



Eric Meffre

Professor of Medicine (Immunology and Rheumatology)
Medicine - Immunology & Rheumatology

Bio

BIO

Dr. Meffre obtained his PhD in Immunology from the Université d'Aix-Marseille in France before he moved to the USA as a postdoc fellow in the laboratory of Dr. Michel Nussenzweig at The Rockefeller University in New York City. He became an assistant professor at Cornell University in 2003 before being recruited at Yale University as associate professor in 2009. He was tenured at Yale in 2014 before he joined the Department of Medicine/ Division of Immunology and Rheumatology at Stanford University as a tenured full professor in 2022.

Dr. Meffre's work focuses on the etiology of autoimmune syndromes and the roles played by B cells in these diseases. His group characterized the abnormal selection of developing autoreactive B cells in patients with rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), type 1 diabetes (T1D), multiple sclerosis (MS) and Sjögren's syndrome, resulting in large numbers of autoreactive naïve B cells accumulating in the patient's blood. Hence, these autoreactive B cells may present self-antigens to T cells and initiate autoimmune diseases. These early B cell tolerance defects are likely primary to these autoimmune diseases and may result from genetic factors such as the 1858T PTPN22 allele that segregates with RA, SLE and T1D and correlate with an impaired removal of developing autoreactive B cells.

His research goals also consist in characterizing the molecules and pathways involved in the establishment of B cell tolerance and the removal of developing autoreactive B cells generated by random V(D)J recombination through the investigation of rare patients with primary immunodeficiency (PID) enrolled through an international network. Alteration of B cell receptor (BCR) or Toll-like receptor (TLR) signaling in PID patients results in a defective central B cell tolerance and a failure to counterselect developing autoreactive B cells in the bone marrow. In contrast, functional and suppressive regulatory T cells play a key role in preventing the accumulation of autoreactive clones in the mature naïve B cell compartment. The recent development of humanized mouse models recapitulating early B cell tolerance checkpoints and their defects in autoimmune settings allow further in-depth investigation of tolerance mechanisms and the development of novel approaches to restore defective central and peripheral B cell tolerance checkpoints and thwart autoimmunity.

ACADEMIC APPOINTMENTS

- Professor, Medicine - Immunology & Rheumatology
