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Executive Summary

The deliverable presents the list of dissemination activities for WP5 classified according to the target: For the general public and patients, we listed the oral and written (including social media). For the scientific and medical community, we reported the academics courses, theses, awards, and meeting participations related to the UNDINE program. We also provided an overview of UNDINE's publication efforts with open access.

Abbreviations

D	Deliverable
EC	European Commission
WP	Work Package
WT	Work Task

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1. Dissemination for the general public and patients

Oral presentations mentioning UNDINE-related projects:

- Emmanuelle Jouanguy. FIMARAD (Dermatological Rare Diseases Branch). Risques Infectieux potentiels des biothérapies par anticorps; ce que nous apprennent les déficits immunitaires primaires. Nov 2022
- Jeremie Rosain. FIMARAD (Dermatological Rare Diseases Branch). Risques Infectieux potentiels des biothérapies par anticorps; ce que nous apprennent les déficits immunitaires primaires. Nov 2022
- Emmanuelle Jouanguy. Round table: From rare to common. Imagine Institute. Feb, 2023.
- Aurélie Cobat. Cinema-debate, "COVID, Leçon d'une crise", Imagine Institute, June 2023
- Emmanuelle Jouanguy. Open Day for general public at Imagine Institute. Science Day. Oct 2022, Oct 2023 and Feb 2024
- Emmanuelle Jouanguy. Presentation of projects and results to Imagine Institute sponsors, Sept 2022, Nov 2023
- Matthieu Mahévas. Webinar. Autoantibodies club of French Society of Immunology. From auto-immunity to therapeutics. Protective and pathogenic Memory B cells in COVID-19. March 2024.

Social media communication:

- Twitter/X account @casanova_lab (PI) relays all information about UNDINE & the advancement of the project
- On the new website on Human Genetics of Infectious Diseases laboratory we inform about UNDINE project (<https://www.hgid.org/collaborative-efforts/>), and we include a link to UNDINE-homepage

Written communications:

French Institutional Press Offices (Inserm and Institut Imagine) regularly release updates on the progress of UNDINE related projects, aimed at the general public:

- 15/06/2022 <https://presse.inserm.fr/covid-19-un-deficit-immunologique-expliquerait-pres-dun-quart-des-tres-rares-formes-severes-observees-chez-les-vaccines/45433/>
- 09/09/2022 <https://www.aphp.fr/contenu/dilemme-cytokinique-virus-contre-inflammation>
- 17/01/2023 <https://u-paris.fr/covid-19-des-defauts-genetiques-responsables-du-syndrome-inflammatoire-multi-systemique-de-lenfant/>
- 17/01/2023 <https://www.aphp.fr/contenu/covid-19-des-defauts-genetiques-responsables-du-syndrome-inflammatoire-multi-systemique-de>
- 18/01/2023 <https://presse.inserm.fr/covid-19-des-defauts-genetiques-responsables-du-syndrome-inflammatoire-multi-systemique-de-lenfant/46337/>
- 26/07/2023 <https://www.institutimagine.org/fr/les-auto-anticorps-contre-les-interferons-ou-pourquoi-certains-virus-nous-affectent-differemment>
- 05/12/2023 <https://www.institutimagine.org/fr/un-nouveau-groupe-de-maladies-genetiques-explique-la-production-dautoanticorps-contre-les-1623>
- 06/12/2023 <https://u-paris.fr/un-nouveau-groupe-de-maladies-genetiques-expliquent-la-predisposition-a-des-maladies-virales-severes/>
- 06/12/2023 <https://www.aphp.fr/contenu/un-nouveau-groupe-de-maladies-genetiques-expliquent-la-predisposition-des-maladies-virales>
- 05/01/2024 <https://www.institutimagine.org/fr/les-auto-anticorps-anti-ifn-de-type-i-detectes-et-operants-des-lenfance-1635>

Interviews and press releases in French and Estonian media:

