

BLOOD CANCER CARE & COVID-19

YOUR QUESTIONS ANSWERED

WELCOME!

The program will begin shortly.



Moderator:



Gwen Nichols, MD
Chief Medical Officer | The Leukemia & Lymphoma Society

Featured Presenters:



Catriona Jamieson, MD, PhD
Deputy Director | UCSD Moores Cancer Center



Derrick Rossi, PhD
Chief Executive Officer | Convelo Therapeutics
Co-Founder | Moderna

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OUR PRESENTERS

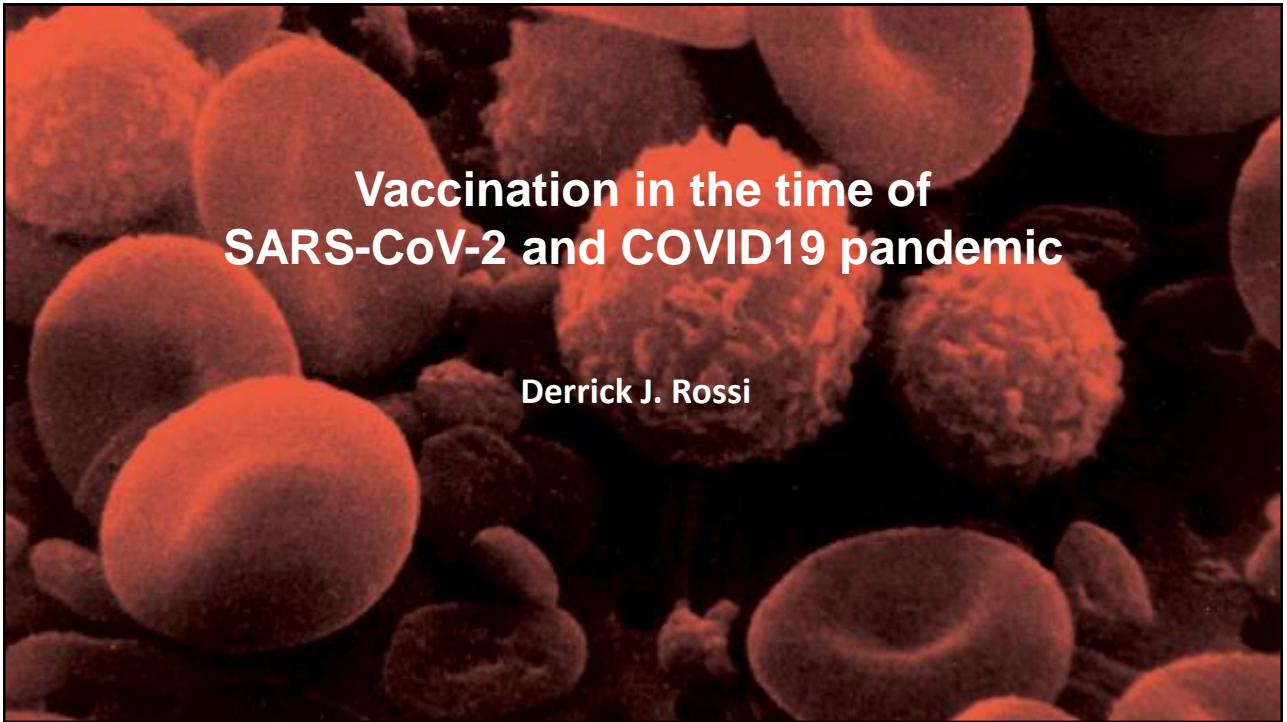


Catriona Jamieson, MD, PhD
Deputy Director | UCSD Moores Cancer Center



Derrick Rossi, PhD
Chief Executive Officer | Convelo Therapeutics
Co-Founder | Moderna

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Vaccination in the time of SARS-CoV-2 and COVID19 pandemic

Derrick J. Rossi

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State of the pandemic

- Respiratory disease breaks out in Wuhan China in late 2019
- First reported case in US on January 15, 2020
- WHO declares outbreak is a global pandemic on March 11, 2020
- Globally, over 2.8 million people have died from COVID19
- In US, 30.8 million people have been infected and >555,000 have died

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What your immune system normally does?



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5

What are vaccines and what do they do?

The purpose of vaccines is the introduction of a part of the virus into our bodies so that it will be recognized as *non-self* by our immune systems .



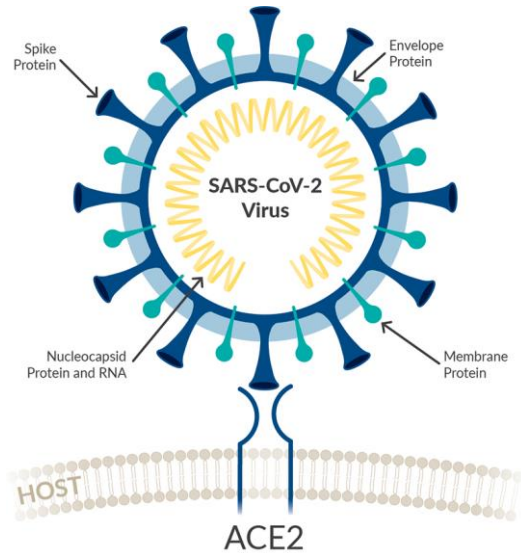
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SARs-CoV-2 spike protein

Corona viruses use a protein called the spike protein to initiate their infectious cycle.



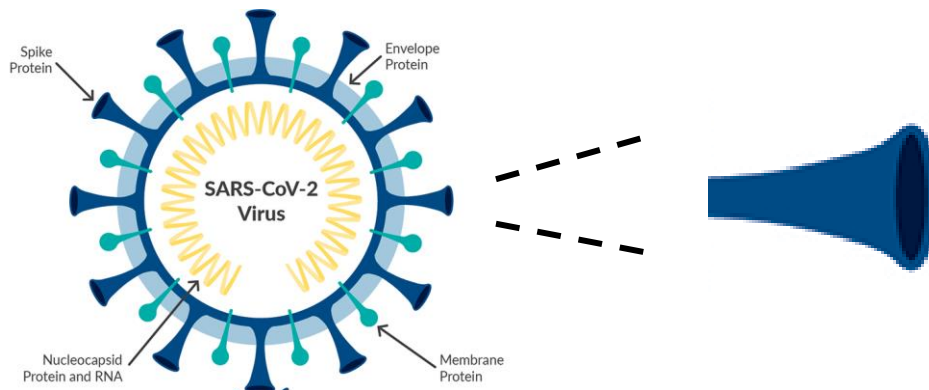
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What are vaccines and what do they do?