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Stanford Medicine Children's Health Center for IBD and Celiac Disease

Teaching

COURSES

2025-26

- Advanced Immunology II: IMMUNOL 202 (Spr)

2024-25

- Advanced Immunology II: IMMUNOL 202 (Spr)

2023-24

- Advanced Immunology II: IMMUNOL 202 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Karan Kathuria, Soyeon Kim

Postdoctoral Faculty Sponsor

Aiswarya Sethumadhavan

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Immunology (Phd Program)
- Immunology/Rheumatology (Fellowship Program)

Publications

PUBLICATIONS

- **Identification of a novel TLR7 gain-of-function variant that underlies systemic lupus erythematosus.** *Journal of human immunity*
Sethumadhavan, A., Mariasoosai, C., Yamakawa, N., Chamberlain, N., Deardorff, M. A., Funaki, S., Asano, T., Casanova, J. L., Torabifard, H., Boisson, B., Meffre, E.
2026; 2 (3): e20250194
- **IgA defects in CVID lead to bacterial translocation, increased serum γ -interferon, and BAFF.** *Journal of human immunity*
Ho, H. E., Radigan, L., Meffre, E., Cunningham-Rundles, C.
2026; 2 (2): e20250080
- **Epstein-Barr virus reprograms autoreactive B cells as antigen-presenting cells in systemic lupus erythematosus.** *Science translational medicine*
Younis, S., Moutusy, S. I., Rasouli, S., Jahanbani, S., Pandit, M., Wu, X., Acharya, S., Sharpe, O., Wijeratne, T. U., Harris, M. L., Yang, E. Y., Chaichian, Y., Parsafar, et al
2025; 17 (824): eady0210
- **Knockdown of the long isoform of the prolactin receptor selectively targets pathogenic immune cells and averts lupus nephritis**
Hamane, K., Hu, Z., Lima-Junior, J., Khani, A., Kumar, A., Ortiz, A., Jung, D., Qin, H., Tao, S., Sanz, I., Meffre, E., Marzan, K., Koff, et al
ELSEVIER.2025: 3003-3004
- **CTLA-4 blockade shifts the B cell repertoire towards autoimmunity.** *The Journal of clinical investigation*
Çakan, E., Wang, M., Dai, Y., Mirouse, A., Villanueva-Pachas, C. R., Bouis, D., Boeckers, J. M., Gera, R., Yrita, S., Clapp, L., Perdigoto, A. L., Delmotte, F. R., Massad, et al
2025
- **Short-term B cell depletion results in medication-free, long-term freedom from disease activity and correction of immune tolerance defect in a subset of people with relapsing MS**
Villanueva, C., Vega, L., Salazar-Camelo, A., Ghajarzadeh, M., Patel, S., Clapp, L., Geha, R., Waubant, E., Nourbakhsh, B., Meffre, E.
SAGE PUBLICATIONS LTD.2024: 107-108
- **Nuclear-penetrating scleroderma autoantibody inhibits topoisomerase 1 cleavage complex formation** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
May, C. K., Noble, P. W., Herzog, E. L., Meffre, E., Hansen, J. E.
2024; 720: 150123

