COLD SPRING HARBOR SYMPOSIA ON QUANTITATIVE BIOLOGY

VOLUME LXXXI

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Targeting Cancer

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Symposium Organizers: Scott Lowe (*Memorial Sloan Kettering Cancer Center*),
Kornelia Polyak (*Dana-Farber Cancer Institute*),
David Stewart and Bruce Stillman (*Cold Spring Harbor Laboratory*),
and Eileen White (*The Rutgers Cancer Institute of New Jersey*)

Editors: David Stewart and Bruce Stillman (*Cold Spring Harbor Laboratory*)

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Symposium Participants

Abbruzzese, Genevieve, Massachusetts Institute of Technology, Cambridge, Massachusetts
Akre, Monica, University of Minnesota, Minneapolis, Minnesota
Alagesan, Brinda, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Albanese, Christina, Rensselaer Polytechnic Institute, Troy, New York
Albrengues, Jean, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Alderton, Gemma, *Nature Reviews Cancer,* London, United Kingdom
Alexandrova, Evguenia, Stony Brook University, Stony Brook, New York
Alonso curbelo, Direna, Memorial Sloan Kettering Cancer Center, New York, New York
Alvania, Rebecca, Rockefeller University Press, New York, New York
Alzrigat, Mohammad, Uppsala University, Uppsala, Sweden
Ambrico, Alexandra, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Amelio, Antonio, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina
Amon, Angelika, Massachusetts Institute of Technology, Cambridge, Massachusetts
Anczukow, Olga, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Antal, Corina, Salk Institute, La Jolla, California
Aranda, Victoria, *Nature,* New York, New York
Ardito-Abraham, Christine, Lustgarten Foundation, Bethpage, New York
Armstrong, Scott, Memorial Sloan Kettering Cancer Center, New York, New York
Arun, Gayatri, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Atretkhany, Kamar-Sulu, Engelhardt Institute of Molecular Biology, Moscow, Russia
Ayeni, Deborah, Yale University, New Haven, Connecticut
Azzopardi, Stephanie, Weill Cornell Medical College, New York, New York
Baker, Lindsey, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Bakhoum, Samuel, Memorial Sloan Kettering Cancer Center, New York, New York
Benevolenskaya, Elizaveta, University of Illinois at Chicago, Chicago
Bergers, Gabriele, University of California, San Francisco, San Francisco, California
Beverly, Levi, University of Louisville, Louisville, Kentucky
Bhola, Patrick, Dana-Farber Cancer Institute, Boston, Massachusetts
Biffi, Giulia, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Bikfalvi, Andreas, INSERM and University Bordeaux, Pessac, France
Biswas, Romi, National Institutes of Health, Bethesda, Maryland
Blain, Stacy, State University of New York Downstate Medical Center, Brooklyn, New York
Blasco, María, Spanish National Cancer Research Center, Madrid, Spain
Bosbach, Benedikt, Memorial Sloan Kettering Cancer Center, New York, New York
Bose, Rohit, Memorial Sloan Kettering Cancer Center, New York, New York
Boye, Kevin, INSERM and Bordeaux University, Pessac, France
Brady, Colleen, *Cancer Cell,* Cambridge, Massachusetts
Brisard, Daphne, Northwestern University, Chicago, Illinois
Brugge, Joan, Harvard Medical School, Boston, Massachusetts
Bruzas, Emilis, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Budman, Daniel, Northwell Health, Lake Success, New York
Burger, Megan, Massachusetts Institute of Technology, Cambridge, Massachusetts
Burgos-Barragan, Guillermo, University of Cambridge, Cambridge, United Kingdom
Caldas, Carlos, Cancer Research UK Cambridge Institute, Cambridge, United Kingdom
Campbell, Robert, Brown University, Providence, Rhode Island
Canner, David, Massachusetts Institute of Technology, Cambridge, Massachusetts
Cao, Zhen, Memorial Sloan Kettering Cancer Center, New York, New York
Carbini, Mariana, Italy
Carugo, Alessandro, University of Texas MD Anderson Cancer Center, Houston, Texas
Carvalho, Tiago, Rockefeller University, New York, New York
Casanova, Irene, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Casper, Karen, Washington Technology School, Roseville, Minnesota
Cha, Adriel, Stanford University, Stanford, California
Chakraborty, Abhishek, Dana-Farber Cancer Institute, Boston, Massachusetts
Challa, Sridevi, H. Lee Moffitt Cancer Center, Tampa, Florida
Chang, Kung-Chi, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Chen, Chong, Sichuan University, Chengdu, China
Chen, Hsiao-Chi, National Yang-Ming University, Taipei, Taiwan
Chen, Liang, Duke University, Durham, North Carolina
Chen, Sidi, Yale University, West Haven, Connecticut
Chen, Yunching, National Tsing Hua University, Hsinchu, Taiwan
Cheon, Dong-Joo, Albany Medical College, Albany, New York
Cheung-Ong, Kahlin, Onkaido Therapeutics, Cambridge, Massachusetts
Chi, Maoyen, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Chiang, Cheng-Ming, UT Southwestern Medical Center, Dallas, Texas
Chio, Christine, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Choi, Soyoung, Weill Cornell Medical College, New York, New York
Chowdhury, A.M. Masudul azad, Doshisha University, Kyotanabe, Japan
Chuang, Chen-Hua, Stanford University, Mountain View, California
Chung, Tae Mun, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Cichowski, Karen, Harvard Medical School/Brigham and Women's Hospital, Boston, Massachusetts
Clark, Susan, Garvan Institute of Medical Research, Sydney, Australia
Cohen, Paula, Cornell University, Ithaca, New York
Colavito, Sierra, University of Wisconsin-La Crosse, La Crosse, Wisconsin
Collado, Manuel, Health Research Institute of Santiago Idis, Santiago de Compostela, Spain
Da Silva-Alvarez, Sabela, Health Research Institute of Santiago Idis, Santiago de Compostela, Spain
Dahlhoff, Maik, Ludwig Maximilian University of Munich, Munich, Germany
Dang, Chi Van, University of Pennsylvania, Philadelphia, Pennsylvania
Das, Kakoli, Duke-NUS Medical School, Singapore, Singapore
Das, Sanjeev, National Institute of Immunology, New Delhi, India
Davis, Nicholas, Duke University, Durham, North Carolina