For vaccines targeting SARS-CoV-2, the vaccines carry instructions to express/introduce the spike protein in our bodies



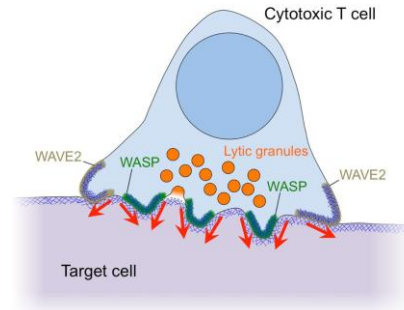
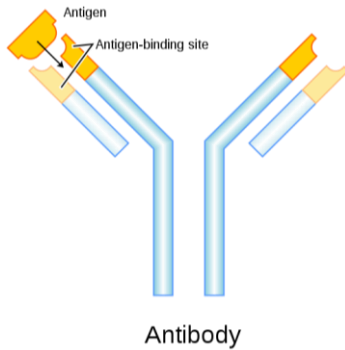
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What are vaccines and what do they do?

The immune system of a vaccinated person responds by producing neutralizing antibodies that specifically recognize and bind to the spike protein, and specialized T-cells that mediate cellular immune responses.



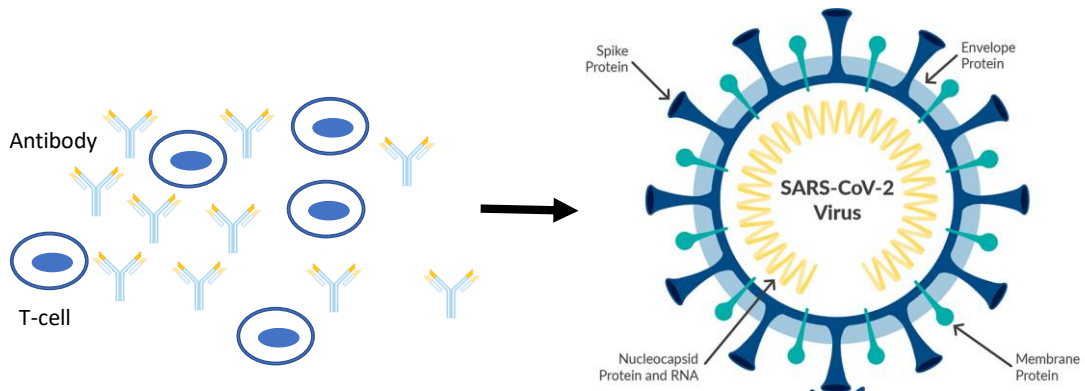
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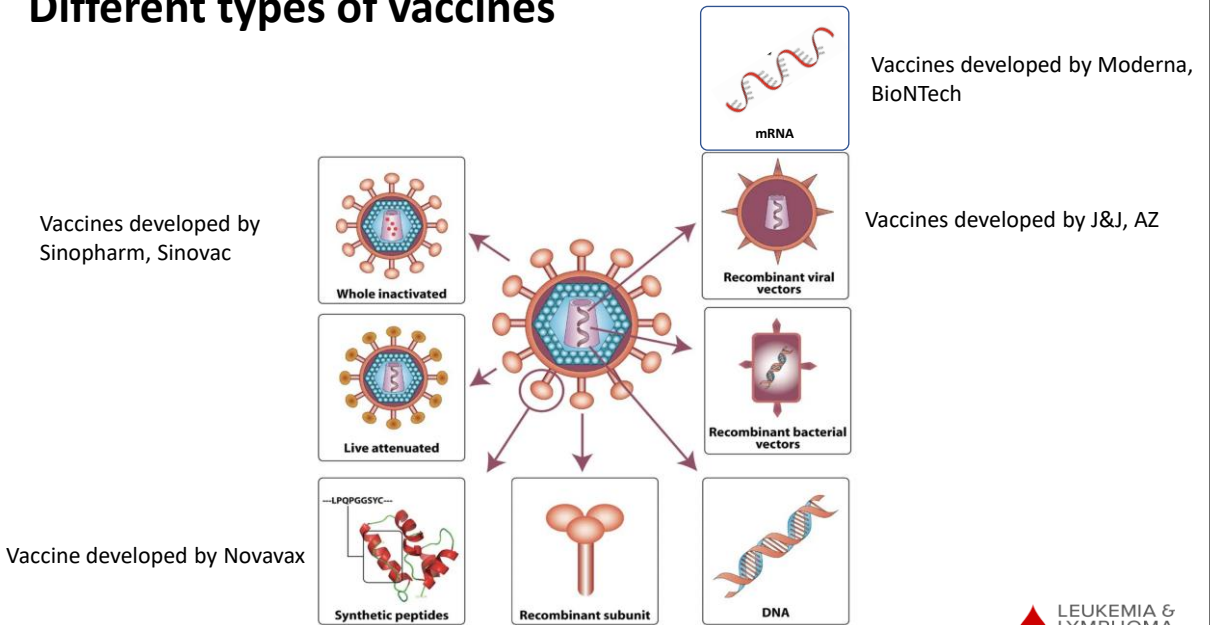
What are vaccines and what do they do?

When a vaccinated person encounters the virus, their immune systems are primed to act quickly blocking the ability of the virus to infect cells (neutralizing antibodies) or killing cells that do become infected (T-cell response).



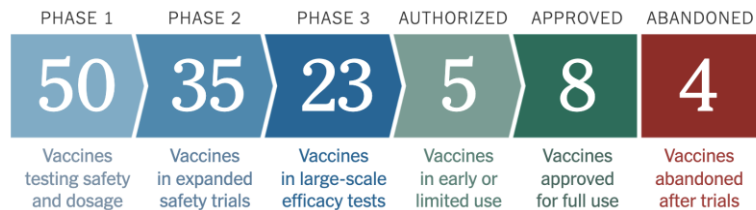
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Different types of vaccines



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How so fast, transparency



- New technologies, yet extensive clinical experience
- Clinical trial design
- Investment in manufacturing
- Massive mobilization of resource and brain power