- **Molecular and functional identification of unstable regulatory and autoreactive effector T cells that are expanded in patients with FOXP3 mutation**
Borna, S., Lee, E., Nideffer, J., Ramachandran, A., Wang, B., Mavers, M., Narula, M., Garrett, A., Schulze, J., Marois, L., Gernez, Y., Bathia, M., Chong, et al
ACADEMIC PRESS INC ELSEVIER SCIENCE.2024
- **Identification of unstable regulatory and autoreactive effector T cells that are expanded in patients with FOXP3 mutations.** *Science translational medicine*
Borna, Š., Lee, E., Nideffer, J., Ramachandran, A., Wang, B., Baker, J., Mavers, M., Lakshmanan, U., Narula, M., Garrett, A. K., Schulze, J., Olek, S., Marois, et al
2023; 15 (727): eadg6822
- **FOXP3 deficiency, from the mechanisms of the disease to curative strategies.** *Immunological reviews*
Borna, S., Meffre, E., Bacchetta, R.
2023
- **TLR9 ligand sequestration by chemokine CXCL4 negatively affects central B cell tolerance** *JOURNAL OF EXPERIMENTAL MEDICINE*
Cakan, E., Kioon, M., Garcia-Carmona, Y., Glauzy, S., Oliver, D., Yamakawa, N., Loza, A., Du, Y., Schickel, J., Boeckers, J. M., Yang, C., Baldo, A., Ivashkiv, et al
2023; 220 (12)
- **CD25 recruits inhibitory phosphatases for feedback control of B-cell receptor signaling**
Sun, R., Lee, J., Robinson, M. E., Kume, K., Cosgun, K., Chan, L. N., Leveille, E., Geng, H., Vykunta, V., Shy, B., Marson, A., Meffre, E., Muschen, et al
AMER ASSOC IMMUNOLOGISTS.2023
- **Isoform-specific knockdown of long and intermediate prolactin receptors interferes with evolution of B-cell neoplasms.** *Communications biology*
Taghi Khani, A., Kumar, A., Sanchez Ortiz, A., Radecki, K. C., Aramburo, S., Lee, S. J., Hu, Z., Damirchi, B., Lorenson, M. Y., Wu, X., Gu, Z., Stohl, W., Sanz, et al
2023; 6 (1): 295
- **Autoantibodies are highly prevalent in non-SARS-CoV-2 respiratory infections and critical illness.** *JCI insight*
Feng, A., Yang, E. Y., Moore, A. R., Dhingra, S., Chang, S. E., Yin, X., Pi, R., Mack, E. K., Völkel, S., Geßner, R., Gündisch, M., Neubauer, A., Renz, et al
2023; 8 (3)
- **Partial RAG deficiency in humans induces dysregulated peripheral lymphocyte development and humoral tolerance defect with accumulation of T-bet+ B cells.** *Nature immunology*
Csomos, K., Ujhazi, B., Blazso, P., Herrera, J. L., Tipton, C. M., Kawai, T., Gordon, S., Ellison, M., Wu, K., Stowell, M., Haynes, L., Cruz, R., Zakota, et al
2022
- **Inflammasome activation in infected macrophages drives COVID-19 pathology.** *Nature*
Sefik, E., Qu, R., Junqueira, C., Kaffe, E., Mirza, H., Zhao, J., Brewer, J. R., Han, A., Steach, H. R., Israelow, B., Blackburn, H. N., Velazquez, S. E., Chen, et al
2022; 606 (7914): 585-593
- **A humanized mouse model of chronic COVID-19.** *Nature biotechnology*
Sefik, E., Israelow, B., Mirza, H., Zhao, J., Qu, R., Kaffe, E., Song, E., Halene, S., Meffre, E., Kluger, Y., Nussenzweig, M., Wilen, C. B., Iwasaki, et al
2022; 40 (6): 906-920
- **A Novel AICDA Splice-Site Mutation in Two Siblings with HIGM2 Permits Somatic Hypermutation but Abrogates Mutational Targeting.** *Journal of clinical immunology*
Dirks, J., Haase, G., Cantaert, T., Frey, L., Klaas, M., Rickert, C. H., Girschick, H., Meffre, E., Morbach, H.
2022; 42 (4): 771-782
- **Loss of Treg identity in IPEX patients is associated with increase autoreactivity in Teff cells**
Borna, S., Lee, E., Lakshmanan, U., Narula, M., Schulze, J., Ramachandran, A., Bertaina, A., Meffre, E., Maria, R., Bacchetta, R.
SPRINGER/PLENUM PUBLISHERS.2022: S78-S79