- 11/07/2022: https://www.lemonde.fr/sciences/article/2022/07/11/covid-19-pourquoi-de-rares-personnes-vaccinees-a-deux-doses-font-des-formes-graves_6134225_1650684.html
- 13/08/2022: Human Immunome Project <https://www.youtube.com/watch?v=mZx91587AyU>
- 06/01/2023: https://www.sciencesetavenir.fr/sante/maladie-enfant/covid-19-le-pims-serait-en-partie-du-a-des-predispositions-genetiques_168701
- 18/01/2023: <https://biotechinfo.fr/article/covid-19-des-defauts-genetiques-responsables-du-syndrome-inflammatoire-multi-systemique-de-lenfant/>
- 25/01/2023: <https://www.radiofrance.fr/franceculture/podcasts/le-journal-des-sciences/covid-19-des-mutations-genetiques-associees-a-un-syndrome-inflammatoire-chez-l-enfant-6920629>
- 27/09/2023 : Fréquence Médicale Emission du 27 septembre 2023 -Anticorps et vaccination
- 08/12/2023 : <https://www.gazettelabo.fr/breves/14318nouveau-groupe-maladies-genetiques.html>
- 2023: Le déficit en interférons de type I n'affecte pas la réponse immunitaire humorale au vaccin contre le SARS-CoV-2. *Medicine Science. Med Sci (Paris)*, 40 1 (2024) 99-101 <https://doi.org/10.1051/medsci/2023182>
- 29/04/2024: <https://novaator.err.ee/1609327635/eakad-poevad-koroonat-ja-grippi-raskemini-autoantikehade-tottu>

2. Dissemination for the scientific and medical community**Academic courses, thesis, awards related to UNDINE activities:**

- Paul Bastard: Michelson Philanthropies & Science Prize for Immunology. Feb 2022.
- Emmanuelle Jouanguy, Paul Bastard, Anne Puel. Medical students course: Intiation to the Research, Université Paris Cité, Paris, Nov 2022
- Laurent Abel: Grand Prix de la Fondation pour la recherche médicale. Lecture at the college de France speaking about human immunological and genetic bases of COVID-19; Nov 2022.
- Matthieu Mahévas. Master course, Immunology and Immunopathologies (I2P) IA. Normal and Pathogenic B cell response 2022, 2023. Paris Cité University.
- Kai Kisand. The international immunology summer school "ABC7: Autoimmunity, B cells and Complement" . Tallin, Estonia. June 2023. <http://eias.ee/abc7-autoimmunity-b-cells-and-complement/>
- Emmanuelle Jouanguy/ Aurélie Cobat Master course-Maladies Infectieuses Emergentes, Pasteur Institute Oct 2023
- Aurélie Cobat. Master course-Human Genetics and Pathology. Sorbone University. Paris. Nov 2023.
- Emmanuelle Jouanguy, Paul Bastard, Anne Puel. Medical students course: Intiation to the Research, Université Paris Cité, Paris, Nov 2023
- Martti Vanker - prize from national competition of students' research works for the paper "Autoantibodies Neutralizing Type III Interferons Are Uncommon in Patients with Severe Coronavirus Disease 2019 Pneumonia" University of Tartu. <https://tervis.ut.ee/et/sisu/parimad-uliopilastood-said-preemia> December 2023
- Tom Le Voyer. PhD thesis. Susceptibilités infectieuses secondaires à des défauts de génétiques innés de l'immunité liée aux interférons de type I ou II ou à leurs phénocopies auto-immunes. University Paris Cité. Nov 2023
- Anne Puel. Fédération de Médecine Translationnelle de Strasbourg (FMTS): Human Host Factors in Critical COVID-19 Pneumonia, Strasbourg, France. Dec 2023
- Anne Puel. "IL-23 Day in 2023" Janssen Symposium: Cytokines Inhibitors: Insights from Human Genetics, Paris, France. Oct 2023.

Conferences in which Immunological and genetic bases of COVID-19 were presented:2022:

