

Judith Campisi (1948–2024)

By Christopher D. Wiley, Eiji Hara & Fabrizio d’Adda di Fagagna

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An inspirational pioneer and leader in the field of cellular senescence.

On 19 January 2024, the field of cellular senescence lost one of its pioneers and champions when Judith Campisi passed away in her home in Berkeley, California. She was a member of the National Academy of Sciences of the United States and recipient of several accolades, including two MERIT awards from the National Institute of Aging, the Olav Thon Foundation Prize and the Ipsen Foundation Longevity Prize. She served on countless scientific review and editorial boards. However, all who knew Judy – as she was universally known – will remember her for her passion in pursuing groundbreaking research that established cellular senescence as a key process in cancer and aging and, most affectionately, for her positive energy and empathy.

Born and raised in Queens, New York, in a family of Sicilian origin, Judy received both her BA and PhD from the State University of New York, Stony Brook, and published her dissertation research in *Science*¹ and *Nature*² on sea urchin fertilization with only her advisor as a co-author. From there, she moved to the Dana-Faber Cancer Institute in Boston, where she made key findings on the role of transcription factors such as FOS and MYC in the regulation of the cell cycle, which paved the way for her move into the field of cellular senescence. Judy started her own laboratory in 1984 at Boston University before moving to the Lawrence Berkeley National Laboratory in California in 1990, when she published her first article on cellular senescence. She opened a second laboratory at the Buck Institute for Research on Aging in 2002, which became her primary affiliation in 2009, and was followed by an adjunct professor appointment at the Leonard Davis School of Gerontology at the University of Southern California in 2015.

For many years, the global scientific community looked to Judy as the guide for the study of cellular senescence. Thanks to her incessant traveling, it was nearly impossible to attend a conference on a subject in which cellular senescence was relevant without meeting this petite woman, typically clad



all in black – often as a keynote speaker. Her passionate yet accessible speaking style – combined with her contributions to the field – made her a common sight at such events. The discovery of senescence-associated β -galactosidase³, which enabled the detection of senescent cells and the demonstration of their accumulation in tissues with age, was her most highly cited publication (more than 8,000 entries in Google Scholar). The discovery and characterization of the senescence-associated secretory phenotype⁴ (SASP) (the transcriptional induction of secreted pro-inflammatory and extracellular matrix-remodeling factors) and its induction by persistent DNA damage signaling⁵ became the foundation for study of the paracrine effects of senescent cells. Paradoxical roles of the SASP include beneficial effects during wound healing and detrimental effects by stimulating cancer cell proliferation and in aging (the ‘good citizens, bad neighbors’ paradigm⁶). This led Judy to propose cellular senescence as an example of antagonistic pleiotropy (something beneficial in young age that is evolutionarily selected for, even if associated with post-reproductive detrimental effects). The now generally accepted notion of chronic inflammation being associated with aging, or ‘inflammaging’ as others named it, as a major contributor to frailty is also grounded in her work. Her discoveries provided the conceptual framework for targeting senescent cells for therapeutic purposes with senomorphics (agents that reduce the SASP) and senolytics (agents that kill senescent cells).

These ideas later led her to become one of the scientific founders of Unity Biotechnology, one of the first biotechnology companies to target cellular senescence.

Judy was many things to many people: a teacher and mentor, a friend and colleague, and a pioneer and vocal champion. Humility, passion for the scientific truth, infectious enthusiasm, energy, kindness and a collaborative spirit were the common elements.

As with many great scientists, she was never religious about her hypotheses and was willing to abandon them when data did not support them. A common refrain from Campisi laboratory meetings was ‘the data are the data’. Indeed, Judy embraced unexpected findings such as mitochondrial dysfunction-associated senescence and the SASP-suppressing role of p53, both of which arose from unexpected findings combined with a rapacious and creative approach. Perhaps the best example was the discovery of senescence-associated β -galactosidase, which resulted from a combination of serendipity (cells had been transfected with a bacterial galactosidase construct but accidentally incubated at the wrong pH) and Judy’s critical mind: she recognized that the color change might not be due to the transfected construct, which led to the most commonly used biomarker of senescence.

