

# Publications

Battista M, Hoffmann B, Bachelot Y, Zimmermann L, Teuber L, Jost A, Linde S, Westermann M, Müller MM, Slevogt H, Hammerschmidt S, Figge MT, Vilhena C<sup>\*#</sup>, Zipfel PF<sup>\*#</sup> (2023) The role of pneumococcal extracellular vesicles on the pathophysiology of the kidney disease hemolytic uremic syndrome. *mSphere* 8(4), e0014223.

Busch C, Rau S, Sekulic A, Perie L, Huber C, Gehrke M, Jousen AM, Zipfel PF, Wildner G, Skerka C, Strauß O (2023) Increased plasma level of terminal complement complex in AMD patients: potential functional consequences for RPE cells. *Front Immunol* 14, 1200725.

Daud M, Dasari P, Adelfinger M, Langenhorst D, Lothar J, Slavkovic-Lukic D, Berges C, Kruhm M, Galler A, Schleussner C, Luther CH, Alberter K, Althammer A, Shaikh H, Pallmann N, Bodem J, El-Mowafy M, Beilhack A, Dittrich M, Topp MS, Zipfel PF, Beyersdorf N (2023) Enolase 1 of *Candida albicans* binds human CD4<sup>+</sup> T cells and modulates naïve and memory responses. *Eur J Immunol* 53(11), e2250284.

Langenhorst D, Fürst AL, Alberter K, Vilhena C, Dasari P, Daud M, Heilig L, Luther CH, Dittrich M, Reiher N, Wich M, Elmowafy M, Jacobsen ID, Jungnickel B, Zipfel PF<sup>\*</sup>, Beyersdorf N<sup>\*#</sup> (2023) Soluble enolase 1 of *Candida albicans* and *Aspergillus fumigatus* stimulates human and mouse B cells and monocytes. *J Immunol* 211(5), 804-815.

Lin L, Wang M, Zeng J, Mao Y, Qin R, Deng J, Ouyang X, Hou X, Sun C, Wang Y, Cai Y, Li M, Tian C, Zhou X, Zhang M, Fan H, Mei H, Sarapultsev A, Wang H, Zhang G, Zipfel PF, Hu Y, Hu D, Luo S (2023) Sequence variation of *Candida albicans* Sap2 enhances fungal pathogenicity via complement evasion and macrophage M2-like phenotype induction. *Adv Sci (Weinh)* 10(20), e2206713.

Noriega M, Husain-Syed F, Wulf S, Csala B, Krebs CF, Jabs W, Zipfel PF, Gröne HJ, Wiech T (2023) Kidney biopsy findings in patients with SARS-CoV-2 infection or after COVID-19 vaccination. *Clin J Am Soc Nephrol* 18(5), 613-625.

Seifert L, Zahner G, Meyer-Schwesinger C, Hickstein N, Dehde S, Wulf S, Köllner SMS, Lucas R, Kylies D, Froembling S, Zielinski S, Kretz O, Borodovsky A, Biniaminov S, Wang Y, Cheng H, Koch-Nolte F, Zipfel PF, Hopfer H, Puelles VG, Panzer U, Huber TB, Wiech T, Tomas NM (2023) The classical pathway triggers pathogenic complement activation in membranous nephropathy. *Nat Commun* 14(1), 473.

Vilhena C, Du S, Battista M, Westermann M, Kohler T, Hammerschmidt S, Zipfel PF (2023) The choline-binding proteins PspA, PspC, and LytA of *Streptococcus pneumoniae* and their interaction with human endothelial and red blood cells. *Infect Immun* 91(9), e0015423.

Zipfel PF, Zipfel S, Wiech T (2023) [Role of Complement in Kidney Diseases - New Aspects]. *Dtsch Med Wochenschr* 148(12), 774-779.

Chen LY, Schirmer U, Widder M, Gruel Y, Rollin J, Zipfel PF, Nguyen TH (2022) Breast cancer cell-based ELISA: a potential material for better detection of heparin-induced thrombocytopenia antibodies. *J Mater Chem B* 10(38), 7708-7716.

Halder LD, Babych S, Palme DI, Mansouri-Ghahnavieh E, Ivanov L, Ashonibare V, Langenhorst D, Prusty B, Rambach G, Wich M, Trinks N, Blango MG, Kornitzer D, Terpitz U, Speth C, Jungnickel

B, Beyersdorf N, Zipfel PF, Brakhage AA, Skerka C (2022) *Candida albicans* induces cross-kingdom miRNA trafficking in human monocytes to promote fungal growth. *mBio* 13(1), e0356321.

Ruiz-Molina N, Parsons J, Müller M, Hoernstein SNW, Bohlender LL, Pumple S, Zipfel PF, Häffner K, Reski R, Decker EL (2022) A synthetic protein as efficient multitarget regulator against complement over-activation. *Commun Biol* 5(1), 152.

Schmidt T, Afonso S, Perie L, Heidenreich K, Wulf S, Krebs CF, Zipfel PF, Wiech T (2022) An interdisciplinary diagnostic approach to guide therapy in C3 glomerulopathy. *Front Immunol* 13, 826513.

Shahraz A, Lin Y, Mbroh J, Winkler J, Liao H, Lackmann M, Bungartz A, Zipfel PF, Skerka C, Neumann H (2022) Low molecular weight polysialic acid binds to properdin and reduces the activity of the alternative complement pathway. *Sci Rep* 12(1), 5818.

Stea ED, Skerka C, Accetturo M, Pesce F, Wiech T, Hartmann A, Pontrelli P, Castellano G, Zipfel PF, Gesualdo L (2022) Novel FHR2 variants in atypical haemolytic uremic syndrome: a case study of translational medicine approach in renal transplantation. *Front Immunol* 13, 1008294.

Wendt R, Siwy J, He T, Latosinska A, Wiech T, Zipfel PF, Tserga A, Vlahou A, Rupprecht H, Catanese L, Mischak H, Beige J (2022) Molecular mapping of urinary complement peptides in kidney diseases. *Proteomes* 9(4), 49.

Wiech T, Reinhard L, Wulf S, Giuffrida AE, Longhitano E, Caruso R, Gröne HJ, Stahl RAK, Zipfel PF, Kikhney J, Moter A, Hoxha E, Santoro D (2022) Bacterial infection possibly causing autoimmunity: *Tropheryma whippelii* and membranous nephropathy. *Lancet* 400(10366), 1882-1883.