1. Jean-Laurent Casanova. 17th Annual Symposium on Primary Immunodeficiency Diseases, Foundation for Primary Immunodeficiency Diseases, Newport Beach, CA, USA, November 2022
2. Jean-Laurent Casanova. Plenary Lecture, Joint Congress: International Immunocompromised Host Society 22nd Symposium, Annual Congress Swiss Society for Allergology and Immunology (H Hirsch, M Recher), Congress Center Basel, Switzerland, September 2022
3. Jean-Laurent Casanova. Philip I. Marcus Memorial Lecture, Philip I. Marcus Symposium: Interferons and antiviral immunity, Cytokines 2022 (Mary Ann Liebert, Inc. Publishers), Big Island, HI, USA (virtual), September 2022
4. Paul Bastard. Lyon Immunopathology Federation (LIFE), Lyon University, Rockefeller Faculty, Lyon, France: From genetics to auto-immunity: predisposition to life-threatening viral infections December 2022
5. Paul Bastard. ITINERARE Symposium – Innovative Therapies in Rare Diseases, University of Zurich, Zurich, Switzerland,: From genetic to auto-immune predisposition to life-threatening COVID-19 December,2022
6. Paul Bastard. European society of immunodeficiencies, ESID 2022 Gothenburg, Sweden Gothenburg, Sweden, Auto-antibodies against type I IFNs and viral infections. October 2022.
7. Paul Bastard. Rencontres en Immunologie et Immunothérapie Pratiques (RIIP), Paris, France, Auto-immunity against innate immunity : leading to severe COVID-10. September 2022
8. Paul Bastard. 28th European Paediatric Rheumatology Congress (PReS 2022), Prague, Czech Republic, Genetic and immunological predisposition to life-threatening COVID-19: immune deficiency leading to immune dysregulation. September 2022.
9. Paul Bastard. XI Simposio Nacional de Inmunodeficiencias Primarias, Cartagena, Colombia : Autoanticuerpos en enfermedades infecciosas. August 2022
10. Emmanuelle Jouanguy. UT Southwestern Medical Center. Texas, USA. December 2022
11. Adrian Gervais. GyrosProtein annual European user meeting. Dublin, Ireland June 2022
12. Anne Puel. XIII Congrès National GeSIDA: Human Host Factors in Critical COVID-19 Pneumonia, Sitges, Spain. Nov 2022
13. Anne Puel. Cordeliers Research Centre Seminars: Human Host Factors in Critical COVID-19 Pneumonia, Paris, France. Dec 2022
14. Anne Puel. ILM - Oceanian Genomics Workshop: A loss-of-function *IFNAR1* allele in Polynesia underlying severe viral diseases in homozygotes, Tahiti, French Polynesia. Nov 2022
15. Anne Puel. 11th International Conference on Rare and Undiagnosed Diseases: Human Host Factors in Critical COVID-19 Pneumonia, Vienna, Austria. Nov 2022
16. Anne Puel. 21st Gene Forum 2022: Autoimmune Phenocopies of Inborn Errors of Immunity Underlying Infectious Diseases, Tartu, Estonia. Sept 2022
17. Le Voyer T. Virtual Symposium « NF-κB2 and anti-type I IFN autoantibodies». Symposium de Déficiés Immunitaires primitifs, Mexico, Apr 2022

2023:

18. Jean-Laurent Casanova. 30th Annual Meeting of the Henry Kunkel Society: Innate Immunity: From Basic Biology to Human Disease, The Rockefeller University, New York, NY, USA, April 2023
19. Jean-Laurent Casanova. 2nd International Symposium on Inborn Errors of Immunity in the Northern Atlantic, Tórshavn, Faroe Islands, June 2023
20. Jean-Laurent Casanova. 18th Annual Symposium on Primary Immunodeficiency Diseases (S Gupta, JL Casanova), Foundation for Primary Immunodeficiency Diseases, Newport Beach, CA, USA, November 2023
21. Jean-Laurent Casanova. Distinguished Lectures in Genetics Seminar Series, Division of Human Genetics, Cincinnati Children's Hospital (S Waggoner), Cincinnati, OH, USA, February 2023
22. Jean-Laurent Casanova. Distinguished Seminar (K Hisert), National Jewish Health, Denver, CO, USA, March 2023