Beyond her contributions to research, Judy was notable as a scientific communicator. She was remarkable for her ability to craft complex concepts into intriguing and inspiring narratives that were accessible to everyone. Indeed E.H. asked her to join her laboratory on the spot after hearing her speaking at a conference. Her talks were profound and, as in her research, she asked the hard questions, always sought a deeper understanding and often ignored the most obvious opportunities for publications.

‘I’ll rest when I’m dead’ was her mantra. Her incessant traveling, her stubborn resistance to jet lag (‘I ignore it’ was her answer to F.d.A.d.F. asking her secret to vigor and vigilance) made calling her ‘tireless’ an understatement. Even now, it is hard to imagine her truly resting.

With her constant travel schedule, mentees might go weeks without seeing Judy. She valued independence and drive from those she trained, so one might think this meant she

would not become attached. The opposite was closer to the truth. She valued the time she had with her laboratory, and eagerly engaged with them on both scientific and personal levels and was immensely proud of their successes.

“Life is too short to drink bad wine” was another common refrain for Judy. If science was Judy’s first love, wine was a close second – with dancing a likely third. Indeed, she had made a home for herself in the San Francisco Bay Area, mere minutes from the California wine country. F.d’A.d.F. vividly remembers having to actively resist the proposal to open a bottle of wine in her kitchen early in the afternoon before discussing the structure of a review article to co-author (eventually becoming one of the most cited in the field⁷), until obtaining a cup of tea that was reluctantly brewed. Her annual ‘champagne fest’ was a distillation (or perhaps fermentation) of Judy’s multiple sides, where oenophiles and scientists would rub elbows wearing everything

from tuxedos to pajamas. It was quintessentially Berkeley, with Judy a central figure who moved effortlessly between disparate groups.

Judy’s personality and science leave a legacy that will endure long after her death among those who knew her. It will take a while for us not to look for her even at the most exotic conference locations. For all the others, we hope our words will help to leave a similar mark in those who were not lucky enough to have met her.

Additional information

C.D.W. was a postdoc in Campisi’s laboratory in 2009–2018; E.H. was a postdoc in Campisi’s laboratory in 1993–1994; and F.d’A.d.F. was a co-author and an admirer.

Christopher D. Wiley ^{1,2,3} , **Eiji Hara** ⁴ & **Fabrizio d’Adda di Fagagna** ^{5,6} 

¹Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston,

MA, USA. ²Department of Medicine, School of Medicine, Tufts University, Boston, MA, USA. ³Friedman School of Nutrition, Tufts University, Boston, MA, USA. ⁴Research Institute for Microbial Diseases, Osaka University, Osaka, Japan. ⁵IFOM ETS - The AIRC Institute of Molecular Oncology, Milan, Italy. ⁶Institute of Molecular Genetics IGM-CNR “Luigi Luca Cavalli-Sforza”, Pavia, Italy.  e-mail: Christopher.Wiley@tufts.edu; fabrizio.dadda@ifom.eu

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References

1. Campisi, J. & Scandella, C. J. *Science* **199**, 1336–1337 (1978).
2. Campisi, J. & Scandella, C. J. *Nature* **286**, 185–186 (1980).
3. Dimri, G. P. et al. *Proc. Natl Acad. Sci. USA* **92**, 9363–9367 (1995).
4. Coppé, J. P. et al. *PLoS Biol.* **6**, 2853–2868 (2008).
5. Rodier, F. et al. *Nat. Cell Biol.* **11**, 973–979 (2009).
6. Campisi, J. *Cell* **120**, 513–522 (2005).
7. Campisi, J. & d’Adda di Fagagna, F. *Nat. Rev. Mol. Cell Biol.* **8**, 729–740 (2007).