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Unique Global Symposium Marries Cancer and Evolution, Suggests Key Shifts in Treatment

More than 30 preeminent experts to present virtually; vast degree of structural disease change, high speed of cancer evolution, rarely considered until now

September 22, 2020 (Boston, MA) – Evolutionary processes have made cancer supremely difficult to treat and cure – but evolutionary *thinking* could hold the fundamental keys to stopping cancer in its tracks.

That premise, rapidly gaining momentum with outside-the-box cancer trailblazers, is the thrust behind a thought-provoking global “Cancer & Evolution Symposium,” held virtually October 14, 15 and 16.

More than 30 leading scientific authors, researchers, oncologists and biopharma experts – ranging from innovative intellectuals in basic science, diagnostics and therapy to creative evolutionary biologists, will participate as speakers, moderators and panelists over the course of 3 consecutive days from 8:30 am to 2 pm ET.

“We are not winning the war on advanced-stage cancers, when therapy resistance and disease spread often emerge suddenly,” said Frank H. Laukien, one of the symposium’s organizers. “The fact that tumors are constantly, rapidly transforming their genetic makeup is one reason late-stage cancers are so difficult to cure. This has spurred thoughtful leaders to take an evolutionary approach to tackling cancer.”

“We have yet to adequately capture the evolutionary capacity of cancer cells,” said Professor Henry Heng, Professor of Molecular and Genetics at Wayne State University. “Advanced stages of disease including metastasis can be different from the initial stages of cancer, similar to the rapid formation of new species. This massive transformation produces treatment-resistant and more “fit” species of cancer cells in just weeks, thwarting oncologists’ efforts to combat the disease. We need adaptive therapies to combat this evolution process, because indiscriminate chemotherapy, while killing some cells, paradoxically induces this “genome chaos” and proliferates new types of malignant cells at alarming speed.”

Experts believe this dialogue between cancer and evolution scientists marks an inflection point in the field, with far-reaching ramifications for physicians and patients as difficult questions are re-examined:

- Does the standard “maximum tolerable dose” of one single therapy, despite initial benefits, cause the disease to make a rapid evolutionary transition that inevitably does more long-term harm to patients as resistance evolves?
- Does the present treatment paradigm of not following up with secondary or tertiary therapies until after tumors reemerge demand reconsideration to extend more lives?
- What are the critical biomarkers for screening to identify tumors before they have evolved beyond treatable stages?
- Does this deeper understanding of these major evolutionary transitions in cancer offer new cell-level targets for treatment?

Papers issued from the Cancer & Evolution Symposium will inform academic medical school, funding agency, diagnostic and biopharma company decision makers and society at large. Presenters hope to influence both early cancer management and applications of novel adaptive therapy strategies to significantly extend progression-free survivals.

Registration is \$250 for corporate participants; \$95 for government, nonprofit or academic research; \$25 for students, post-docs or retired/emeritus individuals. A detailed agenda, abstracts and the link to attend can be found at

www.cancerevolution.org. Members of the press should contact Diane Ferrucci (diane.ferrucci@bruker.com) for access.

“Beating cancer means understanding how it evolves, especially in response to treatments”, said University of Chicago’s James Shapiro. “If you hammer someone’s advancing cancer, you may eliminate 99% of the cells but the stressed 1% that survive shift into a rapid evolution mode and produce a tumor population resistant to your therapy. Knowing how this tumor evolution happens is key to preventing it.”

The 2020 Cancer & Evolution Symposium is organized by a committee including: Frank H. Laukien, Ph.D., Chairman and CEO of Bruker Corporation; James A. Shapiro, University of Chicago, Biochemistry and Molecular Biology; Henry H. Heng, Center for Molecular Medicine and Genetics, Wayne State University; Denis Noble, Oxford University Physiology, Anatomy and Genetics; and Perry Marshall, Founder, *\$10 M Evolution 2.0 Prize*. Among the notable advisors and presenters are: Veracyte CEO Bonnie Anderson; Anna Barker, Chief Strategy Officer, USC Institute for Transformative Medicine; Steven Carr, Broad Institute of Harvard and MIT; George Church, Genetics, Harvard and MIT; and Azra Raza, M.D. Columbia University and Author, *The First Cell: And the Human Costs of Pursuing Cancer to the Last*.