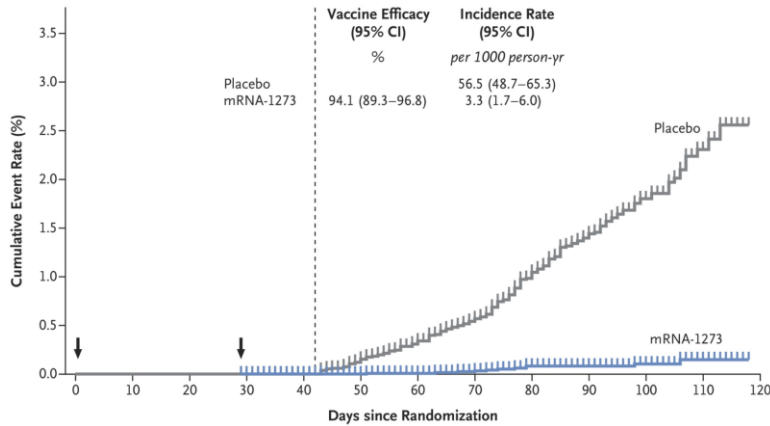
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SARS-CoV-2, COVID19 and mRNA-1273

- SARS-CoV-2 genome on web Jan 2020, 42 days later GMP mRNA ready for human trials
- Nov 30, 2020: Phase 3 blinded, placebo-controlled (15,000 vaccine, 15,000 placebo)



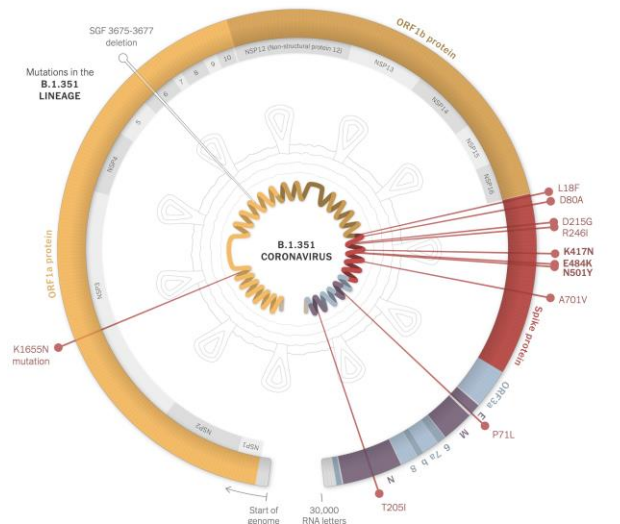
NEJM, Dec 2020

- Well tolerated, no serious safety concerns
- 196 cases, 30 severe, 1 death
- 94.1% effective against COVID19, **100% effective against severe disease**

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SARS-CoV-2 Variants, mRNA-1273.351



- First identified in South Africa in October 2020 (now 24+ countries)
- Evidence of increased transmissibility
- Vaccine-elicited antibodies were also less effective at neutralizing this variant *in vitro* (trials run in SA show reduced efficacy)
- mRNA-1273-351 shipped to NIH Feb 24th for clinical study
- First patient dosed March 10, 2021
- B1.1.7 (Britain) and P1 (Brazil) variants more infectious but current vaccines appear effective

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CANCER
IS IN
OUR BLOOD.**




**BLOOD CANCER
RESEARCH AND
TREATMENT IN THE
TIME OF COVID**

C. JAMIESON, MD PHD
 PROFESSOR OF MEDICINE AND KOMAN FAMILY
 ENDOWED CHAIR IN CANCER RESEARCH
 DIRECTOR, SANFORD STEM CELL CLINICAL
 CENTER
 DEPUTY DIRECTOR,
 UC SAN DIEGO MOORES CANCER CENTER



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**OUR
MISSION**

The mission of The Leukemia & Lymphoma Society (LLS) is: Cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families.

We fund **RESEARCH** to advance lifesaving treatments

We drive **ADVOCACY** for policies that protect patient access to lifesaving treatment

We provide patients and families with hope, guidance, education and **SUPPORT**

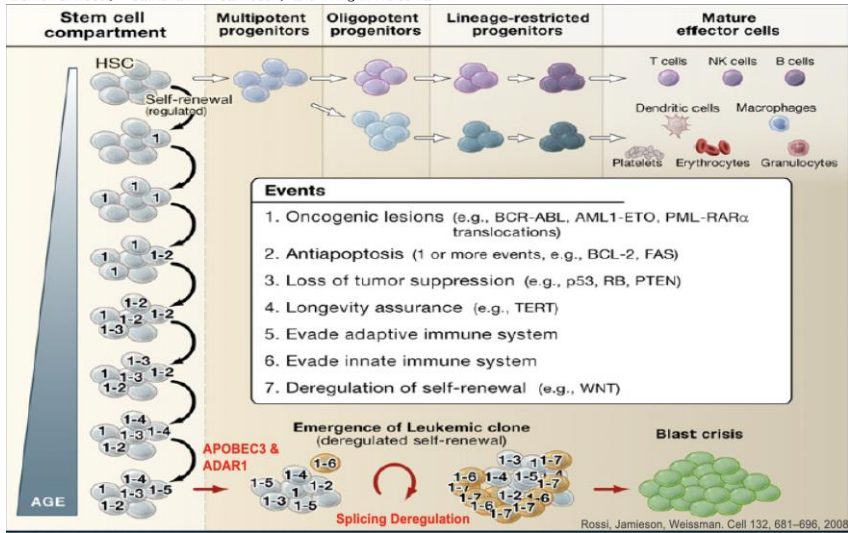


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Stems Cells and the Pathways to Aging and Cancer

Derrick J. Rossi,^{1,*} Catriona H.M. Jamieson,² and Irving L. Weissman³

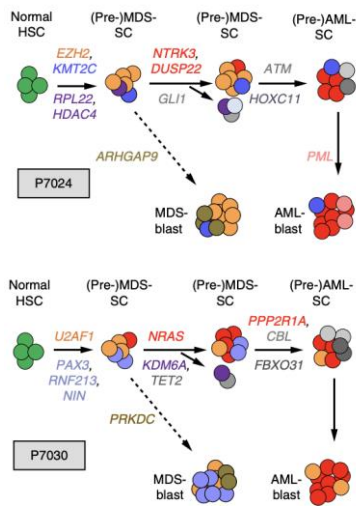


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EVOLUTION OF PRE-LEUKEMIA STEM CELLS IN MYELODYSPLASTIC SYNDROME



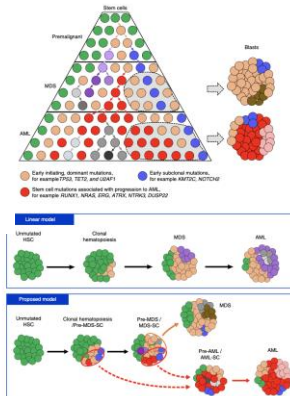
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nature medicine LETTERS

https://doi.org/10.1038/s41591-020-0207-4
Corrected: Publisher Correction

Myelodysplastic syndrome progression to acute myeloid leukemia at the stem cell level