Zipfel PF, Skerka C (2022) From magic bullets to modern therapeutics: Paul Ehrlich, the German immunobiologist and physician who coined the term 'Complement'. *Mol Immunol* 150, 90-98. (Review)

Dasari P, Nordengrün M, Vilhena C, Steil L, Abdurrahman G, Surmann K, Dhople V, Lahrberg J, Bachert C, Skerka C, Völker U, Bröker BM, Zipfel PF (2021) The protease SplB of *Staphylococcus aureus* targets host complement components and inhibits complement-mediated bacterial opsonophagocytosis. *J Bacteriol* 204(1), e0018421.

Du S, Vilhena C, King S, Sahagún-Ruiz A, Hammerschmidt S, Skerka C, Zipfel PF (2021) Molecular analyses identifies new domains and structural differences among *Streptococcus pneumoniae* immune evasion proteins PspC and Hic. *Sci Rep* 11(1), 1701.

Irmscher S, Zipfel SLH, Halder LD, Ivanov L, Gonzalez-Delgado A, Waldeyer C, Seiffert M, Brunner FJ, von der Heide M, Löschmann I, Wulf S, Czamara D, Papac-Milicevic N, Strauß O, Lorkowski S, Reichenspurner H, Holers MV, Banda NK, Zeller T, Binder EB, Binder CJ, Wiech T, Zipfel PF, Skerka C (2021) Factor H-related protein 1 (FHR-1) is associated with atherosclerotic cardiovascular disease. *Sci Rep* 11(1), 22511.

Zipfel PF, Wiech T, Gröne HJ, Skerka C (2021) Complement catalyzing glomerular diseases. *Cell Tissue Res* 385(2), 355-370. (Review)

Alic L, Papac-Milicevic N, Czamara D, Rudnick RB, Ozsvar-Kozma M, Hartmann A, Gurbisz M,

Hoermann G, Haslinger-Hutter S, Zipfel PF, Skerka C, Binder EB, Binder CJ (2020) A genome-wide association study identifies key modulators of complement factor h binding to malondialdehyde-epitopes. *Proc Nat Acad Sci USA* 117(18), 9942-9951.

Hackl A, Erger F, Skerka C, Wenzel A, Tschernoster N, Ehren R, Burgmaier K, Riehmer V, Kirschfink M, Weber IT, Altmueller J, Zipfel PF, Habbig S (2020) Long-term data on two sisters with C3GN due to an identical, homozygous CFH mutation and autoantibodies. *Clini Nephrol* 94(4), 197-206.

Halder LD, Jo EAH, Hasan MZ, Ferreira-Gomes M, Krüger T, Westermann M, Palme DI, Rambach G, Beyersdorf N, Speth C, Jacobsen ID, Kniemeyer O, Jungnickel B, Zipfel PF, Skerka C (2020) Immune modulation by complement receptor 3-dependent human monocyte TGF- $\beta$ 1-transporting vesicles. *Nat Commun* 11(1), 2331.

Luo S, Hu D, Wang M, Zipfel PF, Hu Y (2020) Complement in hemolysis and thrombosis-related diseases. *Front Immunol* 11, 1212. (Review)

Luo S, Wang M, Hu D, Zipfel PF, Hu Y (2020) How does complement affect hematological malignancies: From basic mechanisms to clinical application. *Front Immunol* 11, 593610. (Review)

Person F, Petschull T, Wulf S, Buescheck F, Biniaminov S, Fehrle W, Oh J, Skerka C, Zipfel PF, Wiech T (2020) *In situ* visualization of C3/C5 convertases to differentiate complement activation. *Kidney Int Rep* 5(6), 927-930.

Reiss T, Theis HI, Gonzalez-Delgado A, Vega-Rodriguez J, Zipfel PF, Skerka C, Pradel G (2020) Acquisition of human plasminogen facilitates complement evasion by the malaria parasite *Plasmodium falciparum*. *Eur J Immunol* 51(2), 490-493.

Shopova IA, Belyaev I, Dasari P, Jahreis S, Stroe MC, Cseresnyés Z, Zimmermann AK, Medyukhina A, Svensson C-M, Krüger T, Szeifert V, Nietzsche S, Conrad T, Blango MG, Kniemeyer O, von Lilienfeld-Toal M, Zipfel PF, Ligeti E, Figge MT, Brakhage AA (2020) Human neutrophils produce antifungal extracellular vesicles against *Aspergillus fumigatus*. *mBio* 11(2), e00596-20.

Skerka C, Pradel G, Zipfel PF, Zipfel SLH, Strauß O (2020) Factor H-related protein 1: A complement protein and guardian of necrotic type surfaces. *Br J Pharmacol* [Epub ahead of print] (Review)

Tille A, Lehnert T, Zipfel PF, Figge MT (2020) Quantification of factor H mediated self versus non-self discrimination by mathematical modeling. *Front Immunol* 11, 1911.

Zipfel PF, Wiech T, Stea ED, Skerka C (2020) CFHR gene variations provide insights in the pathogenesis of the kidney diseases atypical hemolytic uremic syndrome and C3 glomerulopathy. *J Am Soc Nephrol* 31(2), 241-256. (Review)

Dasari P, Koleci N, Shopova I, Wartenberg D, Beyersdorf N, Dietrich S, Sahagun-Ruiz A, Figge MT, Skerka C, Brakhage AA, Zipfel PF (2019) Enolase from *Aspergillus fumigatus* is a moonlighting and immune evasion protein that binds the human plasma complement proteins factor H, FHL-1, C4BP, and plasminogen. *Front Immunol* 10, 2573.

Irmscher S, Brix SR, Zipfel SLH, Halder LD, Mutlutürk S, Wulf S, Girdaukas E, Reichenspurner H,

Stahl RAK, Jungnickel B, Wiech T, Zipfel PF, Skerka C (2019) Serum FHR1 binding to necrotic-type cells activates monocyctic inflammasome and marks necrotic sites in vasculopathies. *Nat Commun* 10(1), 2961.

Klaile E, Müller MM, Zubiría-Barrera C, Brehme S, Klassert TE, Stock M, Durotin A, Nguyen TD, Feer S, Singer BB, Zipfel PF, Rudolphi S, Jacobsen ID, Slevogt H (2019) Unaltered fungal burden and ethality in human CEACAM1-transgenic mice during *Candida albicans* dissemination and systemic infection. *Front Microbiol* 10, 2703.