CONTACT:

Kelly Sullivan	312.420.7502	kelly@kmsadvisors.us
Dianne Ferrucci	617.955.6870	dianne.ferrucci@bruker.com



2020 CANCER & EVOLUTION SYMPOSIUM FACT SHEET

WHAT: A trailblazing online global conference where over 30 prominent experts in cancer and evolutionary biology marry these fields and explore newer ideas, strategies and approaches for prevention, early detection, and early intervention. Abstracts, panel discussions and debates intend to capitalize on recent, bold scientific insights showing cancer evolves far more rapidly and significantly than previously thought. The result of entirely new species of late-stage disease requires reconsideration of single therapies and underscores the great need for more adaptive therapies.

WHEN: October 14-16, 2020

WHO: Pioneers, science influencers and authors including preeminent researchers, oncologists and biopharma experts will present, moderate panels and participate. The 2020 Cancer & Evolution Symposium is led by organizers Franck H. Laukien, Ph.D. and CEO, Bruker Corporation; James A. Shapiro, University of Chicago, Biochemistry and Molecular Biology; Henry H. Heng, Molecular and Genetics, Wayne State University; Denis Noble, Oxford University Physiology, Anatomy and Genetics; and Perry Marshal, Founder, \$10 Million *Evolution 2.0 Prize*.

ATTENDANCE COST: \$250 for corporate individuals; \$95 for those in government, nonprofit, research; \$25 for students or retired/emeritus or post-doc individuals; free to members of the media by contacting Dianne.Ferrucci@bruker.com.

GOAL: Stimulate new strategies for comprehensive cancer prevention and consistent early detection, as well as adaptive cancer management and treatment.

FORMAT: The Zoom Cancer & Evolution Symposium is set up to facilitate constructive debate, strive for consensus where possible and unearth new insights into how to reprioritize prevention, research, screening, diagnostics and patient risk stratification to guide therapy improvements.

SPEAKERS, PANELISTS, MODERATORS INCLUDE:

M. William Audeh, MD, Cedars-Sinai and Chief Medical Officer for Agendia:

“Cancer is not an unpredictable, shape-shifting disease against which all available weapons must be thrown, but a population of cells seeking to survive in the ecosystem of the body – it follows the same principles of evolution as every other living thing. The means by which cancer populations develop and ultimately survive the therapies aimed at killing them are now being understood, genomically mapped and predicted. Yet this understanding has not translated into the cancer clinic with the goal of cure. Is cure, or ‘extinction’ of the cancer, in any individual possible?”

Anna Barker, Ph.D., Chief Strategy Officer, Ellison Institute for Transformative Medicine, USC:

“There’s a realization we need data that reflects what is happening in individual patients in real time. This ‘precision cancer medicine’ represents an evolution in thinking about cancer that puts the patient at the center of research and understanding how their particular cancer evolves as a result of their particular treatment.”

Michael Levin, Director, Allen Discovery Center at Tufts:

“The key question isn’t why we get cancer; instead it is: why do we ever have anything but cancer? Our perspective is that it’s a reversible breakdown of cellular communication. We’ve shown we can initiate cancer by disrupting its communication, then normalize these tumors. Our approach suggests a new

roadmap: instead of toxic chemotherapy, use drugs via communication pathways to normalize tumors.”

Elizabeth O’Day, Founder and CEO, Olaris Therapeutics, Inc.:

“Nearly all breast cancer deaths are due to metastasis. Treatments to eradicate metastatic breast cancer do not exist, with the median survival still 3 years. Being able to detect each patient’s own resistance in order to alter therapy accordingly remains a long-standing goal. Currently, there are few, if any, biomarkers of response (markers capable of identifying patients that will respond to specific therapies and those that will not) for clinicians. But recent advancements offer new promise to identify these biomarkers of response with high accuracy to dramatically improve outcomes.”