Jiahao Chen¹, Yun-Ruei Kao¹, Daqian Sun^{2,3}, Tihomira I. Todorova¹, David Reynolds⁴, Swathi-Rao Narayanagari^{1,3}, Cristina Montagna^{5,6}, Britta Will^{1,2,3,6}, Amit Verma^{1,2,3,6} and Ulrich Steidl^{1,2,3,6}



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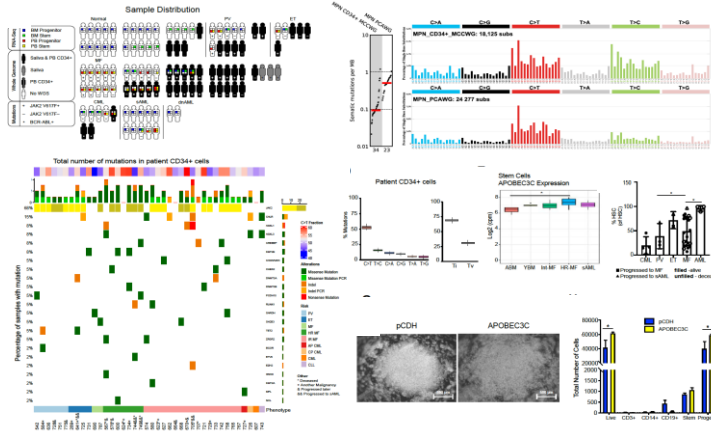
EVOLUTION OF PRE-LEUKEMIA STEM CELLS IN MYELOPROLIFERATIVE NEOPLASMS

Cell Reports



Inflammation-driven deaminase deregulation fuels human pre-leukemia stem cell evolution

Qingfei Jiang,^{1,7} Jane Isquith,^{1,7} Luisa Ladel,¹ Adam Mark,² Frida Holm,³ Cayla Mason,¹ Yudou He,⁴ Phoebe Mondala,¹ Isabelle Oliver,¹ Jessica Pham,¹ Wenxue Ma,¹ Eduardo Reynoso,¹ Shawn Ali,¹ Isabella Jamieson Morris,¹ Raymond Diep,¹ Chanond Nasamran,² Guorong Xu,² Roman Sasik,² Sara Brin Rosenthal,² Amanda Birmingham,² Sanja Coso,¹ Gabriel Pineda,¹ Leslie Crews,¹ Mary E. Donohoe,¹ J. Craig Venter,⁵ Thomas Whisenant,² Ruben A. Mesa,⁶ Ludmil B. Alexandrov,¹ Kathleen M. Fisch,^{1,7} and Catriona Jamieson^{1,7}



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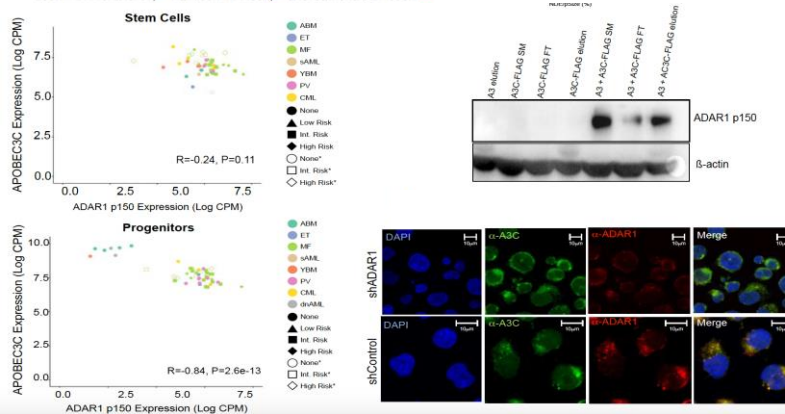
ANTI-VIRAL ENZYME DRIVEN PRE-LEUKEMIA STEM CELL TRANSFORMATION INTO LEUKEMIA STEM CELLS

Cell Reports



Inflammation-driven deaminase deregulation fuels human pre-leukemia stem cell evolution

Qingfei Jiang,^{1,7} Jane Isquith,^{1,7} Luisa Ladel,¹ Adam Mark,² Frida Holm,³ Cayla Mason,¹ Yudou He,⁴ Phoebe Mondala,¹ Isabelle Oliver,¹ Jessica Pham,¹ Wenxue Ma,¹ Eduardo Reynoso,¹ Shawn Ali,¹ Isabella Jamieson Morris,¹ Raymond Diep,¹ Chanond Nasamran,² Guorong Xu,² Roman Sasik,² Sara Brin Rosenthal,² Amanda Birmingham,² Sanja Coso,¹ Gabriel Pineda,¹ Leslie Crews,¹ Mary E. Donohoe,¹ J. Craig Venter,⁵ Thomas Whisenant,² Ruben A. Mesa,⁶ Ludmil B. Alexandrov,¹ Kathleen M. Fisch,^{1,7} and Catriona Jamieson^{1,7}



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JAK2 INHIBITION REDUCES LEUKEMIA STEM CELL SELF-RENEWAL

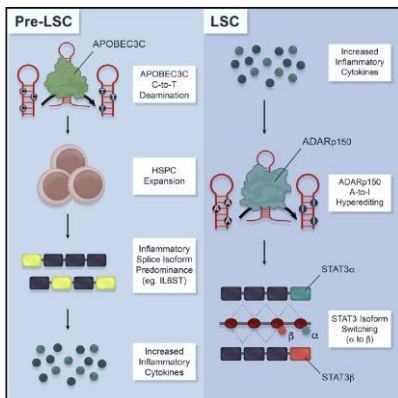
Cell Reports

CellPress

Article

Inflammation-driven deaminase deregulation fuels human pre-leukemia stem cell evolution

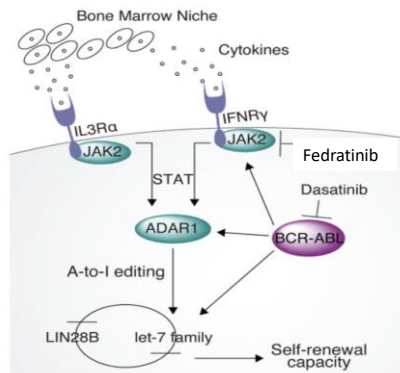
Qingli Jiang^{1,2}, Jian He^{1,2}, Luis Lopez¹, Adam Mark¹, Frida Hohn¹, Cuiya Zhou¹, Yafan He¹, Phoebe Mondala¹, Isabelle Omer¹, Jessica Pham¹, Wilmar Ma¹, Eduardo Reynoso¹, Shuan Ali¹, Isabella Jamison Morris¹, Sharmistha Dasg¹, Chander Heemay¹, Gabriel Yu¹, Roman Sanku¹, Sara Ede Rosenthal¹, Amanda Blomgren¹, Sara Chen¹, Gabriel Pineda¹, Leslie Crews¹, Mary E. Donohoe¹, J. Greg Vander¹, Thomas Whisenant¹, Ruben A. Mesa¹, Leslie B. Janssen^{1,2}, Heather M. Frisch^{1,2}, and Carlton Jamieson^{1,2}



Cell Stem Cell 2016 August 4; 19(2): 177–191, doi:10.1016/j.stem.2016.05.004.