Lang SN, Germerodt S, Glock C, Skerka C, Zipfel PF, Schuster S (2019) Molecular crypsis by pathogenic fungi using human factor H. *PLOS One* 14(2), e0212187.

Person F, Rinschen MM, Brix SR, Wulf S, Noriega MLM, Fehrle W, Schmitz J, Schwarz A, Ivanyi P, Steinmetz OM, Reinhard L, Hoxha E, Zipfel PF, Bräsen JH, Wiech T (2019) Bevacizumab-associated glomerular microangiopathy. *Mod Pathol* 32(5), 684-700.

Person F, Zipfel PF, Wiech T (2019) Thrombotische Mikroangiopathie: Was gibt es Neues? *Der Nephrologe* 14(1), 26-31. (Review)

Röttgerding F, Wagemakers A, Koetsveld J, Fingerle V, Kirschfink M, Hovius JW, Zipfel PF, Wallich R, Kraiczy P (2019) Author Correction: Immune evasion of *Borrelia miyamotoi*: CbiA, a novel outer surface protein exhibiting complement binding and inactivating properties. *Sci Rep* 9(1), 7056.

Schaumburg F, Witten A, Flamen A, Stoll M, Alabi AS, Kremsner PG, Löffler B, Zipfel PF, Velavan TP, Peters G (2019) Complement 5a receptor polymorphisms are associated with PVL-positive *Staphylococcus aureus* colonization in African Pygmies. *Clin Infec Dis* 68(5), 854-856.

Smith RJH, Appel GB, Blom AM, Cook HT, D'Agati VD, Fakhouri F, Fremeaux-Bacchi V, Józsi M, Kavanagh D, Lambris JD, Noris M, Pickering MC, Remuzzi G, de Córdoba SR, Sethi S, Van der Vlag J, Zipfel PF, Nester CM (2019) C3 glomerulopathy – Understanding a rare complement-driven renal disease. *Nat Rev Nephrol* 15(3), 129-143. (Review)

Top O, Parsons J, Bohlender LL, Michelfelder S, Kopp P, Busch-Steenberg C, Hoernstein SNW, Zipfel PF, Häffner K, Reski R, Decker EL (2019) Recombinant production of MFHR1, a novel synthetic multitarget complement inhibitor, in moss bioreactors. *Front Plant Sc* 10, 260.

Walter L, Sürth V, Röttgerding F, Zipfel PF, Fritz-Wolf K, Kraiczy P (2019) Elucidating the immune evasion mechanisms of *Borrelia mayonii*, the causative agent of lyme disease. *Front Immunol* 10, 2722.

Yin C, Ackermann S, Ma Z, Mohanta SK, Zhang C, Li Y, Nietzsche S, Westermann M, Peng L, Hu D, Bontha SV, Sriakulapu P, Beer M, Megens RTA, Steffens S, Hildner M, Halder LD, Eckstein HH, Pelisek J, Herms J, Roeber S, Arzberger T, Borodovsky A, Habenicht L, Binder CJ, Weber C, Zipfel PF, Skerka C, Habenicht AJR (2019) ApoE attenuates unresolvable inflammation by complex formation with activated C1q. *Nat Med* 25(3), 496-506.

Zecher D, Banas B, Büttner-Herold M, Kirschfink M, Zipfel PF (2019) The Case: A 78-year-old woman with acute kidney injury and hemolytic anemia. *Kidney Int* 95(2), 473-474.

Zhao F, Afonso S, Lindner S, Hartmann A, Löschmann I, Nilsson B, Ekdahl KN, Weber LT, Habbig S, Schalk G, Kirschfink M, Zipfel PF, Skerka C (2019) C3-glomerulopathy autoantibodies

mediate distinct effects on complement C3- and C5-convertases. *Front Immunol* 10, 1030.

Zipfel PF, Wiech T, Rudnick R, Afonso S, Person F, Skerka C (2019) Complement inhibitors in clinical trials for glomerular diseases. *Front Immunol* 10, 2166. (Review)

Dasari P, Shopova IA, Stroe M, Wartenberg D, Dahse HM, Beyersdorf N, Hortschansky P, Dietrich S, Cseresnyés Z, Figge MT, Westermann M, Skerka C, Brakhage AA, Zipfel PF (2018) Aspf2 from *Aspergillus fumigatus* recruits human immune regulators for immune evasion and cell damage. *Front Immunol* 9, 1635.

Dennhardt S, Pirschel W, Wissuwa B, Daniel C, Gunzer F, Lindig S, Medyukhina A, Kiehntopf M, Rudolph WW, Zipfel PF, Gunzer M, Figge MT, Amman K, Coldewey S (2018) Modeling hemolytic-uremic syndrome: In-depth characterization of distinct murine models reflecting different features of human disease. *Front Immunol* 9, 1459.

Hummert S, Glock C, Lang SN, Hummert C, Skerka C, Zipfel PF, Germerodt S, Schuster S (2018) Playing 'hide-and-seek' with factor H: game-theoretical analysis of a single nucleotide polymorphism. *J R Soc Interface* 15(142), 20170963.

Irmscher S, Döring N, Halder LD, Jo EAH, Kopka I, Dunker C, Jacobsen ID, Luo S, Slevogt H, Lorkowski S, Beyersdorf N, Zipfel PF, Skerka C (2018) Kallikrein cleaves C3 and activates complement. *J Innate Immun* 10(2), 94-105.

Luo S, Dasari P, Reiher N, Hartmann A, Jacksch S, Wende E, Barz D, Niemiec MJ, Jacobsen I, Beyersdorf N, Hünig T, Klos A, Skerka C, Zipfel PF (2018) The secreted *Candida albicans* protein Pra1 disrupts host defense by broadly targeting and blocking complement C3 and C3 activation fragments. *Mol Immunol* 93, 266-277.

Meinel C, Spartà G, Dahse HM, Hörhold F, König R, Westermann M, Cseresnyés Z, Coldewey SM, Figge MT, Hammerschmidt S, Skerka C, Zipfel PF (2018) *Streptococcus pneumoniae* from patients with hemolytic uremic syndrome binds human plasminogen via the surface protein PspC and uses plasmin to damage human endothelial cells. *J Infect Dis* 217(3), 358-370.