- **High-throughput identification of autoantibodies that target the human exoproteome.** *Cell reports methods*
Wang, E. Y., Dai, Y., Rosen, C. E., Schmitt, M. M., Dong, M. X., Ferré, E. M., Liu, F., Yang, Y., González-Hernández, J. A., Meffre, E., Hinchcliff, M., Koumpouras, F., Lionakis, et al
2022; 2 (2)
- **Defective Early B Cell Tolerance Checkpoints in Patients With Systemic Sclerosis Allow the Production of Self Antigen-Specific Clones.** *Arthritis & rheumatology (Hoboken, N.J.)*
Glauzy, S., Olson, B., May, C. K., Parisi, D., Massad, C., Hansen, J. E., Ryu, C., Herzog, E. L., Meffre, E.
2022; 74 (2): 307-317
- **Autoantibodies targeting cytokines and connective tissue disease autoantigens are common in acute non-SARS-CoV-2 infections.** *Research square*
Feng, A., Yang, E., Moore, A., Dhingra, S., Chang, S., Yin, X., Pi, R., Mack, E., Völkel, S., Geßner, R., Gundisch, M., Neubauer, A., Renz, et al
2022
- **Positive and negative selection shape the human naive B cell repertoire.** *The Journal of clinical investigation*
Chen, J. W., Schickel, J. N., Tsakiris, N., Sng, J., Arbogast, F., Bouis, D., Parisi, D., Gera, R., Boeckers, J. M., Delmotte, F. R., Veselits, M., Schuetz, C., Jacobsen, et al
2022; 132 (2)
- **Developmental partitioning of SYK and ZAP70 prevents autoimmunity and cancer.** *Molecular cell*
Sadras, T., Martin, M., Kume, K., Robinson, M. E., Saravanakumar, S., Lenz, G., Chen, Z., Song, J. Y., Siddiqi, T., Oksa, L., Knapp, A. M., Cutler, J., Cosgun, et al
2021; 81 (10): 2094-2111.e9
- **Disease-associated CTNBL1 mutation impairs somatic hypermutation by decreasing nuclear AID.** *The Journal of clinical investigation*
Kuhny, M., Forbes, L. R., Çakan, E., Vega-Loza, A., Kostiuik, V., Dinesh, R. K., Glauzy, S., Stray-Pedersen, A., Pezzi, A. E., Hanson, I. C., Vargas-Hernandez, A., Xu, M. L., Coban-Akdemir, et al
2020; 130 (8): 4411-4422
- **Autoreactivity in naïve human fetal B cells is associated with commensal bacteria recognition.** *Science (New York, N.Y.)*
Chen, J. W., Rice, T. A., Bannock, J. M., Bielecka, A. A., Strauss, J. D., Catanzaro, J. R., Wang, H., Menard, L. C., Anolik, J. H., Palm, N. W., Meffre, E.
2020; 369 (6501): 320-325
- **Impaired ATM activation in B cells is associated with bone resorption in rheumatoid arthritis.** *Science translational medicine*
Mensah, K. A., Chen, J. W., Schickel, J. N., Isnardi, I., Yamakawa, N., Vega-Loza, A., Anolik, J. H., Gatti, R. A., Gelfand, E. W., Montgomery, R. R., Horowitz, M. C., Craft, J. E., Meffre, et al
2019; 11 (519)
- **Transitional B cells in quiescent SLE: An early checkpoint imprinted by IFN.** *Journal of autoimmunity*
Dieudonné, Y., Gies, V., Guffroy, A., Keime, C., Bird, A. K., Liesveld, J., Barnas, J. L., Poindron, V., Douiri, N., Soulas-Sprauel, P., Martin, T., Meffre, E., Anolik, et al
2019; 102: 150-158
- **Human DEF6 deficiency underlies an immunodeficiency syndrome with systemic autoimmunity and aberrant CTLA-4 homeostasis.** *Nature communications*
Serwas, N. K., Hoeger, B., Ardy, R. C., Stulz, S. V., Sui, Z., Memaran, N., Meeths, M., Krolo, A., Yüce Petronczki, Ö., Pfajfer, L., Hou, T. Z., Halliday, N., Santos-Valente, et al
2019; 10 (1): 3106
- **B cell depletion or absence does not impede anti-tumor activity of PD-1 inhibitors.** *Journal for immunotherapy of cancer*
Damsky, W., Jilaveanu, L., Turner, N., Perry, C., Zito, C., Tomayko, M., Leventhal, J., Herold, K., Meffre, E., Bosenberg, M., Kluger, H. M.
2019; 7 (1): 153
- **Early B cell tolerance defects in neuromyelitis optica favour anti-AQP4 autoantibody production.** *Brain : a journal of neurology*
Cotzomi, E., Stathopoulos, P., Lee, C. S., Ritchie, A. M., Soltys, J. N., Delmotte, F. R., Oe, T., Sng, J., Jiang, R., Ma, A. K., Vander Heiden, J. A., Kleinstein, S. H., Levy, et al
2019; 142 (6): 1598-1615
- **AIRE expression controls the peripheral selection of autoreactive B cells.** *Science immunology*