ADAR1 Activation Drives Leukemia Stem Cell Self-renewal by Impairing Let-7 Biogenesis

Maria Anna Zepeto^{1,2}, Angela C. Court^{1,2}, Anil Sadarangani¹, Nathaniel P. Delos-Santos¹, Larisa Balalan¹, Hye-Jung Chun², Gabriel Pineda¹, Sheldon R. Morris¹, Cayla N. Mason¹, Ilan Geron¹, Christian Barrett¹, Daniel J. Goff¹, Russell Wall¹, Maurizio Pellicchia¹, Mark Minden¹, Kelly A. Frazer¹, Marco A. Marra¹, Leslie A. Crews¹, Qingli Jiang^{1,2}, and Carlton H. M. Jamieson^{1,2}



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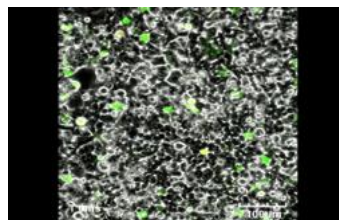
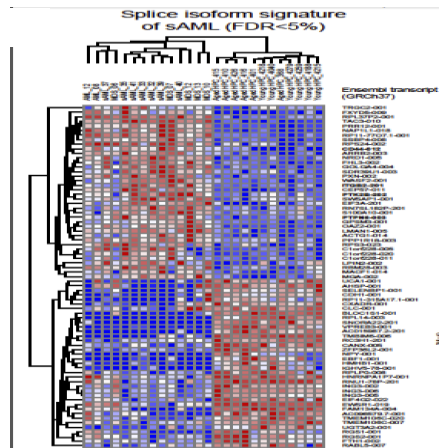
LEUKEMIA STEM CELL TARGETING WITH A SPLICING MODULATOR, REBEC SINIB (17S-FD-895)

Cell Stem Cell

Article

RNA Splicing Modulation Selectively Impairs Leukemia Stem Cell Maintenance in Secondary Human AML

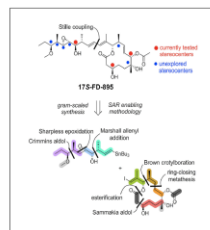
Leslie A. Crews^{1,2}, Larisa Balalan^{1,2}, Nathaniel P. Delos Santos^{1,2}, Heather B. Liu^{1,2}, Angela C. Court¹, Elisa Lazarini¹, Anil Sadarangani¹, Maria A. Zepeto¹, James J. Lu-Cook¹, Raymond W. Williams¹, Anna Kuligajski¹, Ruiner Shou^{1,2}, Sheldon R. Morris¹, Edward D. Ball¹, Michael D. Burkert¹, and Carlton H.M. Jamieson^{1,2}



Cell Reports
Physical Science

CellPress

Scalable Synthesis of 17S-FD-895 Expands the Structural Understanding of Splice Modulatory Activity



Warren C. Chen, James J. Lu-Cook, Brian Lohs, ... Andrew S. Figueroa, Carlton Jamieson, Michael D. Burkert, Leslie A. Crews, and Carlton H.M. Jamieson

17S-FD-895
Process scaled synthesis of a complex polycyclic

Complete control of regioselective bond assembly
Installation of 11 stereocenters with high enantioselectivity
Synthetic access to single stereoisomers and single-atom isotopically labeled analogs

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DETECTION AND PREVENTION OF MALIGNANT MYELOMA REGENERATION

THE LANCET
Haematology

ARTICLES | VOLUME 375, ISSUE 10158, AUGUST 11, 2021

Treatment with PF-0449913, an oral smoothed antagonist, in patients with myeloid malignancies: a phase 1 safety and pharmacokinetics study

Shannon McPherson, MD, Victor C. Gohari, MD, Cristinel Popescu, MD, Rachel Coombs, PhD, M. Hassan Shah, PhD, Siwei Zhang, PhD, Ashleigh O'Connell, MSc, Karen H. McCluskey, PhD, Siwan Zhang, PhD, Prof. Jerald Kalish, MD, Prof. Nabeel Razvi, MD, Prof. Hagen M. Rosenblatt, MD

Drug Approval Package: DAURISMO (glasdegib)

Company: Pfizer, Inc.
Application Number: 210506
Approval Date: 11/03/2018

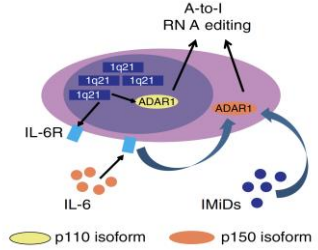
DrugPDBA information available about DAURISMO

THLIFE COMMUNICATIONS

ARTICLE

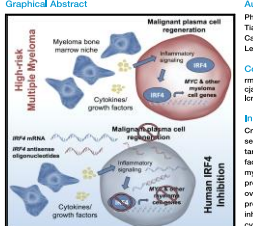
Alu-dependent RNA editing of GLI1 promotes malignant regeneration in multiple myeloma

Elisa Lazzeri¹, Phoebe K. Mondala¹, Nathaniel Dallas Santos¹, Amber C. Miller², Gabriel Firooz^{1,3}, Qingli Jiang⁴, Heather Lau¹, Shaan A. Ali¹, Anusha Pruthi Gattam¹, Christina H. Wu¹, Caitlin Costello¹, Mark Menden¹, Raffaella Ciaramanti¹, A. Keith Stewart¹, Leslie A. Crews¹ & Carlotta H.M. Jamison^{1*}



Cell Stem Cell Clinical and Translational Report

Selective antisense oligonucleotide inhibition of human IRF4 prevents malignant myeloma regeneration via cell cycle disruption