Michelfelder S, Fischer F, Wäldin A, Hörle K, Pohl M, Parsons J, Reski R, Decker EL, Zipfel PF, Skerka C, Häffner K (2018) The MFHR1 fusion protein is a novel synthetic multitarget complement inhibitor with therapeutic potential. *J Am Soc Nephrol* 29(4), 1141-1153.

Pujol-Lereis LM, Liebisch G, Schick T, Lin Y, Grassmann F, Uchida K, Zipfel PF, Fauser S, Skerka C, Weber BHF (2018) Evaluation of serum sphingolipids and the influence of genetic risk factors in age-related macular degeneration. *PLOS One* 13(8), e0200739.

Reiss T, Rosa TFA, Blaesius K, Bobbert RP, Zipfel PF, Skerka C, Pradel G (2018) FHR-1 binding impairs factor H-mediated complement evasion by the malaria parasite *Plasmodium falciparum*. *J Immunol* 201(12), 3497-3502.

Rudnick RB, Chen Q, Stea ED, Hartmann A, Papac-Milicevic N, Person F, Wiesener M, Binder CJ, Wiech T, Skerka C, Zipfel PF (2018) FHR5 binds to laminins, uses separate C3b and surface-binding sites, and activates complement on malondialdehyde-acetaldehyde surfaces. *J Immunol* 200(7), 2280-2290.

Spartà G, Gaspert A, Neuhaus TJ, Weitz M, Mohebbi N, Odermatt U, Zipfel PF, Bergmann C, Laube GF (2018) Membranoproliferative glomerulonephritis and C3 glomerulopathy in children:

Change in treatment modality? A report on a case series. *Clin Kidney J* 11(4), 479-490.

Zipfel PF, Luo S, Dasari P, Reiher N, Jacobsen I, Beyersdorf N, Klos A, Serka C (2018) Reply to kang and brooks: Comment on the interpretation of binding of Pra1, the fungal immune evasion protein from *Candida albicans* to the human C3 and on the conformational changes of C3 upon activation: Kang and brooks optimization of biolayer-interfero. *Mol Immunol* 101, 638-639.

Bergfeld A, Dasari P, Werner S, Hughes TR, Song WC, Hortschansky P, Brakhage AA, Hünig T, Zipfel PF, Beyersdorf N (2017) Direct Binding of the pH-Regulated Protein 1 (Pra1) from *Candida albicans* Inhibits Cytokine Secretion by Mouse CD4(+) T Cells. *Front Microbiol* 8, 844.

Busch C, Annamalai B, Abdusalamova K, Reichhart N, Huber C, Lin Y, JAH, Zipfel PF, Skerka C, Wildner G, Diedrichs-Möhring M, Rohrer B, Strauß O (2017) Anaphylatoxins Activate Ca<sup>2+</sup>, Akt/PI3-Kinase, and FOXO1/FoxP3 in the Retinal Pigment Epithelium. *Front Immunol* 8, 703.

Goodship TH, Cook HT, Fakhouri F, Fervenza FC, Frémeaux-Bacchi V, Kavanagh D, Nester CM, Noris M, Pickering MC, Rodríguez de Córdoba S, Roumenina LT, Sethi S, Smith RJ; Conference Participants (2017) Atypical hemolytic uremic syndrome and C3 glomerulopathy: conclusions from a "Kidney Disease: Improving Global Outcomes" (KDIGO) *Kidney Int* 91(3), 539-551.

Hackl A, Ehren R, Kirschfink M, Zipfel PF, Beck BB, Weber LT, Habbig S (2017) Successful discontinuation of eculizumab under immunosuppressive therapy in DEAP-HUS. *Pediatr Nephrol* 32(6), 1081-1087.

Halder LD, Abdelfatah MA, Jo EA, Jacobsen ID, Westermann M, Beyersdorf N, Lorkowski S, Zipfel PF, Skerka C (2017) Factor H Binds to Extracellular DNA Traps Released from Human Blood Monocytes in Response to *Candida albicans*. *Front Immunol* 7, 671.

Klaile E, Müller MM, Schäfer MR, Clauder AK, Feer S, Heyl KA, Stock M, Klassert TE, Zipfel PF, Singer BB, Slevogt H (2017) Binding of *Candida albicans* to Human CEACAM1 and CEACAM6 Modulates the Inflammatory Response of Intestinal Epithelial Cells. *mBio* 8(2), pii: e02142-16.

Michelfelder S, Parsons J, Bohlender LL, Hoernstein SN, Niederkrüger H, Busch A, Krieghoff N, Koch J, Fode B, Schaaf A, Frischmuth T, Pohl M, Zipfel PF, Reski R, Decker EL, Häffner K (2017) Moss-Produced, Glycosylation-Optimized Human Factor H for Therapeutic Application in Complement Disorders. *J Am Soc Nephrol* 28(5), 1462-1474.

Micklisch S, Lin Y, Jacob S, Karlstetter M, Dannhausen K, Dasari P, von der Heide M, Dahse HM, Schmölz L, Grassmann F, Alene M, Fauser S, Neumann H, Lorkowski S, Pauly D, Weber BH, Jousen AM, Langmann T, Zipfel PF, Skerka C (2017) Age-related macular degeneration associated polymorphism rs10490924 in ARMS2 results in deficiency of a complement activator. *J Neuroinflammation* 14(1), 4.

Mühlenkamp MC, Hallström T, Autenrieth IB, Bohn E, Linke D, Rinker J, Riesbeck K, Singh B, Leo JC, Hammerschmidt S, Zipfel PF, Schütz MS (2017) Vitronectin Binds to a Specific Stretch within the Head Region of *Yersinia* Adhesin A and Thereby Modulates *Yersinia enterocolitica* Host Interaction. *J Innate Immun* 9(1), 33-51.

Röttgerding F, Wagemakers A, Koetsveld J, Fingerle V, Kirschfink M, Hovius JW, Zipfel PF, Wallich R, Kraiczy P (2017) Immune evasion of *Borrelia miyamotoi*: CbiA, a novel outer surface protein exhibiting complement binding and inactivating properties. *Sci Rep* 7(1), 303.

Buhlmann D<sup>\*</sup>, Eberhardt HU<sup>\*</sup>, Medyukhina A, Proding WM, Figge MT, Zipfel PF, Skerka C<sup>\*</sup> authors contributed equally (2016) FHR3 Blocks C3d-Mediated Coactivation of Human B Cells. *J Immunol* 197(2), 620-629.