DELFINO, TESS, Genentech, South San Francisco, California
DEMARE, LAURA, Cold Spring Harbor Laboratory Press, Woodbury, New York
DESWAL, SUMIT, Research Institute of Molecular Pathology, Vienna, Austria
DETCHOKUL, SUJITRA, University of Melbourne, Heidelberg, Australia
DEVOE, CRAIG, Northwell Health, Lake Success, New York
DIERMEIER, SARAH, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
DONEN, MAURY, Manitoba Civil Service Superannuation Board, Winnipeg, Manitoba, Canada
DORNIAK, PIOTR, University of Texas MD Anderson Cancer Center, Houston, Texas
DOW, LUKE, Weill Cornell Medicine, New York, New York
DRAKE, JUSTIN, Rutgers Cancer Institute of New Jersey, New Brunswick, New Jersey
DROSOS, YIANNIS, St. Jude Children's Research Hospital, Memphis, Tennessee
DU, YI-CHIEH NANCY, Weill Cornell Medical College, New York, New York
DUTTA, ADITYA, Columbia University Medical Center, New York, New York
EBERLEIN, CATH, Cancer Research UK Manchester Institute, Manchester, United Kingdom
EGEBLAD, MIKALA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
ELYADA, ELA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
ENGELMAN, JEFFREY, Massachusetts General Hospital, Boston, Massachusetts
ENGLE, DANNIELLE, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
ENOS, MIRIAM, Brigham and Women's Hospital, Boston, Massachusetts
ER, EKREM EMRAH, Memorial Sloan Kettering Cancer Center, New York, New York
EVAN, GERARD, University of Cambridge, Cambridge, United Kingdom
EVANS, RONALD, Salk Institute for Biological Studies, La Jolla, California
FEARON, DOUGLAS, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
FEIGIN, MICHAEL, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
FEIN, MIRIAM, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
FEIN LEVY, CAROLYN, Cohen Children's Medical Center, New Hyde Park, New York
FEINBERG, ANDREW, Johns Hopkins University School of Medicine, Baltimore, Maryland
FELDHAHN, NIKLAS, Imperial College London, London, United Kingdom
FERNANDEZ, MARIO, H. Lee Moffitt Cancer Center, Tampa, Florida
FILANT, JUSTYNA, University of Texas MD Anderson Cancer Center, Houston, Texas
FILLMORE, CHRISTINE, Boston Children's Hospital, Boston, Massachusetts
FIORANI, SIMONA, *Nature Communications,* London, United Kingdom
FISHER, DANIEL, Centre National de la Recherche Scientifique, Montpellier, France
FONSECA, CECILIA, University of São Paulo, São Paulo, Brazil
FRAUMAN, ALBERT, University of Melbourne, Heidelberg, Australia
FUJIWARA, HIROAKI, University of Tokyo, Tokyo, Japan
GALLI, GIORGIO, Novartis Institute for Biomedical Research, Basel, Switzerland
GANESAN, RAJKUMAR, Boehringer Ingelheim, Ridgefield, Connecticut
GARTEL, ANDREI, University of Illinois College of Medicine, Chicago, Illinois
GENOVESE, GIANNICOLA, University of Texas MD Anderson Cancer Center, Houston, Texas
GHYSDAEL, JACQUES, Institute Curie, Orsay, France
GIANNAKOU, ANDREAS, Pfizer Inc., Pearl River, New York
GIMOTTY, PHYLLIS, University of Pennsylvania, Philadelphia, Pennsylvania
GORRINI, CHIARA, Princess Margaret Hospital, Toronto, Ontario, Canada
GOTTERER, JESSICA, Cold Spring Harbor Laboratory/Northwell Health, Cold Spring Harbor, New York
GOURONNEC, ALIZÉE, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
GRABOLE, NILS, F. Hoffmann-La Roche, Roche Innovation Center Basel, Basel, Switzerland
GRAY, VERONICA, ORISE Postbac Fellow at FDA, Silver Spring, Maryland
GRODZICKER, TERRI, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
GUHA, UDAYAN, Center for Cancer Research/National Cancer Institute/National Institutes of Health, Bethesda, Maryland
GUNES, CAGATAY, Ulm University, Ulm, Germany
HABER, DANIEL, Massachusetts General Hospital, Charlestown, Massachusetts
HAHN, WILLIAM, Dana-Farber Cancer Institute, Boston, Massachusetts
HALL, MATTHEW, National Institutes of Health Center for Advancing Translational Sciences, Rockville, Maryland
HAMMELL, AMY, Bristol-Myers Squibb, Princeton, New Jersey
HAN, TENG, Weill Cornell Medicine, New York, New York
HAN, XIAOQING, University of Miami, Miami, Florida
HANDLY-SANTANA, ABRAM, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
HANEMANN, CLEMENS, Plymouth University, Plymouth, United Kingdom
HAO, YUAN, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
HART, TRAVER, University of Texas MD Anderson Cancer Center, Houston, Texas
HASTINGS, KATHERINE, Yale University, New Haven, Connecticut
HATZI, KATERINA, Memorial Sloan Kettering Cancer Institute, New York, New York
HE, BING, The Children's Hospital of Philadelphia, Philadelphia, Pennsylvania
HEBERT, JESS, Massachusetts Institute of Technology, Cambridge, Massachusetts
HEDEGGER, KATHRIN, Ludwig Maximilian University at Munich, Munich, Germany
HENDERSON, CHRISTINA, Moderna Therapeutics, Inc., Cambridge, Massachusetts
HERR, WINSHIP, University of Lausanne, Lausanne, Switzerland
HICKSON, IAN, The Panum Institute, Copenhagen, Denmark
HO, YU-JUI, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
HODGES, MARIA, Genome Medicine, London, United Kingdom
HOESL, CHRISTINE, Ludwig Maximilian University at Munich, Munich, Germany
HOGG, SIMON, Peter MacCallum Cancer Centre, Melbourne
HOH, HONG HUAT, Okinawa Institute of Science and Technology, Onnason, Okinawa, Japan
HOPKINS, NANCY, Massachusetts Institute of Technology, Cambridge, Massachusetts
HOULIHAN, SHAUNA, Sloan Kettering Institute, New York, New York
HSU, HSIN-LING, National Health Research Institutes, Zhunan Town, Miaoli, Taiwan
HU, BOMIAO, Yale University, New Haven, Connecticut
HU, WENWEI, Rutgers University-Cancer Institute of New Jersey, New Brunswick, New Jersey
HU, YUXUAN, The Children's Hospital of Philadelphia, Philadelphia, Pennsylvania
HUANG, CHUN-HAO, Memorial Sloan Kettering Cancer Center, New York, New York
HUANG, SIDONG, McGill University, Montreal, Quebec, Canada
HUANG, XINYAN, University of New York, New York, New York
HWANG, CHANG-IL, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
IGGO, RICHARD, University of Bordeaux, Bordeaux, France
IYER, SWATHI, University of Kansas Medical Center, Kansas City, Kansas
JACKS, TYLER, David H. Koch Institute for Integrative Cancer Research at MIT, Cambridge, Massachusetts
JAHCHAN, NADINE, ORIC Pharmaceuticals, South San Francisco, California
JAILKHANI, NOOR, Massachusetts Institute of Technology, Cambridge, Massachusetts
JAIN, SAKET, University of Alberta, Alberta, Edmonton, Canada
JAISWAL, ARUSHI, University of Toronto, Toronto, Ontario, Canada