23. Jean-Laurent Casanova. Inaugural Speaker, Robert W. Finberg, MD Memorial Lecture: Pandemics, Plagues and Viruses (K Fitzgerald, D Golenbock), University of Massachusetts Chan Medical School, Worcester, MA, USA, March 2023
24. Jean-Laurent Casanova. Distinguished Faculty Lectureship in Infectious Diseases (J Coburn), Medical College of Wisconsin, Milwaukee, WI, USA, April 2023
25. Jean-Laurent Casanova. Sidney Leskowitz Memorial Lecture (A Poltorak), Tufts University Medical School, Boston, MA, USA, April 2023
26. Jean-Laurent Casanova. Founders Lecture, Latin American Society for Immunodeficiencies (LASID) 2023 Meeting (G Segundo, A Alvarez), Mexico City, Mexico, October 2023
27. Paul Bastard. Keynote speaker, Precision Medicine & Functional Genomics (PMFG) Young Scientists Symposium, Doha, Qatar,: Auto-immune predisposition to life-threatening viral infections. November 2023
28. Paul Bastard. Speaker, International Congress – Interferons in Cancer and viral diseases, La Havane, Cuba: “Auto-antibodies to Type I IFNs in Patients with Severe Viral Infections September 2023
29. Paul Bastard. keynote speaker for the Rare Disease Summer School, ITINERARE; Kartause Ittingen, Switzerland, From rare to more frequent causes of severe viral diseases: genetics and auto-immunity. July 2023
30. Paul Bastard. Symposium Maladies rares 2023 : Du diagnostic au traitement : Prédilection génétique et immunologique aux formes sévères de COVID-19 : de la pneumopathie au Kawasaki-COVID. Bruxelles, Belgium; June 2023
31. Paul Bastard. 33rd annual congress of the European Society of Clinical Microbiology and Infectious Diseases (ECCMID); Copenhagen, Denmark; Role of neutralising autoantibodies to type I interferons in the pathogenesis of critical COVID-19 and influenza. April 2023
32. Paul Bastard. Division of Viral Products seminar series, Pasteur Institute, Paris, France;: Genetic and auto-immune causes of life-threatening viral diseases. March, 2023
33. Paul Bastard. European Society of Clinical Microbiology and Infectious Diseases: Genetic and auto-immune causes of life-threatening COVID-19, Copenhagen, Denmark: April 2023
34. Paul Bastard. Symposium of the Belgian Primary Immune Deficiency Group (BPIDG) Bruxelles, Belgium, March 2023.
35. Paul Bastard. NSI Rising Stars in Immunology Seminar Series, Norway (online);: Genetic and auto-immune predisposition to life-threatening COVID-19 February 2023
36. Paul Bastard. French National Research Agency (ANR) symposium: COVID-19 (Research perspectives), Paris, France: February 2023
37. Paul Bastard. European Academy of Allergy & Clinical Immunology (EAACI) Immunology Winterschool: Switzerland : Genetic and auto-immune determinants of life-threatening COVID-19 January 2023, Davos
38. Paul Bastard. Infectiology symposium of the Maurice Rappin Institute, Paris, France: Genetic and auto-immune determinants of life-threatening COVID-19. January 2023
39. Anne Puel. NIAID Friday Grand Rounds: Alternative NF- κ B Pathway Drives AIRE Thymic Expression and Type I IFN Tolerance, NIH, virtual meeting. Sept 2023
40. Anne Puel. International Symposium EUREKA!2023: Human Host Factors in Susceptibility to Viral Diseases; Ex: Critical COVID-19 Pneumonia, Würzburg, Germany. Oct 2023
41. Anne Puel. Joint Meeting SFI & DGfI: Human Host Factors in Susceptibility to Viral Diseases; Ex: Critical COVID-19 Pneumonia, Strasbourg, France. Sept 2023
42. Anne Puel. 33rd Annual Conference of the Australian Society of Clinical Immunology and Allergy (ASCA): Autoimmune Phenocopies of Inborn Errors of Immunity Ex: Type I IFNs and Critical COVID-19 Pneumonia, and Human Inborn Errors of Immunity and Chronic Mucocutaneous Candidiasis (CMC), Sydney, Australia. Sept 2023
43. Anne Puel. Australasian Immunogenomics Symposium 2023: Alternative NF- κ B Pathway Drives AIRE Thymic Expression and Type I IFN Tolerance, Sydney, Australia. Sept 2023
44. Anne Puel. 16th ENII EFIS EJI Summer School on Advanced Immunology: Human Host Factors in Susceptibility to Infectious Diseases; Ex: Critical COVID-19 Pneumonia, Alghero, Sardinia, Italy. May 2023.