Chen Q, Manzke M, Hartmann A, Büttner M, Amann K, Pauly D, Wiesener M, Skerka C, Zipfel PF (2016) Complement Factor H-Related 5-Hybrid Proteins Anchor Properdin and Activate Complement at Self-Surfaces. *J Am Soc Nephrol* 27(5), 1413-1425.

Hallström T, Singh B, Kraiczy P, Hammerschmidt S, Skerka C, Zipfel PF, Riesbeck K (2016) Conserved Patterns of Microbial Immune Escape: Pathogenic Microbes of Diverse Origin Target the Human Terminal Complement Inhibitor Vitronectin via a Single Common Motif. *PLOS ONE* 11(1), e0147709.

Hammerschmidt H, Klevenhaus Y, Koenigs A, Hallström T, Fingerle V, Skerka C, Pos KM, Zipfel PF, Wallich R, Kraiczy P (2016) BGA66 and BGA71 facilitate complement resistance of *Borrelia bavariensis* by inhibiting assembly of the membrane attack complex. *Mol Immunol* 99, 407-424.

Koenigs A, Stahl J, Averhoff B, Göttig S, Wichelhaus TA, Wallich R, Zipfel PF, Kraiczy P (2016) CipA of *Acinetobacter baumannii* Is a Novel Plasminogen Binding and Complement Inhibitory Protein *J Infect Dis* 213(9), 1388-1399.

Olivar R, Luque A, Cárdenas-Brito S, Naranjo-Gómez M, Blom AM, Borràs F, Rodríguez de Córdoba S, Zipfel PF, Aran JM (2016) The complement inhibitor factor H generates an anti-inflammatory and tolerogenic state in monocyte-derived dendritic cells *J Immunol* 196(10), 4274-4290.

Pollmächer J, Timme S, Schuster S, Brakhage AA, Zipfel PF, Figge MT (2016) Deciphering the counterplay of *Aspergillus fumigatus* infection and host inflammation by evolutionary games on graphs. *Sci Rep* 6, 27807.

Rosa TF, Flammersfeld A, Ngwa CJ, Kiesow M, Fischer R, Zipfel PF, Skerka C, Pradel G (2016) The *Plasmodium falciparum* blood stages acquire factor H family proteins to evade destruction by human complement. *Cell Microbiol* 18(4), 573-590.

Schäfer N, Grosche A, Reinders J, Hauck SM, Pouw RB, Kuijpers TW, Wouters D, Ehrenstein B, Enzmann V, Zipfel PF, Skerka C, Pauly D (2016) Complement Regulator FHR-3 Is Elevated either Locally or Systemically in a Selection of Autoimmune Diseases. *Front Immunol* 7, 542.

Taudien S, Lausser L, Giamarellos-Bourboulis EJ, Sponholz C, Schöneweck F, Felder M, Schirra LR, Schmid F, Gogos C, Groth S, Petersen BS, Franke A, Lieb W, Huse K, Zipfel PF, Kurzai O, Moepps B, Gierschik P, Bauer M, Scherag A, Kestler HA, Platzer M (2016) Genetic Factors of the Disease Course After Sepsis: Rare Deleterious Variants Are Predictive. *EBioMedicine* 12, 227-238.

Weiss R, Rosendahl A, Czesla D, Meyer-Schwesinger C, Stahl R, Ehmke, H, Kurts C, Zipfel PF, Köhl J, Wenzel U (2016) The complement receptor C5aR1 contributes to renal damage but protects the heart in angiotensin II-induced hypertension *Am J Ren Physiol* 310(11), F1356-F1365.

Bradley DT, Bourke TW, Fairley DJ, Borrow R, Shields MD, Zipfel PF, Hughes AE (2015) Susceptibility to invasive meningococcal disease: polymorphism of complement system genes and *Neisseria meningitidis* factor H binding protein. *PLOS One* 10(3), e0120757.

- Duehring S, Germerodt S, Skerka C, Zipfel PF, Dandekar T, Schuster S (2015) Host-pathogen interactions between the human innate immune system and *Candida albicans* - Understanding and modeling defense and evasion strategies *Front Microbiol* 6, 625.
- Garrone A, Archipowa N, Zipfel PF, Hermann G, Dietzek B (2015) Plant Protochlorophyllide Oxidoreductases A and B - Catalytic Efficiency and Initial Reaction Steps. *J Biol Chem* 290(47), 28530-28539.
- Genewsky A, Jost I, Busch C, Huber C, Stindl J, Skerka C, Zipfel PF, Rohrer B, Strauß O (2015) Activation of endogenously expressed ion channels by active complement in the retinal pigment epithelium. *Pflugers Arch* 467(10), 2179-2191.
- Hallström T, Uhde M, Singh B, Skerka C, Riesbeck K, Zipfel PF (2015) *Pseudomonas aeruginosa* Uses Dihydrolipoamide Dehydrogenase (Lpd) to Bind to the Human Terminal Pathway Regulators Vitronectin and Clusterin to Inhibit Terminal Pathway Complement Attack. *PLOS One* 10(9), e0137630.
- Kloppot P, Selle M, Kohler C, Stentzel S, Fuchs S, Liebscher V, Müller E, Kale D, Ohlsen K, Bröker BM, Zipfel PF, Kahl BC, Ehrlich R, Hecker M, Engelmann S (2015) Microarray based identification of human antibodies against *Staphylococcus aureus* antigens. *Proteomics Clin Appl* 9(11-12), 1003-1011.
- Koenigs A, Zipfel PF, Kraiczy P (2015) Translation Elongation Factor Tuf of *Acinetobacter baumannii* Is a Plasminogen-Binding Protein. *PLOS One* 10(9), e0138398.
- Kohler S, Hallström T, Singh B, Riesbeck K, Sparta G, Zipfel PF, Hammerschmidt S (2015) Binding of vitronectin and Factor H to Hic contributes to immune evasion of *Streptococcus pneumoniae* serotype 3. *Thromb Haemost* 113(1), 125-142.
- Luo S, Hipler UC, Münzberg C, Skerka C, Zipfel PF (2015) Sequence variations and protein expression levels of the two immune evasion proteins Gpm1 and Pra1 influence virulence of clinical *candida albicans* isolates *PLOS One* 10(2), e0113192.
- Nester CM, Barbour T, de Cordoba SR, Dragon-Durey MA, Fremeaux-Bacchi V, Goodship TH, Kavanagh D, Noris M, Pickering M, Sanchez-Corral P, Skerka C, Zipfel P, Smith RJ (2015) Atypical aHUS: State of the art. *Mol Immunol* 67(1), 31-42.
- Singh B, Al-Jubair T, Voraganti C, Andersson T, Mukherjee O, Su YC, Zipfel P, Riesbeck K (2015) *Moraxella catarrhalis* binds plasminogen to evade host innate immunity. *Infect Immun* 83(9), 3458-3469.
- Zipfel PF, Skerka C (2015) Complement the alternative Pathway *Encyclopedia of Life Sciences; John Wiley & Sons, Ltd, Chichester* [In press]
- Zipfel PF, Skerka C, Chen Q, Wiech T, Goodship T, Johnson S, Fremeaux-Bacchi V, Nester C, Córdoba SR, Noris M, Pickering M, Smith R (2015) The role of complement in C3 glomerulopathy. *Mol Immunol* 67(1), 21-30.
- Barthel A, Kopka I, Vogel H, Zipfel P, Heckel DG, Groot AT (2014) Immune defence strategies of generalist and specialist insect herbivores. *Proc Biol Sci* 281(1788), 20140897.
- Bernhard S, Fleury C, Su YC, Zipfel PF, Koske I, Nordström T, Riesbeck K (2014) Outer