JAKIMO, ALAN, Hofstra University, Hempstead, New York
JEN, JAYU, National Cheng Kung University, Tainan, Taiwan
JIANG, YING, University of Virginia, Charlottesville, Virginia
JIN, KE, University of Miami, Miami, Florida
JOHNSON, RON, National Cancer Institute, Bethesda, Maryland
JONKERS, JOS, Netherlands Cancer Institute, Amsterdam, The Netherlands
JOSHI, NIKHIL, Massachusetts Institute of Technology, Cambridge, Massachusetts
JUDE, JULIAN, Research Institute of Molecular Pathology (IMP), Vienna, Austria
JUNE, CARL, University of Pennsylvania, Philadelphia, Pennsylvania
KADOCH, CIGALL, Dana-Farber/Harvard Cancer Center, Boston, Massachusetts
KAELIN, WILLIAM, Howard Hughes Medical Institute/Dana-Farber Cancer Institute, Boston, Massachusetts
KALDIS, PHILIPP, Institute of Molecular and Cell Biology (IMCB), Singapore, Singapore
KALLURI, RAGHU, University of Texas MD Anderson Cancer Center, Houston, Texas
KANG, YIBIN, Princeton University, Princeton, New Jersey
KARAKASHEVA, BAGRYANA, Sabanci University, Istanbul, Turkey
KASTENHUBER, EDWARD, Memorial Sloan Kettering Cancer Center, New York, New York
KATO, JUN-YA, Nara Institute of Science and Technology, Nara, Japan
KATO, NORIKO, Nara Institute of Science and Technology, Nara, Japan
KHAN, SHOWKHIN, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
KIBERSTIS, PAULA, *Science* Magazine, Newbury, Massachusetts
KIM, EEJUNG, Dana-Farber Cancer Institute, Cambridge, Massachusetts
KIM, JAE-YOUNG, Moffitt Cancer Center, Tampa, Florida
KIM, JIHUN, Asan Medical Center, Seoul, South Korea
KIM, KYUNGTAE, National Cancer Center, Goyang, South Korea
KIM, YOUNG JIN, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
KIM, YOUNGJOO, SUNY College at Old Westbury, Old Westbury, New York
KOBAYASHI, AKIRA, Doshisha University, Kyotanabe, Japan
KODIGEPALLI, MADHAV KARTHIK, The Ohio State University, Columbus, Ohio
KOEGL, MANFRED, Boehringer Ingelheim RCV GmbH & Co KG, Vienna, Austria
KOLLET, JUTTA, Miltenyi Biotec GmbH, Bergisch Gladbach, Germany
KORIMERLA, NAVYATEJA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
KRUCHER, NANCY, Pace University, Pleasantville, New York
KUNDU, SAMRAT, University of Texas MD Anderson Cancer Center, Houston, Texas
KUZMIN, ELENA, McGill University, Goodman Cancer Centre, Montreal, Quebec, Canada
KVAJO, MIRNA, *Cell,* Cambridge, Massachusetts
LAI, SHAO-CHIANG (MICHAEL), Eastern Virginia Medical School, Norfolk, Virginia
LAUGHNEY, ASHLEY, Memorial Sloan Kettering Cancer Center, New York, New York
LAVI, SARA, Tel Aviv University, Tel Aviv, Israel
LEBLEU, VALERIE, MD Anderson Cancer Center, Houston, Texas
LEE, DA-HYE, Korea Advanced Institute of Science & Technology (KAIST), Daejeon, South Korea
LEE, HO, National Cancer Center, Goyang-si, South Korea
LEE, JAE, Kyungpook National University School of Medicine, Daegu, South Korea
LEE, JE, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
LEE, MATT, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
LEIBMAN, NICOLE
LEIBOLD, JOSEF, Memorial Sloan Kettering Cancer Center, New York, New York
LETAI, ANTHONY, Dana-Farber Cancer Institute, Boston, Massachusetts
LI, AMY, Massachusetts Institute of Technology, Cambridge, Massachusetts
LI, ANDREW, Dana-Farber Cancer Institute, Boston, Massachusetts
LI, HUIPENG, Genome Institute of Singapore, Singapore, Singapore
LI, RONG, University of Texas Health Science Center at San Antonio, San Antonio, Texas
LI, WEI, Pennsylvania State University, Hershey College of Medicine, Hershey, Pennsylvania
LI, XIANG, Memorial Sloan Kettering Cancer Center, New York, New York
LI, YI, Baylor College of Medicine, Houston, Texas
LIAO, SHENG-YOU, National Cheng Kung University, Tainan, Taiwan
LIN, YI-JANG, Harvard University, Boston, Massachusetts
LIOT, CAROLINE, New York University Medical Center, New York, New York
LIU, HUI, Harvard Medical School/Beth Israel Deaconess Medical Center, Boston, Massachusetts
LIU, JUAN, Rutgers Cancer Institute of New Jersey, New Brunswick, New Jersey
LIU, YU, Sichuan University, Chengdu, China
LIU, ZHIMIN, Stony Brook University, Stony Brook, New York
LIVSHITS, GEULAH, Memorial Sloan Kettering Cancer Center, New York, New York
LOCKWOOD, WILLIAM, British Columbia Cancer Research Centre, Vancouver, British Columbia, Canada
LOIZOU, EVANGELIA, Memorial Sloan Kettering Cancer Center, New York, New York
LOPES, EDUARDO, Universidade de São Paulo, São Paulo, Brazil
LOVE, CASSANDRA, Duke University, Durham, North Carolina
LOWE, SCOTT, Memorial Sloan Kettering Cancer Center, New York, New York
LOZANO, GUILLERMINA (GIGI), University of Texas MD Anderson Cancer Center, Houston, Texas
LU, RICHARD, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio
LU, TSAILING, University Health Network (UHN), Toronto, Ontario, Canada
LUGA, VALBONA, Weill Cornell Medicine, New York, New York
LUJAMBIO, AMAIA, Icahn School of Medicine at Mount Sinai, New York, New York
LUO, WEIBO, UT Southwestern Medical Center, Dallas, Texas
LYDEN, DAVID, Weill Cornell Medical College of Cornell University, New York, New York
LYONS, SCOTT, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
MAIA-SILVA, DIOGO, Faculdade de Medicina Universidade de Lisboa, Lisbon, Portugal
MAIORINO, LAURA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
MAITY, TAPAN, National Institutes of Health, Bethesda, Maryland
MAK, TAK, University of Toronto, Toronto, Ontario, Canada
MAKI, ROBERT, Northwell Health, Lake Success, New York
MANCHADO, EUSEBIO, Novartis, Basel, Switzerland
MANSUKHANI, ALKA, New York University School of Medicine, New York, New York
MARCH, NIKKI, Cancer Research UK Manchester Institute, Manchester, United Kingdom
MARCHENKO, NATALIA, Stony Brook University, Stony Brook, New York
MARDIS, ELAINE, Nationwide Children's Hospital Research Institute, Columbus, Ohio
MAROTO, MIGUEL, Adaptimmune, Abingdon, United Kingdom
MARTINEZ, LUIS, Stony Brook University, Stony Brook, New York
MASCARENO, MANYA, State University of New York, College at Old Westbury, Old Westbury, New York
MATHEW, GRINU, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
MAURER, CARLO, Columbia University, New York, New York
MAYER, ANDREAS, Harvard Medical School, Boston, Massachusetts
MAYLE, ALLISON, Memorial Sloan Kettering Cancer Center, New York, New York
MCKENNA, ELIZABETH, *Cancer Discovery,* Philadelphia, Pennsylvania
MCKINNEY, KRISTINE, Moderna Therapeutics, Cambridge, Massachusetts
MCMAHON, MARTIN, University of Utah, Huntsman Cancer Institute, Salt Lake City, Utah
MELNICK, ARI, Weill Cornell Medical College, New York, New York
MENSSEN, ANTJE, Ludwig Maximilian University at Munich, Munich, Germany

