

# Joost J. Oppenheim (1934–2022)

In the 1930s, Joost's (Joe) parents fled Nazi Germany for the Netherlands, where Joe and his brother were born. Following the German invasion of Holland, the boys were given false identities and moved in with a Dutch Catholic family, and Joe's parents went into hiding. Joe's parents were eventually captured and their father was killed, while their mother was sent to a labor camp in Czechoslovakia. In 1945, the boys were reunited with their mother and soon after they moved to New York City.

Joe did not speak English when he enrolled in school, but picked up a few words from another boy who spoke some German. He attended the prestigious Bronx High School of Science and then the graduate medical school of Columbia University (now known as Columbia University Vagelos College of Physicians and Surgeons), on scholarships and commuted from the family apartment where he continued to work to support his family. He initially chose to study medicine owing to an interest in psychiatry.

After completing his hospital residency in Seattle, Joe and his wife Libby moved to Maryland and Joe began his work at the National Institutes of Health (NIH) in the National Cancer Institute (NCI). He moved to the National Institute of Dental Research in 1966 as a senior investigator, and then as chief of the Laboratory of Microbiology and Immunology. In 1983, he moved to the NCI at Frederick as the chief of the Laboratory of Molecular Immunoregulation until 2015. After several reorganizations, he remained a senior investigator in the Cancer Innovation Laboratory at Frederick NCI until his death. During this time, he also had several sabbaticals, including at the University of Birmingham in the UK, the Weizmann Institute in Israel, and the University of Regensburg and the Borstel Research Institute in Germany.

Joe was a true pioneer in the research of soluble immune mediators, beginning in the 1970s when this work was met with skepticism by mainstream immunologists. 'Lymphodrek' was perhaps the first of many neologisms coined by Joe, as a self-deprecatory term for his beloved, albeit crude, mixtures of what would first be known as 'lymphokines' and later as 'cytokines'. Joe organized the 1st International Workshop on Lymphokine Research in 1976 in Bethesda, Maryland, and led the organization of countless conferences thereafter around the world. Joe's belief in the importance of these immune mediators helped spur the creation



Credit: Landis Chilcoate

of a new field of immunological research. This spilled beyond the boundaries of the immune system and resulted in many new medicines. He led societies and journals and received numerous awards for his discoveries and leadership. Without Joe, the "father of cytokines", the field would have developed, but perhaps not at such a fast rate. In current terminology, Joe was an immunology influencer.

Joe's research on soluble mediators began at the Dental Institute with studies on the activation of lymphocytes. In 1972, he was involved in studies of supernatant factors that induced bone resorption. By 1973, he reported factors that stimulated and inhibited macrophages and lymphocytes. Two decades would pass before the actual molecules were identified by Joe and his colleagues at the NCI. Together with Kouji Matsushima, Edward Leonard and Teizo Yoshimura, he entered the molecular age in the cloning of cytokines and chemotactic factors. Joe named the chemotactic factors 'chemokines', which stuck despite fervent opposition from a few prominent researchers. Joe was also involved in adopting the term cytokines (proposed by Stanley Cohen) and interleukin (proposed by Vern Paetkau).

Joe would continue to advance the field of chemokines, in collaboration with Ji Ming

Wang and others. But in the late 1990s, his interest in chemotaxis took a different turn. Oleg Chertov, in his group, found that other peptides were chemotactic. These included defensins, which are smaller than chemokines. De Yang showed that some of these chemotactic peptides also activated antigen-presenting cells and acted as adjuvants. 'Alarmins' (a term proposed by Josh Farber) was popularized by Joe to define mediators released by endogenous cells, and to distinguish them from exogenous factors released by microorganisms, as proposed by Charlie Janeway. Joe and De Yang collaborated extensively with Michael Bustin's group to identify the nuclear component HMGB1 as one such alarmin.

Joe made many contributions to understanding regulatory T cells, together with Xin Chen and Zack Howard. Most recently, Joe and De Yang developed a promising approach to cancer vaccines that incorporated multiple immune modulators. Joe, the indefatigable neologist, would term the vaccine 'TheraVac' and showed its benefit in several mouse tumor models.

Joe has had a varied 60-year career and trained a network of scientists in Europe, Asia and the US. These were not just colleagues to Joe as he opened his home to them, invited them to live with his family at times, to celebrate holidays and to become part of his extended science family. The German name Oppenheim translates to mean 'open house', which was precisely the way Joe lived.

It is my good fortune to have known Joe since 1983, first as a colleague and then as a dear friend. I have often reflected on what made him a great scientist. Passion and boundless energy for sure; some serendipity; but there was also a kind of special intuition. A special intuition that was propelled by his courage, often deaf to the skeptics around him. What a life, and what a man!

He is pre-deceased by his first wife, Libby Oppenheim (1935–2011). He is survived by his second wife, Ann Goldman, children, Meers, Matthew, Monty and Emia Oppenheim, their spouses, two step-children, and 20 grandchildren. □

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