- Highlights**
- Myeloma progenitors are enriched in protective niches and with IRF4 overexpression
 - IRF4 antisense agents impair myeloma cell survival through cell cycle disruption
 - Selective IRF4 inhibition reduces myeloma regeneration in pre-clinical models
 - IRF4 inhibitors sensitize myeloma cells to clinical drugs and spare normal immune cells

Mondala et al., 2021, Cell Stem Cell 26, 1-14
May 6, 2021 © 2020 Elsevier Inc.
<https://doi.org/10.1016/j.stem.2020.12.017>

Authors
Phoebe K. Mondala, Ashni A. Vora, Tianyuan Zhou, et al., Robert MacLeod, Carlotta H.M. Jamison, Leslie A. Crews

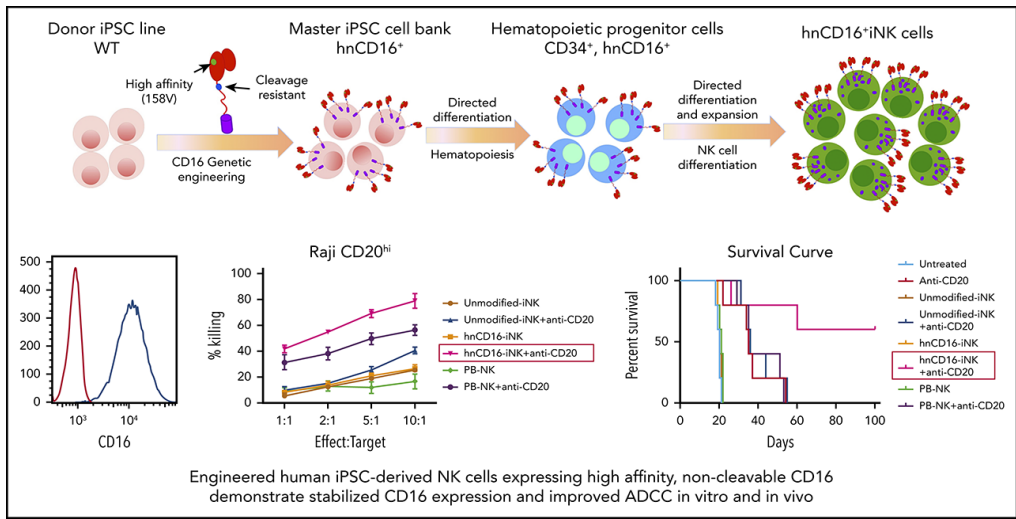
Correspondence
rmmacleod@ionoph.com (A.J.M.), cjamison@ucsf.edu (C.H.M.), lewis@ionoph.com (L.A.C.)

In Brief
Crews and colleagues demonstrate that selective antisense oligonucleotides targeting the plasma cell transcription factor, IRF4, reduce disease burden and myeloma regeneration in human-relevant pre-clinical models. Mechanistically, IRF4 overexpression expands a myeloma progenitor population, while IRF4 inhibition impairs cell survival via cell cycle arrest and sensitization to clinical myeloma drugs.

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INDUCED PLURIPOTENT STEM CELL DERIVED NK CELL TARGETING OF CANCER



Engineered human iPSC-derived NK cells expressing high affinity, non-cleavable CD16 demonstrate stabilized CD16 expression and improved ADCC in vitro and in vivo

Huang Zhu, Robert H. Blum, ... and Dan S. Kaufman. Pluripotent stem cell-derived NK cells with high-affinity non-cleavable CD16a mediate improved antitumor activity. *Blood* (2020) 135 (6): 399.

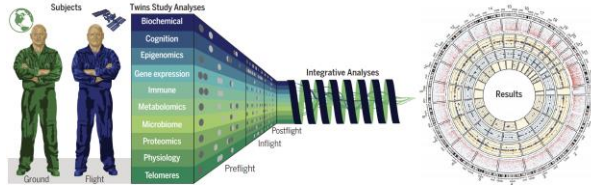
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PRE-LEUKEMIA STEM CELL DETECTION IN THE UCSD NASA INTEGRATED SPACE STEM CELL ORBITAL RESEARCH (ISSCOR) LAB

The NASA twin study demonstrated that repeated or protracted periods in low earth orbit (LEO) on the ISS:

- increases inflammatory growth factor expression and may accelerate stem cell aging
- Induces pre-malignant changes in the blood and immune dysfunction
- The ISSCOR lab will use stem cell bioreactors and fluorescent reporters of stem cell activity to detect pre-leukemia stem cells



Garrett-Bakelman et al., Science 364, 144 (2019) 12 April 2019

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COVID-19 IN PATIENTS WITH CANCER

Case Fatality Rate of Cancer Patients with COVID-19 in a New York Hospital System

Vikas Mehta^{1*}, Sanjay Goel^{2*}, Rafi Kabarriti^{3*}, Daniel Cole², Mendel Goldfinger², Ana Acuna-Villaorduna², Kith Pradhan², Raja Thota⁴, Stan Reissman⁴, Joseph A Sparano², Benjamin A. Gartrell², Richard V Smith¹, Nitin Ohri¹, Madhur Garg³, Andrew D Racine⁵, Shalom Kalnicki³, Roman Perez-Soler², Balazs Halmos^{2*}, Amit Verma^{2*}
 * Equal Contribution

Table 2: Disease characteristics of cancer patients with COVID-19 and association with mortality

	Alive	Deceased	P Val
Total	157 (72%)	61 (28%)	
Males	91 (72%)	36 (28%)	0.6
Females	66 (73%)	25 (27%)	0.6
Median Age (Range)	66 (10-92)	76 (10-92)	0.0006
Race			0.602
Caucasian	14 (64%)	8 (36%)	
Hispanic	58 (76%)	18 (24%)	
African American	67(73%)	25 (27%)	
Asian	5 (71%)	2 (29%)	
Other	13 (62%)	8 (38%)	
ICU admission	8 (5%)	15 (24%)	9.10E-05
Ventilator support	10 (6%)	35 (57%)	1.74E-15
Hemodialysis	10 (6%)	6 (10%)	0.37
Metastasis (Solids only)	27 (22%)	15 (37%)	0.06
Active Cancer (<3yr)	60 (38%)	32 (52%)	0.09
Active ChemoTx	34 (22%)	8 (13%)	0.2
Immunotherapy	4 (3%)	1 (2%)	1
Radiation Therapy	38 (24%)	11 (18%)	0.33
DM	53 (34%)	27 (44%)	0.116
HTN	100 (64%)	47 (77%)	0.047
Chronic Lung Dis	34 (22%)	28 (46%)	0.0003
Chronic Kidney Dis	33 (21%)	21 (34%)	0.052
Coronary Artery Dis	24 (15%)	19 (31%)	0.012
CHF	18 (11%)	15 (25%)	0.019