MERTENS, CLAUDIA, The Rockefeller University, New York, New York
MIETHING, CORNELIUS, Universitätsklinikum Freiburg, Freiburg, Germany
MIIKKULAINEN, PETRA, University of Turku, Turku, Finland
MILLS, ALEA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
MIN, JIMIN, Seoul National University, Seoul, South Korea
MOCK, BEVERLY, National Cancer Institute, National Institutes of Health, Bethesda, Maryland
MOLIK, DAVID, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
MOLINA, JENNIFER, MD Anderson Cancer Center, Houston, Texas
MOLL, UTE, Stony Brook University, Stony Brook, New York
MONSERRAT-SANCHEZ, JOSEP, The Francis Crick Institute, London, United Kingdom
MOON, HYEONG-GON, Seoul National University College of Medicine, Seoul, South Korea
MORRIS IV, JOHN, Memorial Sloan Kettering Cancer Center, New York, New York
MORRISON, SEAN, UT Southwestern Medical Center, Dallas, Texas
MOU, HAIWEI, University of Massachusetts Medical School, Worcester, Massachusetts
MU, DAVID, Eastern Virginia Medical School, Norfolk, Virginia
MUHAR, MATTHIAS, Research Institute for Molecular Pathology, Wien, Austria
MULEY, ASHLESHA, Weill Cornell Medicine, New York, New York
MURANEN, TARU, Beth Israel Deaconess Medical Center, Boston, Massachusetts
MUZUMDAR, MANDAR, Koch Institute at Massachusetts Institute of Technology, Cambridge, Massachusetts
NACIRI, IKRAME, University Paris Diderot/CNRS, Paris, France
NAKANISHI, SHIMA, H. Lee Moffitt Cancer Center, Tampa, Florida
NAKATSUKA, TAKUMA, The University of Tokyo, Bunkyo-ku, Tokyo, Japan
NAZ, SARWAT, National Cancer Institute, National Institutes of Health, Bethesda, Maryland
NEDOSPASOV, SERGEI, Engelhardt Institute of Molecular Biology, Moscow, Russia
NEEL, BENJAMIN, New York University School of Medicine, New York, New York
NELSON, SARAH, University of Colorado Denver, Aurora, Colorado
NEMAJEROVA, ALICE, Stony Brook University, Stony Brook, New York
NG, SHENG RONG, Koch Institute at Massachusetts Institute of Technology, Cambridge, Massachusetts
NGO, BRYAN, Weill Cornell Medical College, New York City, New York
NOLAN, EMMA, Walter and Eliza Hall Institute, Melbourne, Australia
NOWAK, DAWID, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
OLIVE, KENNETH, Columbia University, New York, New York
OLSEN, SARAH NAOMI, Brigham and Women's Hospital, Boston, Massachusetts
ONI, TOBILOBA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
O'ROURKE, KEVIN, Memorial Sloan Kettering Cancer Center, New York, New York
OSER, MATTHEW, Dana-Farber Cancer Institute, Boston, Massachusetts
OUDIN, MADELEINE, Massachusetts Institute of Technology, Cambridge, Massachusetts
OZDUMAN, KORAY, Acibadem University, School of Medicine, Istanbul, Turkey
PADDOCK, MARCIA, Weill Cornell Medicine/New York-Presbyterian, New York, New York
PAL, DEBJANI, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
PAPAGIANNAKOPOULOS, THALES, New York University Medical School, New York, New York
PARADA, LUIS, Memorial Sloan Kettering Cancer Center, New York, New York
PARDEE, TIMOTHY, Wake Forest University School of Medicine, Winston-Salem, North Carolina
PARK, WOO-YONG, Korea Advanced Institute of Science and Technology, Daejeon, South Korea
PARK, YOUNGKYU, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
PARRILLA-MONGE, LAURA, Stony Brook University, Stony Brook, New York
PASHINE, ACHAL, Bristol-Myers Squibb, Lawrenceville, New Jersey
PAUL, DORU, Northwell Health, Lake Success, New York
PENG, DAVID, MD Anderson Cancer Center, Houston, Texas
PHELPS, CODY, Eastern Virginia Medical School, Norfolk, Virginia
PISKOL, ROBERT, Genentech, South San Francisco, California
PISKOUNOVA, ELENA, UT Southwestern, Dallas, Texas
PISTERZI, PAOLA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
POLITI, KATERINA, Yale University, New Haven, Connecticut
POLLOCK, MILA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
POLYAK, KORNELIA, Dana-Farber Cancer Institute, Boston, Massachusetts
POLYANSKAYA, SOFYA, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
POMMIER, ARNAUD, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
POWERS, SCOTT, Cold Spring Harbor Laboratory, Woodbury, New York
PREMSRIRUT, PREM, Mirimus, Inc., Woodbury, New York
PRUMMER, MICHAEL, ETH Zürich, Zürich, Switzerland
PULVIRENTI, TEODORO, *Nature Cell Biology,* New York, New York
QIAO, SHUXI, Mass General Hospital and Harvard Medical School, Boston, Massachusetts
RAGOUSSIS, IOANNIS, McGill University, Montreal, Quebec, Canada
RAJU, PRAVEEN, Weill Cornell Medical College, New York, New York
RAMSEY, MATTHEW, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts
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ROE, JAE SEOK, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
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ROMESSER, PAUL, Memorial Sloan Kettering Cancer Center, New York, New York
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ROSEN, MONICA, Weill Cornell Medicine, New York, New York
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SANCHEZ-RIVERA, FRANCISCO, Memorial Sloan Kettering Cancer Center, New York, New York
SAROSIEK, KRISTOPHER, Dana-Farber Cancer Institute, Boston, Massachusetts
SASAKI, TOMOAKI, Yale University, New Haven, Connecticut