- Sng, J., Ayoglu, B., Chen, J. W., Schickel, J., Ferre, E. M., Glauzy, S., Romberg, N., Hoenig, M., Cunningham-Rundles, C., Utz, P. J., Lionakis, M. S., Meffre, E.
2019; 4 (34)
- **A novel ATM mutation associated with elevated atypical lymphocyte populations, hyper-IgM, and cutaneous granulomas.** *Clinical immunology (Orlando, Fla.)*
Minto, H., Mensah, K. A., Reynolds, P. R., Meffre, E., Rubtsova, K., Gelfand, E. W.
2019; 200: 55-63
 - **Patients with common variable immunodeficiency with autoimmune cytopenias exhibit hyperplastic yet inefficient germinal center responses.** *The Journal of allergy and clinical immunology*
Romberg, N., Le Coz, C., Glauzy, S., Schickel, J. N., Trofa, M., Nolan, B. E., Paessler, M., Xu, M. L., Lambert, M. P., Lakhani, S. A., Khokha, M. K., Jyonouchi, S., Heimall, et al
2019; 143 (1): 258-265
 - **TACI Isoforms Regulate Ligand Binding and Receptor Function.** *Frontiers in immunology*
Garcia-Carmona, Y., Ting, A. T., Radigan, L., Athuluri Divakar, S. K., Chavez, J., Meffre, E., Cerutti, A., Cunningham-Rundles, C.
2018; 9: 2125
 - **Reprogramming human T cell function and specificity with non-viral genome targeting** *NATURE*
Roth, T. L., Puig-Saus, C., Yu, R., Shifrut, E., Carnevale, J., Li, P., Hiatt, J., Saco, J., Krystofinski, P., Li, H., Tobin, V., Nguyen, D. N., Lee, et al
2018; 559 (7714): 405+
 - **Antigen-mediated regulation in monoclonal gammopathies and myeloma.** *JCI insight*
Nair, S., Sng, J., Boddupalli, C. S., Seckinger, A., Chesi, M., Fulciniti, M., Zhang, L., Rauniyar, N., Lopez, M., Neparidze, N., Parker, T., Munshi, N. C., Sexton, et al
2018; 3 (8)
 - **Alterations in repertoire of T and B cell subsets in patients with partial recombination activating gene (RAG) deficiency with autoimmunity and history of viral infections**
Csomos, K., Ujhazi, B., Butte, M. J., Hernandez, J., Geha, R., Al-Herz, W., Notarangelo, L. D., Meffre, E., Walter, J. E.
SPRINGER/PLENUM PUBLISHERS.2018: 420-21
 - **Impaired TLR9 responses in B cells from patients with systemic lupus erythematosus.** *JCI insight*
Gies, V., Schickel, J. N., Jung, S., Joublin, A., Glauzy, S., Knapp, A. M., Soley, A., Poindron, V., Guffroy, A., Choi, J. Y., Gottenberg, J. E., Anolik, J. H., Martin, et al
2018; 3 (5)
 - **Naive B cells are prone to develop into polyreactive autoantibody secreting cells from adult RAG2-deficient patient with combined immunodeficiency**
Stowell, M. T., Walter, J. E., Pennix, T. C., Ujhazi, B., Mueller, G., Butte, M., Hoyte, E. G., Hernandez, J. D., Meffre, E. R. F., Csomos, K.
MOSBY-ELSEVIER.2018: AB22
 - **Accumulation of Antigen-Driven Lymphoproliferations in Complement Receptor 2/CD21-low B Cells From Patients With Sjögren's Syndrome.** *Arthritis & rheumatology (Hoboken, N.J.)*
Glauzy, S., Boccitto, M., Bannock, J. M., Delmotte, F. R., Saadoun, D., Cacoub, P., Ice, J. A., Sivils, K. L., James, J. A., Wolin, S. L., Meffre, E.
2018; 70 (2): 298-307
 - **mTOR intersects antibody-inducing signals from TACI in marginal zone B cells.** *Nature communications*
Sintes, J., Gentile, M., Zhang, S., Garcia-Carmona, Y., Magri, G., Cassis, L., Segura-Garzón, D., Ciociola, A., Grasset, E. K., Bascones, S., Comerma, L., Pybus, M., Lligé, et al
2017; 8 (1): 1462
 - **Defective Early B Cell Tolerance Checkpoints in Sjögren's Syndrome Patients.** *Arthritis & rheumatology (Hoboken, N.J.)*
Glauzy, S., Sng, J., Bannock, J. M., Gottenberg, J. E., Korganow, A. S., Cacoub, P., Saadoun, D., Meffre, E.
2017; 69 (11): 2203-2208
 - **HSC extrinsic sex-related and intrinsic autoimmune disease-related human B-cell variation is recapitulated in humanized mice.** *Blood advances*
Borsotti, C., Danzl, N. M., Nauman, G., Hölzl, M. A., French, C., Chavez, E., Khosravi-Maharlooeei, M., Glauzy, S., Delmotte, F. R., Meffre, E., Savage, D. G., Campbell, S. R., Goland, et al