45. Anne Puel. 14th International Conference on Immunodeficiency Diseases (ICID): Anti-Cytokine Auto-Antibodies and Infectious Diseases, Teheran, Virtual meeting. Apr 2023.
46. Anne Puel. XXVèmes Journées Francophones de Virologie (JFV): Human Host Factors in Critical COVID-19 Pneumonia, Paris, France. Apr 2023.
47. Anne Puel. 6th International Conference on inborn errors of immunity: Inborn Errors of the Alternative NF- κ B pathway underlie the Production of Autoantibodies to Type I IFNs, Gurugram, India. Apr 2023
48. Adrian Gervais. 2nd International symposium on Inborn Errors of Immunity Faroe Islands, June 2023
49. Adrian Gervais. Young Researchers of the Imagine Institute congress, Paris, June 2023
50. Adrian Gervais. Young Researchers in Life Sciences, Paris, July 2023
51. Adrian Gervais. Encephalitis International Conference, London, December 2023
52. Astrid Marchal. ED393 Pierre Louis Doctoral School Seminar, St Malo, France. Poster Anti-type I interferon autoantibodies: a genetic basis?. February 2023
53. Kai Kisand. AIS2023. Monogenic autoimmunity as a source of autoantibodies with therapeutic and diagnostic potential. Tours, France. June 2023.
54. Laurent Abel; Keynote lecture, ANRS-EID scientific days, Paris, France, March 2023
55. Laurent Abel; Invited lecture, Académie de médecine, Paris, France, April 2023
56. Aurélie COBAT: INCEPTION meeting, Inborn errors of type I IFN immunity in patients with life-threatening COVID-19 pneumonia Pasteur Institute France, Nov 2023
57. Le Voyer T, Cell Symposium: Viruses in health and disease 2023. Impaired thymic AIRE expression underlies autoantibodies against type I IFNs in humans with inborn errors of the alternative NF- κ B pathway. Sitges, Spain. March 2023.
58. Le Voyer T Clinical Immunology Society Annual Meeting: Immune Deficiency & Dysregulation North American Conference, Impaired thymic AIRE expression underlies autoantibodies against type I IFNs in humans with inborn errors of the alternative NF- κ B pathway. St Louis; Missouri, (USA). May 2023.
59. Le Voyer T, Inborn errors of the canonical and alternative NF- κ B pathways. Séminaire Pierre Royer. Institut Imagine. Paris, France. Apr 2023.

2024:

60. Jean-Laurent Casanova. Keynote Lecture, 2nd Fenglin International Clinical Immunology Forum (X Wang, JL Casanova), Children's Hospital of Fudan University, Shanghai, China, March 2024
61. Jean-Laurent Casanova. Keynote Lecture, 2024 Formosa Translational Immunology Symposium (CL Ku, MD Kuo), Linkou Chang Gung Memorial Hospital, Taoyuan, Taiwan, March 2024
62. Jean-Laurent Casanova. 2nd Fenglin International Clinical Immunology Forum (X Wang, JL Casanova), Children's Hospital of Fudan University, Shanghai, China, March 2024
63. Jean-Laurent Casanova. 31th Annual Meeting of the Henry Kunkel Society: Innate Immunity: From Basic Biology to Human Disease, The Rockefeller University, New York, NY, USA, April 2024
64. Emmanuelle Jouanguy. HUGO annual meeting. Rome, Italy, Apr 2024.
65. Adrian Gervais. World Encephalitis Day, Bichat Hospital, Paris, February 2024
66. Astrid Marchal. National Meeting on Genetics. Poster Lack of association between HLA and asymptomatic SARS-CoV2 infection Paris January 2024
67. Astrid Marchal. ED393 Pierre Louis Doctoral School Seminar Poster Lack of association between HLA and asymptomatic SARS-CoV2 infection, St Malo, France, February 2024.
68. Jacques Fellay. Personalised Health Conference 2024, Basel: Translational genomics in infectious diseases, Jacques Fellay (Keynote talk). March 2024.
69. Guy Gorochov. Invited lecture at Rockefeller University. Molecular insights into type 1 interferon autoantibody reactivity. Apr 2024.
70. Anne Puel. 19th Spring School on Immunology: Human autoantibodies neutralizing type I interferons and their clinical consequences, Ettal, Germany. March 2024
71. Anne Puel. Formosa Translational Immunology Symposium (FTIS): Autoantibodies against Type I IFNs and their clinical consequences, Taoyuan, Taiwan. March, 2024.

72. Anne Puel. Belgian PID symposium: Alternative NF- κ B Pathway Drives AIRE Thymic Expression and Type I IFN Tolerance, Brussels, Belgium. April, 2024,
73. Anne Puel. 15th International Congress of Immunodeficiency Diseases (ICID): Alternative NF- κ B Pathway Drives AIRE Thymic Expression and Type I IFN Tolerance, Online, Tehran, Iran. April, 2024
74. Matthieu Mahévas. EMBO Workshop. Autoimmune B cell response against type I interferons in COVID-19. EMBO, July 2024.
75. Laurent Abel. Invited lecture. Swiss Tropical Institute, Basel, Switzerland, December 2024.
76. Beziat V, The Immunopathological Landscape of Human Pre-TCRa Deficiency: From Rare to Common Variants, 31st Annual Henry Kunkel Society Meeting, The Rockefeller University, New York, USA. Apr 2024.
77. Le Voyer T, Autoantibodies against type I IFNs in humans with alternative NF- κ B pathway deficiency, 19ème Journée Nationale du Centre de Référence Déficiences Immunitaires Héritaires – CEREDIH, Institut Imagine, Paris. France. Jan 2024
78. Le Voyer T, NFKB2 Signaling in the Thymus Controls Production of Anti-Type I IFN Antibodies, 31st Annual Henry Kunkel Society Meeting, The Rockefeller University, New York, USA. Apr 2024.