Sawyers, Charles, Memorial Sloan Kettering Cancer Center, New York, New York
Scaglioni, Pier, UT Southwestern Medical Center, Dallas, Texas
Scarborough, Hannah, University of Colorado Denver, Denver, Colorado
Schmidt, Leah, Koch Institute at Massachusetts Institute of Technology, Cambridge, Massachusetts
Schoenfeld, Alan, Adelphi University, Garden City, New York
Scott, Andrew, North Dakota State University, Fargo, North Dakota
Semenova, Ekaterina, The Netherlands Cancer Institute (NKI), Amsterdam, The Netherlands
Serrano, Manuel, Spanish National Cancer Center (CNIO), Madrid, Spain
Sever, Richard, Cold Spring Harbor Laboratory Press, Woodbury, New York
Shand, Tiffany, University of Virginia, Charlottesville, Virginia
Shaw, Reuben, Salk Institute for Biological Studies, La Jolla, California
Sheltzer, Jason, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
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Shi, Junwei, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Shi, Qing, Baylor College of Medicine, Houston, Texas
Shields, Mario, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Shirole, Nitin, Cold Spring Harbor Laboratory, Cold Spring Harbor, Alabama
Shu, Shaokun, Dana-Farber Cancer Institute, Boston, Massachusetts
Sierra Gonzalez, Pablo, Beatson Institute for Cancer Research, Glasgow, United Kingdom
Simon, M. Celeste, University of Pennsylvania Medical School, Philadelphia, Pennsylvania
Simón Carrasco, Lucía, Spanish National Cancer Research Center, Madrid, Spain
Sindhwani, Shrey, University of Toronto, Toronto, Ontario, Canada
Singh, Kamini, Memorial Sloan Kettering Cancer Center, New York, New York
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Solit, David, Memorial Sloan Kettering Cancer Center, New York, New York
Solomon, Larry, AbbVie, Inc, North Chicago, Illinois
Song, Dongyan, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Song, Ji-Ying, The Netherlands Cancer Institute (NKI), Amsterdam, The Netherlands
Sordella, Raffaella, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Spector, David, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Sridevi, Priya, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Stahlhut, Carlos, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Steinberg, Bettie, The Feinstein Institute, Northwell Health, Manhasset, New York
Stewart, David, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Stillman, Bruce, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Stommel, Jayne, National Cancer Institute, Bethesda, Maryland