Membrane Protein OIpA Contributes to *Moraxella catarrhalis* Serum Resistance via Interaction With Factor H and the Alternative Pathway. *J Infect Dis* 210(8), 1306-1310.

Chen Q, Wiesener M, Eberhardt HU, Hartmann A, Uzonyi B, Kirschfink M, Amann K, Buettner M, Goodship T, Hugo C, Skerka C, Zipfel PF (2014) Complement factor H-related hybrid protein deregulates complement in dense deposit disease. *J Clin Invest* 124(1), 145-155.

Fleury C, Su YC, Hallström T, Sandblad L, Zipfel PF, Riesbeck K (2014) Identification of a *Haemophilus influenzae* factor H-Binding lipoprotein involved in serum resistance. *J Immunol* 192(12), 5913-5923.

Hammerschmidt C, Koenigs A, Siegel C, Hallström T, Skerka C, Wallich R, Zipfel PF, Kraiczy P (2014) Versatile roles of CspA orthologs in complement inactivation of serum-resistant Lyme disease spirochetes. *Infect Immun* 82(1), 380-392.

Lopez CM, Wallich R, Riesbeck K, Skerka C, Zipfel PF (2014) *Candida albicans* uses the surface protein Gpm1 to attach to human endothelial cells and to keratinocytes via the adhesive protein vitronectin. *PLOS One* 9(3), e90796.

Mehta G, Ferreira VP, Skerka C, Zipfel PF, Banda NK (2014) New insights into disease-specific absence of complement factor H related protein C in mouse models of spontaneous autoimmune diseases. *Mol Immunol* 62(1), 235-248.

Mohan S, Hertweck C, Dudda A, Hammerschmidt S, Skerka C, Hallström T, Zipfel PF (2014) Tuf of *Streptococcus pneumoniae* is a surface displayed human complement regulator binding protein. *Mol Immunol* 62(1), 249-264.

Noone D, Waters A, Pluthero FG, Geary DF, Kirschfink M, Zipfel PF, Licht C (2014) Successful treatment of DEAP-HUS with eculizumab. *Pediatr Nephrol* 29(5), 841-851.

Pauly D, Nagel BM, Reinders J, Killian T, Wulf M, Ackermann S, Ehrenstein B, Zipfel PF, Skerka C, Weber BH (2014) A novel antibody against human properdin inhibits the alternative complement system and specifically detects properdin from blood samples. *PLOS One* 9(5), e96371.

Poolpol K, Orth-Höller D, Speth C, Zipfel PF, Skerka C, de Córdoba SR, Brockmeyer J, Bielaszewska M, Würzner R (2014) Interaction of Shiga toxin 2 with complement regulators of the factor H protein family. *Mol Immunol* 58(1), 77-84.

Watson R, Lindner S, Bordereau P, Hunze EM, Tak F, Ngo S, Zipfel PF, Skerka C, Dragon-Durey MA, Marchbank KJ (2014) Standardisation of the factor H autoantibody assay. *Immunobiology* 219(1), 9-16.

Weinberger AW, Eddahabi C, Carstesen D, Zipfel PF, Walter P, Skerka C (2014) Human complement factor H and factor H-like protein 1 are expressed in human retinal pigment epithelial cells. *Ophthalmic Res* 51(2), 59-66.

Zipfel PF, Skerka C (2014) *Staphylococcus aureus*: the multi headed hydra resists and controls human complement response in multiple ways. *Int J Med Microbiol* 304(2), 188-194.

Ansari M, McKeigue PM, Skerka C, Hayward C, Rudan I, Vitart V, Polasek O, Armbrecht AM, Yates JR, Vataavuk Z, Bencic G, Kolcic I, Oostra BA, Van Duijn CM, Campbell S, Stanton CM,