2017; 1 (23): 2007-2018

- **Smith-Magenis Syndrome Patients Often Display Antibody Deficiency but Not Other Immune Pathologies** *JOURNAL OF ALLERGY AND CLINICAL IMMUNOLOGY-IN PRACTICE*
Perkins, T., Rosenberg, J. M., Le Coz, C., Alaimo, J. T., Trofa, M., Mullegama, S. V., Antaya, R. J., Jyonouchi, S., Elsea, S. H., Utz, P. J., Meffre, E., Romberg, N.
2017; 5 (5): 1344-+
- **Novel in vitro booster vaccination to rapidly generate antigen-specific human monoclonal antibodies.** *The Journal of experimental medicine*
Sanjuan Nandin, I., Fong, C., Deantonio, C., Torreno-Pina, J. A., Pecetta, S., Maldonado, P., Gasparrini, F., Ordovas-Montanes, J., Kazer, S. W., Kjaer, S., Borley, D. W., Nair, U., Coleman, et al
2017; 214 (8): 2471-2490
- **Germline hypomorphic CARD11 mutations in severe atopic disease.** *Nature genetics*
Ma, C. A., Stinson, J. R., Zhang, Y., Abbott, J. K., Weinreich, M. A., Hauk, P. J., Reynolds, P. R., Lyons, J. J., Nelson, C. G., Ruffo, E., Dorjbal, B., Glauzy, S., Yamakawa, et al
2017; 49 (8): 1192-1201
- **Self-reactive VH4-34-expressing IgG B cells recognize commensal bacteria.** *The Journal of experimental medicine*
Schickel, J. N., Glauzy, S., Ng, Y. S., Chamberlain, N., Massad, C., Isnardi, I., Katz, N., Uzel, G., Holland, S. M., Picard, C., Puel, A., Casanova, J. L., Meffre, et al
2017; 214 (7): 1991-2003
- **A novel humanized mouse model with significant improvement of class-switched, antigen-specific antibody production.** *Blood*
Yu, H., Borsotti, C., Schickel, J. N., Zhu, S., Strowig, T., Eynon, E. E., Frlleta, D., Gurer, C., Murphy, A. J., Yancopoulos, G. D., Meffre, E., Manz, M. G., Flavell, et al
2017; 129 (8): 959-969
- **Deficiency of base excision repair enzyme NEIL3 drives increased predisposition to autoimmunity.** *The Journal of clinical investigation*
Massaad, M. J., Zhou, J., Tsuchimoto, D., Chou, J., Jabara, H., Janssen, E., Glauzy, S., Olson, B. G., Morbach, H., Ohsumi, T. K., Schmitz, K., Kyriacos, M., Kane, et al
2016; 126 (11): 4219-4236
- **Decreased somatic hypermutation induces an impaired peripheral B cell tolerance checkpoint.** *The Journal of clinical investigation*
Cantaert, T., Schickel, J. N., Bannock, J. M., Ng, Y. S., Massad, C., Delmotte, F. R., Yamakawa, N., Glauzy, S., Chamberlain, N., Kinnunen, T., Menard, L., Lavoie, A., Walter, et al
2016; 126 (11): 4289-4302
- **PTPN22 inhibition resets defective human central B cell tolerance.** *Science immunology*
Schickel, J. N., Kuhny, M., Baldo, A., Bannock, J. M., Massad, C., Wang, H., Katz, N., Oe, T., Menard, L., Soulas-Sprauel, P., Strowig, T., Flavell, R., Meffre, et al
2016; 1 (1)
- **Rituximab does not reset defective early B cell tolerance checkpoints.** *The Journal of clinical investigation*
Chamberlain, N., Massad, C., Oe, T., Cantaert, T., Herold, K. C., Meffre, E.
2016; 126 (1): 282-7
- **Activation-Induced Cytidine Deaminase Expression in Human B Cell Precursors Is Essential for Central B Cell Tolerance.** *Immunity*
Cantaert, T., Schickel, J. N., Bannock, J. M., Ng, Y. S., Massad, C., Oe, T., Wu, R., Lavoie, A., Walter, J. E., Notarangelo, L. D., Al-Herz, W., Kilic, S. S., Ochs, et al
2015; 43 (5): 884-95
- **The Genotype and Phenotype (GAP) Registry: A National Resource for Studying Genetic Regulation of Immune Function in Normal Populations**
Gregersen, P., Keogh, M., Meffre, E., Nolan, G., Kimberly, R., Diamond, B.
ACADEMIC PRESS INC ELSEVIER SCIENCE.2010: S136