Perry Marshall, Founder, \$10 Million Evolution 2.0 Prize:

“All cells exhibit agency and seem to evolve purposefully. This is why cancer has outwitted doctors for 100 years and why stage 3-4 patients are no better in 2020 than in 1930. Evolution used to be presumed as random and purposeless – but we know now, cells possess cognition. The origin of biological information possessed by cancer is an unsolved cognition problem. We propose a new framework by modeling the cell as a computer that can choose before writing its next output.”

Denis Noble, Physiology, Anatomy and Genetics, Oxford University:

“A major theme of this symposium are the strong parallels between evolutionary origin of species within populations...and the origin of cancers within the tissues of the body. Cancers can be regarded as a new species developing within the host organism.”

Azra Raza, Director-MDS Center, Columbia University, Author of *The First Cell*:

“Among newly diagnosed cancer patients today, 68% are cured (surgery, chemotherapy, radiation) while for the remaining 32% with advanced disease, the outcome is no different than it was 50 years ago. Despite a quarter of a trillion dollars invested in research, this level of failure is both staggering and perplexing. How does cancer remain one step ahead of every therapeutic strategy? What is the secret of its effortless superiority? The solution for the patient? Early detection of malignant behaviors through biomarkers, scanning

and imaging devices, swift elimination and prevention of the disease from morphing into the untreatable end-stage monstrosity.”

James Schapiro, University of Chicago:

“Traditional radiation and chemotherapy approaches often stimulate evolutionary tumor changes that make the cancer even more malignant and dangerous. How can we avoid providing such evolutionary stimulus in our therapies? The idea that evolutionary changes can be directly stimulated is absent from conventional evolutionary thinking but not from the newer ideas championed by these symposium speakers and organizers.”

Patrick Soon-Shiong, M.D., Founder of NantWorks and inventor of the drug Abraxane:

“As vital as the advancements in analyzing tumor tissue has been in contributing to cancer therapy, generally they have been used to characterize a single biopsy or surgical sample to inform choices in therapies. The illusion of this approach is that it assumes cancer is a single clone. But we now understand, there is a subpopulation of cells resistant to therapy. Therefore, conventional chemo or even precision medicine, if based on a single tumor sample only, are often doomed to fail.”

Others:

- Bonnie Anderson, Chairman and CEO, Veracyte, Inc.
- Scott Bonner, University of Oxford
- Michael Campbell, Ph.D, Biology, Howard University
- George Church, Wyss Institute, Harvard University
- Paul Davies, Director of Beyond Center for Fundamental Concepts in Science, Arizona State University
- Robert Gatenby, Co-Director of Cancer Biology and Evolution Program, Moffit Cancer Center
- Michael Gillette, M.D., Ph.D, Broad Institute of MIT and Harvard
- Steve Gullans, Ph.D., co-author of *Evolving Ourselves*
- Henry Heng, Center for Molecular Medicine and Genetics, Wayne State University
- Leroy Hood, M.D., Ph.D., Chief Strategy Officer for Institute for Systems Biology
- Natalia Komarova, Mathematics, University of California Irvine
- Nevan Krogan, Director of the Quantitative Biosciences Institute, University of California San Francisco
- Frank Laukien, Ph.D., President and CEO, Bruker Corporation

- Jinsong Liu, M.D., Ph.D., Anatomic Pathology, Molecular and Cellular Biology, University of Texas M.D. Anderson Cancer Center
- Carlo Maley, Ph.D., cancer biologist, Arizona State University
- Matthias Mann, Director at the Planck Institute of Biochemistry, Germany
- Adelene Perkins, CEO, Infinity Pharmaceuticals
- Kenneth Pienta, M.D., Johns Hopkins University
- Dimitar Sasselov, Director of the Origins of Life Initiative, Harvard University
- Charles Swanton, M.D., Ph.D., Cancer Evolution and Genome Instability Laboratory, The Francis Crick Institute
- Jeffrey Townsend, Biostatistics and Ecology and Evolutionary Biology, Yale University
- Robert Weinberg, Director, MIT Ludwig Center for Molecular Oncology