- Huffman J, Shu X, Khan JC, Shahid H, Harding SP, Bishop PN, Deary IJ, Moore AT, Dhillon B, Rudan P, Zipfel PF, Sim RB, Hastie ND, Campbell H, Wright AF (2013) Genetic influences on plasma CFH and CFHR1 concentrations and their role in susceptibility to age-related macular degeneration. *Hum Mol Genet* 22(23), 4857-4869.
- Caesar JJ, Wallich R, Kraiczy P, Zipfel PF, Lea SM (2013) Further structural insights into the binding of complement factor H by complement regulator-acquiring surface protein 1 (CspA) of *Borrelia burgdorferi*. *Acta Crystallogr Sect F Struct Biol Cryst Commun* 69(Pt 6), 629-633.
- Eberhardt HU, Buhlmann D, Hortschansky P, Chen Q, Böhm S, Kemper MJ, Wallich R, Hartmann A, Hallström T, Zipfel PF, Skerka C (2013) Human factor H-related protein 2 (CFHR2) regulates complement activation. *PLOS One* 8(11), e78617.
- Hallström T, Siegel C, Mörgelin M, Kraiczy P, Skerka C, Zipfel PF (2013) CspA from *Borrelia burgdorferi* inhibits the terminal complement pathway. *MBio* 4(4),
- Koenigs A, Hammerschmidt C, Jutras BL, Pogoryelov D, Barthel D, Skerka C, Kugelstadt D, Wallich R, Stevenson B, Zipfel PF, Kraiczy P (2013) BBA70 of *Borrelia burgdorferi* is a novel plasminogen-binding protein. *J Biol Chem* 288(35), 25229-25243.
- Leshner AM, Zhou L, Kimura Y, Sato S, Gullipalli D, Herbert AP, Barlow PN, Eberhardt HU, Skerka C, Zipfel PF, Hamano T, Miwa T, Tung KS, Song WC (2013) Combination of factor H mutation and properdin deficiency causes severe C3 glomerulonephritis. *J Am Soc Nephrol* 24(1), 53-65.
- Luo S, Hoffmann R, Skerka C, Zipfel PF (2013) Glycerol-3-phosphate dehydrogenase 2 is a novel factor H-, factor H-like protein 1-, and plasminogen-binding surface protein of *Candida albicans*. *J Infect Dis* 207(4), 594-603.
- Luo S, Skerka C, Kurzai O, Zipfel PF (2013) Complement and innate immune evasion strategies of the human pathogenic fungus *Candida albicans*. *Mol Immunol* 56(3), 161-169.
- Schwab J, Hammerschmidt C, Richter D, Skerka C, Matuschka FR, Wallich R, Zipfel PF, Kraiczy P (2013) *Borrelia valaisiana* resist complement-mediated killing independently of the recruitment of immune regulators and inactivation of complement components. *PLOS One* 8(1), e53659.
- Simon N, Lasonder E, Scheuermayer M, Kuehn A, Tews S, Fischer R, Zipfel PF, Skerka C, Pradel G (2013) Malaria parasites co-opt human factor H to prevent complement-mediated lysis in the mosquito midgut. *Cell Host Microbe* 13(1), 29-41.
- Voss S, Hallström T, Saleh M, Burchhardt G, Pribyl T, Singh B, Riesbeck K, Zipfel PF, Hammerschmidt S (2013) The choline-binding protein PspC of *Streptococcus pneumoniae* interacts with the C-terminal heparin-binding domain of vitronectin. *J Biol Chem* 288(22), 15614-15627.
- Zipfel PF, Hallström T, Riesbeck K (2013) Human complement control and complement evasion by pathogenic microbes - tipping the balance. *Mol Immunol* 56(3), 152-160.
- Zipfel PF, Lauer N (2013) Defective complement action and control defines disease pathology for retinal and renal disorders and provides a basis for new therapeutic approaches. *Adv Exp Med Biol* 735, 173-187.
- Zipfel PF, Skerka C, Hallström T, Wolf G (2013) 14th European Meeting on Complement in

Human Disease, Jena, Germany, August 17-21, 2013. *Mol Immunol* 56(3), 151-151.

Barthel D, Schindler S, Zipfel PF (2012) Plasminogen is a complement inhibitor. *J Biol Chem* 287(22), 18831-18842.

Barthel D, Singh B, Riesbeck K, Zipfel PF (2012) Haemophilus influenzae uses the surface protein E to acquire human plasminogen and to evade innate immunity. *J Immunol* 188(1), 379-385.

Citiulo F, Jacobsen ID, Miramón P, Schild L, Brunke S, Zipfel PF, Brock M, Hube B, Wilson D (2012) *Candida albicans* scavenges host zinc via Pra1 during endothelial invasion. *PLoS Pathog* 8(6), e1002777.

Foltyn Zadura A, Zipfel PF, Bokarewa MI, Sturfelt G, Jönsen A, Nilsson SC, Hillarp A, Saxne T, Trouw LA, Blom AM (2012) Factor H autoantibodies and deletion of Complement Factor H-Related protein-1 in rheumatic diseases in comparison to atypical hemolytic uremic syndrome. *Arthritis Res Ther* 14(4), R185.

Hallström T, Mörgelin M, Barthel D, Raguse M, Kunert A, Hoffmann R, Skerka C, Zipfel PF (2012) Dihydrolipoamide dehydrogenase of *Pseudomonas aeruginosa* is a surface-exposed immune evasion protein that binds three members of the factor H family and plasminogen. *J Immunol* 189(10), 4939-4950.

Hammerschmidt C, Hallström T, Skerka C, Wallich R, Stevenson B, Zipfel PF, Kraiczy P (2012) Contribution of the infection-associated complement regulator-acquiring surface protein 4 (ErpC) to complement resistance of *Borrelia burgdorferi*. *Clin Dev Immunol* 2012, 349657.

Noone D, Al-Matrafi J, Tinckam K, Zipfel PF, Herzenberg AM, Thorner PS, Pluthero FG, Kahr WH, Filler G, Hebert D, Harvey E, Licht C (2012) Antibody mediated rejection associated with complement factor h-related protein 3/1 deficiency successfully treated with eculizumab. *Am J Transplant* 12(9), 2546-2553.

Schindler MK, Schütz MS, Mühlkamp MC, Rooijackers SH, Hallström T, Zipfel PF, Autenrieth IB (2012) *Yersinia enterocolitica* YadA mediates complement evasion by recruitment and inactivation of C3 products. *J Immunol* 189(10), 4900-4908.

Benz MR, Schmid H, Heinen S, Lange-Sperandio B, Hoefele J, Sitter T, Zipfel PF, Weber LT (2011) Different factor H-related protein patterns in siblings with typical hemolytic uremic syndrome. *Pediatr Nephrol* 26(8), 1345-1347.

Bradley DT, Zipfel PF, Hughes AE (2011) Complement in age-related macular degeneration: a focus on function. *Eye (Lond)* 25(6), 683-693.

Burmester A, Shelest E, Glöckner G, Heddergott C, Schindler S, Staib P, Heidel A, Felder M, Petzold A, Szafranski K, Feuermann M, Pedruzzi I, Priebe S, Groth M, Winkler R, Li W, Kniemeyer O, Schroeckh V, Hertweck C, Hube B, White TC, Platzer M, Guthke R, Heitman J, Wöstemeyer J, Zipfel PF, Monod M, Brakhage AA (2011) Comparative and functional genomics provide insights into the pathogenicity of dermatophytic fungi. *Genome Biol* 12(1), R7.

Büttner-Mainik A, Parsons J, Jérôme H, Hartmann A, Lamer S, Schaaf A, Schlosser A, Zipfel PF, Reski R, Decker EL (2011) Production of biologically active recombinant human factor H in *Physcomitrella*. *Plant Biotechnol J* 9(3), 373-383.