Strasser, Samantha dale, Massachusetts Institute of Technology, Cambridge, Massachusetts
Stratton, Michael, The Wellcome Trust Sanger Institute, Hinxton, Cambridge, United Kingdom
Strohecker, Anne, The Ohio State University, Columbus, Ohio
Sültmann, Holger, German Cancer Research Center/National Center for Tumor Diseases, Heidelberg, Germany
Sundaresan, Varsha, University of Florida, Gainesville, Florida
Sussman, Hillary, Cold Spring Harbor Laboratory Press, Woodbury, New York
Symons, Marc, Feinstein Institute, Manhasset, New York
Talos, Flaminia, Stony Brook University, Stony Brook, New York
Tammela, Tuomas, Massachusetts Institute of Technology, Cambridge, Massachusetts
Tan, Kai, University of Pennsylvania, Philadelphia, Pennsylvania
Tanaka, Yasuo, The University of Tokyo, Tokyo, Japan
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Thomson, Timothy, CSIC, Barcelona, Spain
Tomaszewski, Monica, Thermofisher, Pittsburgh, Pennsylvania
Tonelli, Claudia, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
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Tran Quang, Christine, Institut Curie, Orsay, France
Trotman, Lloyd, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Truini, Anna, Yale University, New Haven, Connecticut
Truitt, Morgan, The Salk Institute for Biological Studies, La Jolla, California
Tuveson, David, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
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Unni, Arun, Weill Cornell Medicine, New York, New York
Vakili, Jalal, Servier Laboratories, Suresnes Cedex, France
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Wagenblast, Elvin, University Health Network (UHN), Toronto, Ontario, Canada
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Watrud, Kaitlin, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Weaver, Valerie, University of California, San Francisco, San Francisco, California
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Weisbrod, Stu, Iguana Healthcare Partners, LLC, New York, New York
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Weissman, Irving, Stanford University, Stanford, California
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Wigler, Michael, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York
Wilkinson, John, North Dakota State University, Fargo, North Dakota
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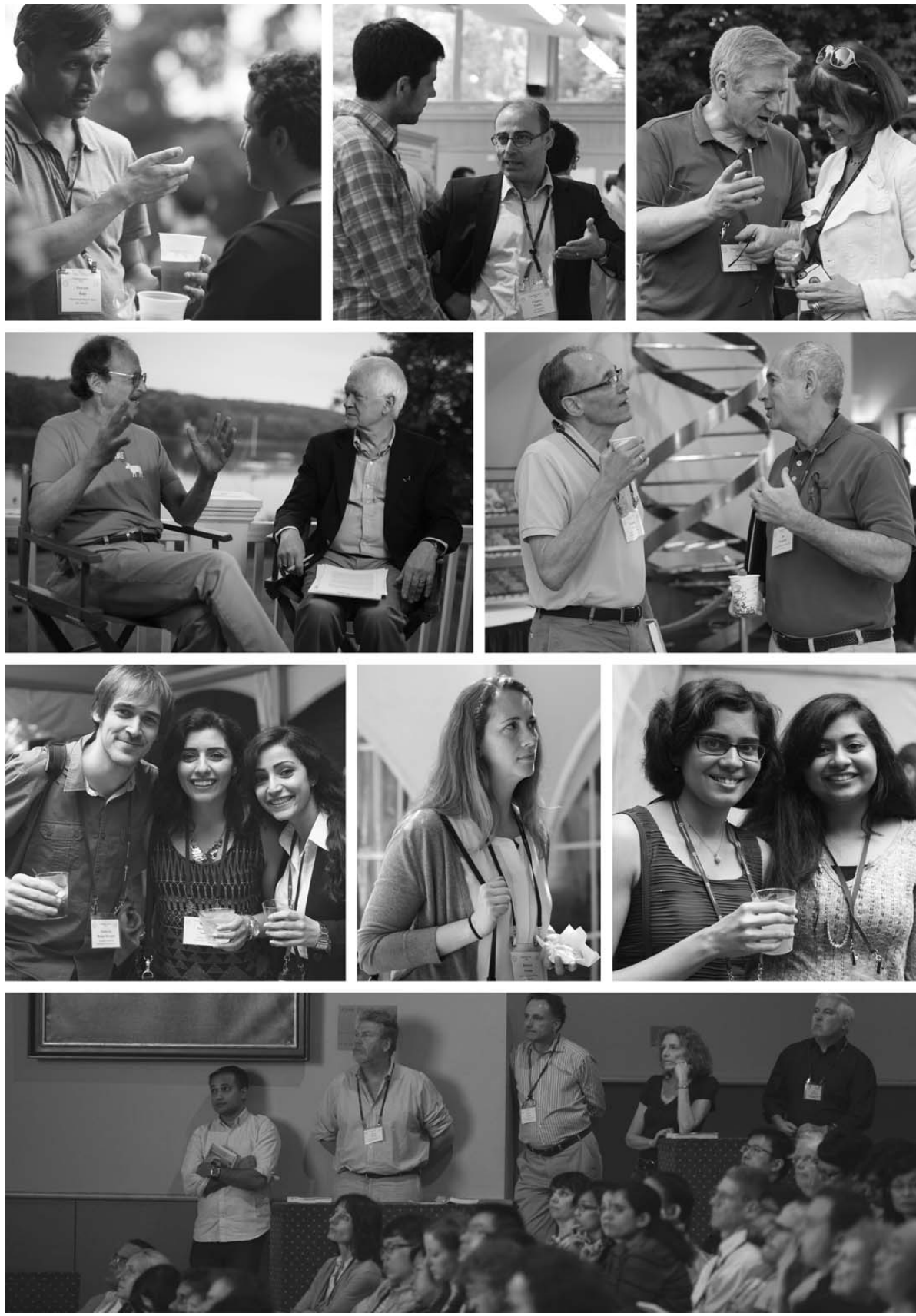