	Alive	Deceased
Total	157 (72%)	61 (28%)
Solid tumors	123(75%)	41 (25%)
Genitourinary	39 (85%)	7 (15%)
Breast	24 (86%)	4 (14%)
Colorectal	13 (62%)	8 (38%)
Gynecologic	8 (62%)	5 (38%)
Lung	5 (45%)	6 (55%)
Head and Neck	7 (88%)	1 (13%)
Neuro	7 (88%)	1 (13%)
Upper GI	5 (63%)	3 (38%)
Hepatobiliary	5 (71%)	2 (29%)
Bone / Soft Tissue	4 (80%)	1 (20%)
Neuro-endocrine	3 (100%)	0 (0%)
Pancreas	1 (33%)	2 (67%)
Skin	2 (67%)	1 (33%)
Hematologic malignancies	34 (63%)	20 (37%)
NHL	10 (67%)	5 (33%)
MDS	2 (40%)	3 (60%)
MPN	5 (71%)	2 (29%)
ALL	4 (100%)	0 (0%)
AML	1 (100%)	0 (0%)
MM	8 (62%)	5 (38%)
CML	0 (0%)	1 (100%)
Hodgkin's	2 (40%)	3 (60%)
CLL	2 (67%)	1 (33%)
Myeloid Malignancy	8 (57%)	6 (43%)
Lymphoid Malignancy	26 (65%)	14 (35%)

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COVID-19 MORTALITY AND IN MYELOPROLIFERATIVE NEOPLASMS

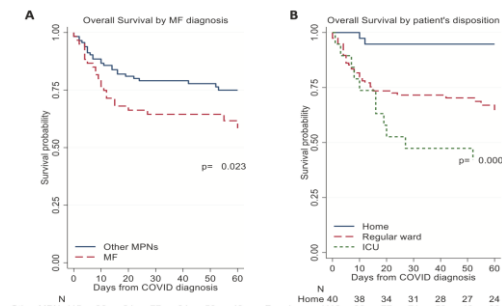
Leukemia (2021) 35:485–493
<https://doi.org/10.1038/s41375-020-01107-y>

ARTICLE

Chronic Myeloproliferative Neoplasms

High mortality rate in COVID-19 patients with myeloproliferative neoplasms after abrupt withdrawal of ruxolitinib

Tiziano Barbui¹ · Alessandro Maria Vannucchi² · Alberto Alvarez-Larran³ · Alessandra Iurlo⁴ · Arianna Masciulli¹ · Alessandra Carobbio¹ · Arianna Ghirardi¹ · Alberto Ferrari¹ · Giuseppe Rossi⁵ · Elena Elli⁶ · Marco Miguel Andrade-Campos⁷ · Mercedes Gasior Kabat⁸ · Jean-Jaques Kiladjian⁹ · Francesca Palandri¹⁰ · Giulia Benevolo¹¹ · Valentín García-Gutiérrez¹² · María Laura Fox¹³ · María Angeles Foncillas¹⁴ · Carmen Montoya Morcillo¹⁵ · Elisa Rumi¹⁶ · Santiago Osorio¹⁷ · Petros Papadopoulos¹⁸ · Massimiliano Bonifacio¹⁹ · Keina Susana Quiroz Cervantes²⁰ · Miguel Sagues Serrano²¹ · Gonzalo Carreno-Tarragona²² · Marta Anna Sobas²³ · Francesca Lunghi²⁴ · Andrea Patriarca²⁵ · Begona Navas Elorza²⁶ · Anna Angona²⁷ · Elena Magro Mazo²⁸ · Steffen Koschmieder²⁹ · Marco Ruggeri³⁰ · Beatriz Cuevas³¹ · Juan Carlos Hernandez-Boluda³² · Emma Lopez Abadía³³ · Blanca Xicoy Cirica³⁴ · Paola Guglielmelli³⁵ · Marta Garrote³ · Daniele Cattaneo³⁶ · Rosa Daffini³⁷ · Fabrizio Cavalca³⁸ · Beatriz Bellosillo⁷ · Lina Benajiba⁹ · Natalia Curto-García³⁵ · Marta Bellini³⁹ · Silvia Betti³⁷ · Valerio De Stefano³⁷ · Claire Harrison³⁵ · Alessandro Rambaldi^{10,38}



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JAK2 INHIBITION OF PRE-LEUKEMIA STEM CELLS AND COVID-19 INDUCED IMMUNE DYSREGULATION

Cancer Cell
 Article

Selective Inhibition of JAK2-Driven Erythroid Differentiation of Polycythemia Vera Progenitors

Raf Geico,^{1,2} Anvella E. Abrahamson,^{1,4} Charlene F. Barrios,¹ Edward Kivertshvili,¹ Jason Gottlieb,¹ John D. Hood,³ Jeffrey Dunneker,¹ Chi-Ching Mak,¹ Glenn Horowitz,¹ Richard M. Siegel,⁵ Ayalew Tefera,¹ Ken Kaushansky,¹ and Carlos H.M. Jamison^{1,*}

FDA approves fedratinib for myelofibrosis

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On August 16, 2019, the Food and Drug Administration approved fedratinib (INREBIC, Impact Biomedicines, Inc.) for adults with intermediate-2 or high-risk primary or secondary (post-polycythemia vera or post-essential thrombocythemia) myelofibrosis (MF).

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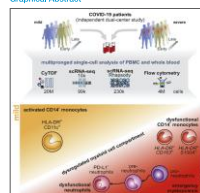
Cell
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Cell

Article

Severe COVID-19 Is Marked by a Dysregulated Myeloid Cell Compartment

Graphical Abstract



Highlights

- SARS-CoV-2 infection induces profound alterations of the myeloid compartment
- MM COVID-19 is marked by inflammatory HLA-DP^{CD116}⁺ CD14⁺ monocytes
- Dysfunctional HLA-DP^{CD116}⁺ and HLA-DP^{CD114}⁺ CD14⁺ monocytes in severe COVID-19
- Emergency myelopoiesis with immature and dysfunctional neutrophils in severe COVID-19

Schulte-Schnepp et al., 2020, Cell 182, 1419–1430
 September 15, 2020 © 2020 Elsevier Inc.
<https://doi.org/10.1016/j.cell.2020.08.001>

CellPress

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In Brief

Analysis of patients with mild and severe COVID-19 reveals the presence of dysfunctional neutrophils in the latter that is linked to emergency myelopoiesis.