- Chen Q, Müller D, Rudolph B, Hartmann A, Kuwertz-Bröking E, Wu K, Kirschfink M, Skerka C, Zipfel PF (2011) Combined C3b and factor B autoantibodies and MPGN type II. *N Engl J Med* 365(24), 2340-2342.
- Hallström T, Nordström T, Tan TT, Manolov T, Lambris JD, Isenman DE, Zipfel PF, Blom AM, Riesbeck K (2011) Immune evasion of *Moraxella catarrhalis* involves ubiquitous surface protein A-dependent C3d binding. *J Immunol* 186(5), 3120-3129.
- Lauer N, Mihlan M, Hartmann A, Schlötzer-Schrehardt U, Keilhauer C, Scholl HP, Charbel Issa P, Holz F, Weber BH, Skerka C, Zipfel PF (2011) Complement regulation at necrotic cell lesions is impaired by the age-related macular degeneration-associated factor-H His402 risk variant. *J Immunol* 187(8), 4374-4383.
- Losse J, Svobodová E, Heyken A, Hube B, Zipfel PF, Józsi M (2011) Role of pH-regulated antigen 1 of *Candida albicans* in the fungal recognition and antifungal response of human neutrophils. *Mol Immunol* 48(15-16), 2135-2143.
- Luo S, Blom AM, Rupp S, Hipler UC, Hube B, Skerka C, Zipfel PF (2011) The pH-regulated antigen 1 of *Candida albicans* binds the human complement inhibitor C4b-binding protein and mediates fungal complement evasion. *J Biol Chem* 286(10), 8021-8029.
- Mihlan M, Blom AM, Kupreishvili K, Lauer N, Stelzner K, Bergström F, Niessen HW, Zipfel PF (2011) Monomeric C-reactive protein modulates classic complement activation on necrotic cells. *FASEB J* 25(12), 4198-4210.
- Reuter M, Zipfel PF (2011) Immune evasion des Gram-positiven Bakteriums *Staphylococcus aureus* und der multiresistenten Formen MRSA. *Medizinisch-orthopädische Technik* 131, 22-22.
- Singh B, Jalalvand F, Mörgelin M, Zipfel PF, Blom AM, Riesbeck K (2011) *Haemophilus influenzae* protein E recognizes the C-terminal domain of vitronectin and modulates the membrane attack complex. *Mol Microbiol* 81(1), 80-98.
- Thywißen A, Heinekamp T, Dahse HM, Schmalder-Ripcke J, Nietzsche S, Zipfel PF, Brakhage AA (2011) Conidial dihydroxynaphthalene melanin of the human pathogenic fungus *Aspergillus fumigatus* interferes with the host endocytosis pathway. *Front Microbiol / Fungi and their interactions* 2, 96.
- Weismann D, Hartvigsen K, Lauer N, Bennett KL, Scholl HP, Charbel Issa P, Cano M, Brandstätter H, Tsimikas S, Skerka C, Superti-Furga G, Handa JT, Zipfel PF, Witztum JL, Binder CJ (2011) Complement factor H binds malondialdehyde epitopes and protects from oxidative stress. *Nature* 478(7367), 76-81.
- Zipfel PF, Skerka C, Kupka D, Luo S (2011) Immune escape of the human facultative pathogenic yeast *Candida albicans*: the many faces of the Candida Pra1 protein. *Int J Med Microbiol* 301(5), 423-430.
- Zipfel PF, Wolf G, John U, Kentouche K, Skerka C (2011) Novel developments in thrombotic microangiopathies: is there a common link between hemolytic uremic syndrome and thrombotic thrombocytopenic purpura? *Pediatr Nephrol* 26(11), 1947-1956.
- Behnsen J, Lessing F, Schindler S, Wartenberg D, Jacobsen ID, Thoen M, Zipfel PF, Brakhage AA (2010) Secreted *Aspergillus fumigatus* protease Alp1 degrades human complement proteins

C3, C4, and C5. *Infect Immun* 78(8), 3585-3594.

Brakhage AA, Bruns S, Thywissen A, Zipfel PF, Behnsen J (2010) Interaction of phagocytes with filamentous fungi. *Curr Opin Microbiol* 13(4), 409-415.

Reuter M, Caswell CC, Lukomski S, Zipfel PF (2010) Binding of the human complement regulators CFHR1 and factor H by streptococcal collagen-like protein 1 (Scl1) via their conserved C termini allows control of the complement cascade at multiple levels. *J Biol Chem* 285(49), 38473-38485.

Siegel C, Hallström T, Skerka C, Eberhardt H, Uzonyi B, Beckhaus T, Karas M, Wallich R, Stevenson B, Zipfel PF, Kraiczy P (2010) Complement factor H-related proteins CFHR2 and CFHR5 represent novel ligands for the infection-associated CRASP proteins of *Borrelia burgdorferi*. *PLOS One* 5(10), e13519.

Gropp K, Schild L, Schindler S, Hube B, Zipfel PF, Skerka C (2009) The yeast *Candida albicans* evades human complement attack by secretion of aspartic proteases. *Mol Immunol* 47(2-3), 465-475.

Franke K, Nguyen M, Härtl A, Dahse HM, Vogl G, Würzner R, Zipfel PF, Künkel W, Eck R (2006) The vesicle transport protein Vac1p is required for virulence of *Candida albicans*. *Microbiology* 152(Pt 10), 3111-3121.

Hellwage J, Eberle F, Babuke T, Seeberger H, Richter H, Kunert A, Härtl A, Zipfel PF, Jokiranta TS, Józsi M (2006) Two factor H-related proteins from the mouse: expression analysis and functional characterization. *Immunogenetics* 58(11), 883-893.

Günther J, Nguyen M, Härtl A, Künkel W, Zipfel PF, Eck R (2005) Generation and functional *in vivo* characterization of a lipid kinase defective phosphatidylinositol 3-kinase Vps34p of *Candida albicans*. *Microbiology* 151(Pt 1), 81-89.

Poltermann S, Nguyen M, Günther J, Wendland J, Härtl A, Künkel W, Zipfel PF, Eck R (2005) The putative vacuolar ATPase subunit Vma7p of *Candida albicans* is involved in vacuole acidification, hyphal development and virulence. *Microbiology* 151(Pt 5), 1645-1655.

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