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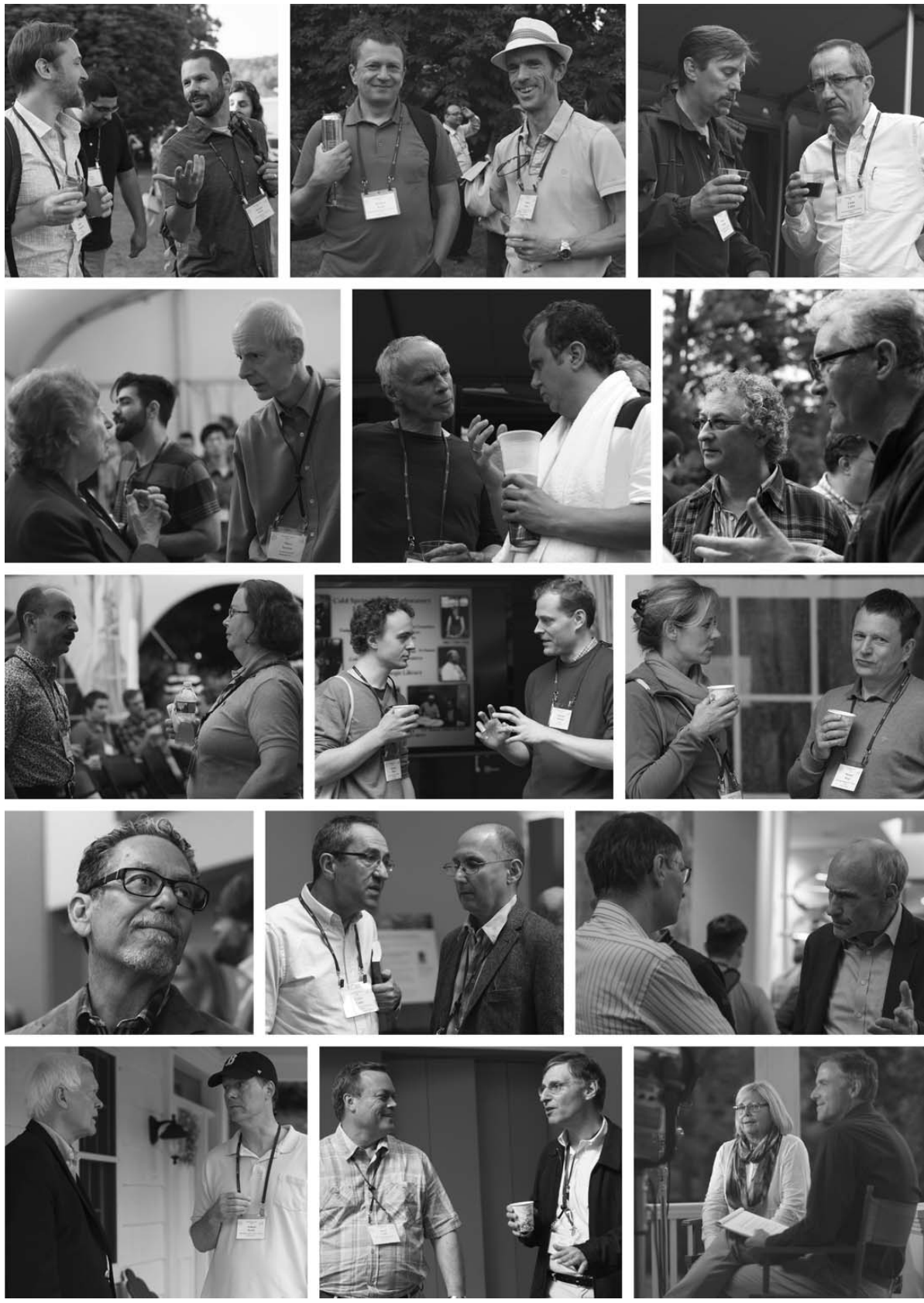