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LEUKEMIA & LYMPHOMA SOCIETY

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COVID-19 VACCINE

Cell Stem Cell. 2010 November 5; 7(5): 618-630. doi:10.1016/j.stem.2010.08.012.

Highly efficient reprogramming to pluripotency and directed differentiation of human cells using synthetic modified mRNA

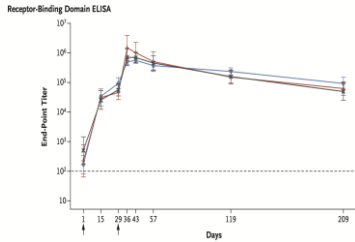
Luigi Warren^{1,12}, Philip D. Manos^{2,3,12}, Tim Ahfeldt^{4,11}, Yui-Han Loh^{2,5}, Hu Li⁶, Frank Lau^{4,5}, Wataru Ebina¹, Pankaj Mandal¹, Zachary D. Smith⁷, Alexander Meissner⁷, George Q. Daley^{2,3,5,9}, Andrew S. Brack¹⁰, James J. Collins⁸, Chad Cowan^{4,5}, Thorsten M. Schmitt^{2,5} and Plausick J. Brusa¹

THE NEW ENGLAND JOURNAL OF MEDICINE

CORRESPONDENCE

Antibody Persistence through 6 Months after the Second Dose of mRNA-1273 Vaccine for Covid-19

• 18-55 yr of age • 56-70 yr of age • ≥71 yr of age



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THE NEW ENGLAND JOURNAL OF MEDICINE

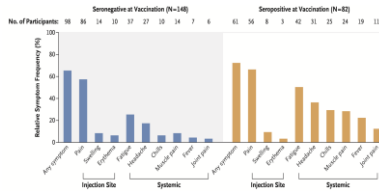
CORRESPONDENCE

SARS-CoV-2 Infection after Vaccination in Health Care Workers in California

Table 1. New SARS-CoV-2 Infections among Vaccinated Health Care Workers from December 16, 2020, through February 9, 2021.

Days after Vaccination	Vaccinated Persons		
	With New Infection (N=379)	Tested (N=14,504)*	Eligible for Testing (N=36,659)†
	number	number	percent
Dose 1			
Days 1-7	145	5794	35,673 (97.3)
Days 8-14	125	7844	34,404 (93.8)
Days 15-21	57	7958	32,667 (89.1)
Day 22 or later, before dose 2	15	4286	32,327 (88.2)
Dose 2			
Days 1-7	22	5546	23,100 (63.0)
Days 8-14	8	4909	16,082 (43.9)
Day 15 or later	7	4167	14,990 (40.9)

Antibody Responses in Seropositive Persons after a Single Dose of SARS-CoV-2 mRNA Vaccine



Larisa Balaian
 Leslie Crews
 Mary Donohoe
 Jane Isquith
 Qingfei Jiang
 Jeremy Lee
 Ara Lidstrom
 Wenxue Ma
 Cayla Mason
 Phoebe Mondala
 Isabelle Oliver
 Luisa Ladel
 Gabriel Pineda
 Karina Santos
 Kathleen Steel
 Christina Wu
 Jessica Pham

THANK YOU

We have one goal: A world without blood cancers

SUBMITTING QUESTIONS

- **Many of you have submitted questions in advance. Thank you! If you have a question during the session, please follow the below instructions.**
- **Ask a question by web:**
 - Click "Ask a question"
 - Type your question
 - Click "Submit"

Due to time constraints, we may not be able to answer all questions. Thank you for understanding!

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LLS EDUCATION & SUPPORT RESOURCES

HOW TO CONTACT US:

To contact an **Information Specialist** about disease, treatment and support information, resources and clinical trials:

Call: (800) 955-4572

Monday to Friday, 9 a.m. to 9 p.m. ET

Chat live online:

www.LLS.org/InformationSpecialists

Monday to Friday, 10 a.m. to 7 p.m. ET

Email: infocenter@LLS.org

All email messages are answered within one business day.



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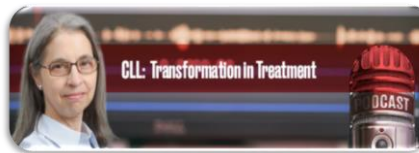
LLS EDUCATION & SUPPORT RESOURCES



Online Chats
 Online Chats are free, live sessions, **moderated by oncology social workers**. To register for one of the chats below, or for more information, please visit www.LLS.org/Chat.



Education Videos
 View our free education videos on disease, treatment, and survivorship. To view all patient videos, please visit www.LLS.org/EducationVideos.



Patient Podcast
The Bloodline with LLS is here to remind you that after a diagnosis comes hope. To listen to an episode, please visit www.TheBloodline.org.

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LLS EDUCATION & SUPPORT RESOURCES

877.557.2672

LEUKEMIA & LYMPHOMA SOCIETY

Help With Finances

The Leukemia & Lymphoma Society (LLS) offers financial assistance* to help individuals with blood cancer.

The **LLS Patient Aid** Program provides financial assistance to blood cancer patients in active treatment. Eligible patients will receive a \$100 stipend. Visit www.LLS.org/PatientAid

The **Urgent Need** Program, established in partnership with Maggie's Love, helps pediatric and young adult blood cancer patients, or adult blood cancer patients who are enrolled in clinical trials, with acute financial need. The program provides a \$500 grant to assist with non-medical expenses, including utilities, rent, mortgage, food, lodging, dental care, child care, elder care, and other essential needs. Visit www.LLS.org/UrgentNeed

The **Susan Lang Pay-It-Forward Patient Travel Assistance** Program provides blood cancer patients a \$500 grant to assist with transportation and lodging-related expenses. Visit www.LLS.org/Travel

The **Co-Pay Assistance** Program offers financial support toward the cost of insurance co-payments and/or insurance premiums for prescription drugs. Visit www.LLS.org/Copay

*Funding for LLS's Co-pay Assistance Program is provided by pharmaceutical companies. Funding for other LLS financial assistance programs is provided by donations from individual donors, companies, and LLS campaigns.

The Leukemia & Lymphoma Society (LLS) offers the following financial assistance programs to help individuals with blood cancer:
www.LLS.org/Finances



To order free materials: www.LLS.org/Booklets

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