Overview of UNDINE's publication efforts with open access

1. Casanova JL, Abel L. From rare disorders of immunity to common determinants of infection: Following the mechanistic thread. *Cell*. 2022. 185: 3086-103
2. Lee D, et al. Inborn errors of OAS-RNase L in SARS-CoV-2-related multisystem inflammatory syndrome in children. *Science*. 2023. 379(6632):eabo3627.
3. Mathian A, et al. Lower disease activity but higher risk of severe COVID-19 and herpes zoster in patients with systemic lupus erythematosus with pre-existing autoantibodies neutralising IFN- α . *Ann Rheum Dis* 2022. 81: 1695-703
4. Matuozzo D, et al. Rare predicted loss-of-function variants of type I IFN immunity genes are associated with life-threatening COVID-19. *Genome Med*. 2023;15(1):22.
5. Zhang Q, et al. Recessive inborn errors of type I IFN immunity in children with COVID-19 pneumonia. *J Exp Med* 2022. 219
6. Zhang Q, et al. Autoantibodies against type I IFNs in patients with critical influenza pneumonia. *J Exp Med*. 2022. 219(11):e20220514.
7. Sokal A, et al. Human type I IFN deficiency does not impair B cell response to SARS-CoV-2 mRNA vaccination. *J Exp Med*. 2023. 220(1):e20220258.
8. Buccioli G; et al. Inherited and acquired errors of type I interferon immunity govern susceptibility to COVID-19 and multisystem inflammatory syndrome in children. *J Allergy Clin Immunol*. 2023. 151(4):832-840.
9. Tangye SG; et al. Impact of SARS-CoV-2 infection and COVID-19 on patients with inborn errors of immunity. *J Allergy Clin Immunol*. 2023 151(4):818-831.
10. Cobat A, et al. Human Genomics of COVID-19 Pneumonia: Contributions of Rare and Common Variants. *Annu Rev Biomed Data Sci*. 2023. 6:465-486.
11. Philippot Q, et al. Autoantibodies Neutralizing Type I IFNs in the Bronchoalveolar Lavage of at Least 10% of Patients During Life-Threatening COVID-19 Pneumonia. *J Clin Immunol*. 2023. 43(6):1093-1103.
12. Pan-Hammarström Q, Casanova JL. Human genetic and immunological determinants of SARS-CoV-2 and Epstein-Barr virus diseases in childhood: Insightful contrasts. *J Intern Med*. 2023. 294(2):127-144.
13. Buccioli G, et al. Human inherited complete STAT2 deficiency underlies inflammatory viral diseases. *J Clin Invest*. 2023. 133(12):e168321.
14. Aquino Y, et al. Dissecting human population variation in single-cell responses to SARS-CoV-2. *Nature*. 2023. 621(7977):120-128.
15. Gervais A, et al. Autoantibodies neutralizing type I IFNs underlie West Nile virus encephalitis in ~40% of patients. *J Exp Med*. 2023. 220(9):e20230661.
16. von Gunten S, et al. Antibody diversity in IVIG: Therapeutic opportunities for novel immunotherapeutic drugs. *Front Immunol*. 2023. 14:1166821.

17. Lin SC, et al. Blockade of interferon signaling decreases gut barrier integrity and promotes severe West Nile virus disease. *Nat Commun.* 2023. 14(1):5973.
 18. Le Voyer T, et al. Autoantibodies against type I IFNs in humans with alternative NF- κ B pathway deficiency. *Nature.* 2023. 623(7988):803-813.
 19. Benezech S, et al. Pre-Covid-19, SARS-CoV-2-Negative Multisystem Inflammatory Syndrome in Children. *N Engl J Med.* 2023. 389(22):2105-2107.
 20. Bastard P, et al. Human autoantibodies neutralizing type I IFNs: From 1981 to 2023. *Immunol Rev.* 2024. 322(1):98-112.
 21. Bastard P, et al. Higher COVID-19 pneumonia risk associated with anti-IFN- α than with anti-IFN- ω auto-Abs in children. *J Exp Med.* 2024. 221(2):e20231353.
 22. Materna M, et al. The immunopathological landscape of human pre-TCR α deficiency: From rare to common variants. *Science.* 2024 . 383(6686):eadh4059.
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