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Foreword

Cancer is a deadly disease that will afflict one out of every two to three people in the developed world in their lifetime. Recent years have produced transformative discoveries revealing the mechanisms behind the development and progression of cancer and the implementation of targeted cancer therapies in the clinic based on these discoveries. We have defined the mutational landscape of many cancers and with that the incipient driver mutations. Sophisticated and elegant models now exist for many types of cancer, and we understand in great detail the changes in signaling and gene expression that promote cancer and have begun to unravel the antitumor immune response. Cell death and survival mechanisms used by cancer cells have been identified and therapeutically exploited, and we have revealed processes that dictate cancer cell growth, repair, and proliferation and have the means to inhibit these processes. We have also seen advances in the mechanistic understanding, implementation, and deployment of cytotoxic cancer therapy. Collectively these advances are improving both the quality of life and overall survival of cancer patients.

The decision to focus the 81st Cold Spring Harbor Laboratory Symposium on Targeting Cancer reflected the enormous research progress achieved in recent years and provided a broad synthesis of the current state of the field, setting the stage for future discoveries and applications. Implications of how the underlying science can drive improvements in diagnostic, prognostic, and therapeutic approaches were a major theme throughout the Symposium. Previous Symposia that have included significant aspects of cancer research have occurred on a roughly five- to 10-year cycle, notably but not limited to Genes and Mutations (1951); Cellular Regulatory Mechanisms (1961); Transcription of Genetic Material (1970); Tumor Viruses (1974); Viral Oncogenes (1979); The Cell Cycle (1991); The Molecular Genetics of Cancer (1994); Biological Responses to DNA Damage (2000); and Molecular Approaches to Controlling Cancer (2005).

Major themes and topics highlighted at the 2016 Symposium included Cancer Genes and Genomes (genome stability, chromatin, epigenetic regulation); Cancer Pathways (signaling pathways, networks); Tumor Cell Biology (cells of origin, metabolism, autophagy, senescence); Cancer Growth & Progression (microenvironment, stroma/niche, tumor evolution, metastasis); Innate & Adaptive Immune Responses (inflammation, immunotherapies); and Enabling Technologies (single-cell sequencing, imaging, genetic screens, genome editing, organoids). Opening night speakers included Elaine Mardis (Nationwide Children's Hospital Research Institute) on translating cancer genomics into therapeutic target identification and vaccine design, Craig Thompson (Memorial Sloan Kettering Cancer Center), who spoke on the emerging treatment paradigm exploiting cancer metabolism, Carl June (University of Pennsylvania) on the use of genetic editing to generate synthetic lethal T cells, and Tyler Jacks (David H. Koch Institute for Integrative Cancer Research at MIT), who addressed engineering the cancer genome. Charles Sawyers (HHMI/Memorial Sloan Kettering Cancer Center) delivered an outstanding Dorcas Cummings Lecture on "Reflections on Precision Medicine and Cancer Moonshots" for Laboratory friends, neighbors, and Symposium participants prior to the annual Symposium dinners. Joan Brugge (Harvard Medical School) provided a masterful Summary at the conclusion of the Symposium immediately prior to the final banquet.

This Symposium was attended by almost 490 scientists from universities around the country and internationally, and the program included 55 invited presentations and more than 200 poster presentations. To disseminate the latest results and discussion of the Symposium to a wider audience, attendees were able to share many of the Symposium talks with their colleagues who were unable to attend using the Leading Strand video archive. A collection of interviews by Gemma Alderton (*Nature Reviews Cancer),* Paula Kiberstis (*Science*), Mirna Kvajo (Cell Press), Elizabeth McKenna (*Cancer Discovery*/AACR), Richard Sever (CSHL Press), and Jan Witkowski (CSHL Banbury Center) with leading experts in the field were arranged during the Symposium and distributed as free video from the Cold Spring Harbor Symposium interviews website.

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Symposium Organizers
Scott Lowe, Memorial Sloan Kettering Cancer Center
Kornelia Polyak, Dana-Farber Cancer Institute
David Stewart, Cold Spring Harbor Laboratory
Bruce Stillman, Cold Spring Harbor Laboratory
Eileen White, The Rutgers Cancer Institute of New Jersey

Editors
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