D., Surulescu C., **Becker H.M.**, Deitmer J.W., Mühlhaus T., Garth C. & Schroda M.* (2015) BioComp - complex data analysis in sciences and biotechnology. *Systembiologie.de* 9:68-71
3. **Becker H.M.*** (2014) Transport of lactate: Characterization of the transporters involved in transport at the plasma membrane by heterologous protein expression in *Xenopus* oocytes. In: Hirrlinger J., Waagepetersen H. (eds) *Neuromethods: Brain Energy Metabolism*, 90, Springer. *Invited Review*
4. **Becker H.M.***, Klier M. & Deitmer J.W. (2014) Carbonic Anhydrase and their Interplay with acid/base-coupled Transporters. In: Frost S.C., McKenna R. (eds) *Sub-cellular biochemistry*. Springer Netherlands, Dordrecht, pp 105-34. *Invited Review*