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2011 - YEAR OF THE CHEMIST
PHIL GOLD 1936 -

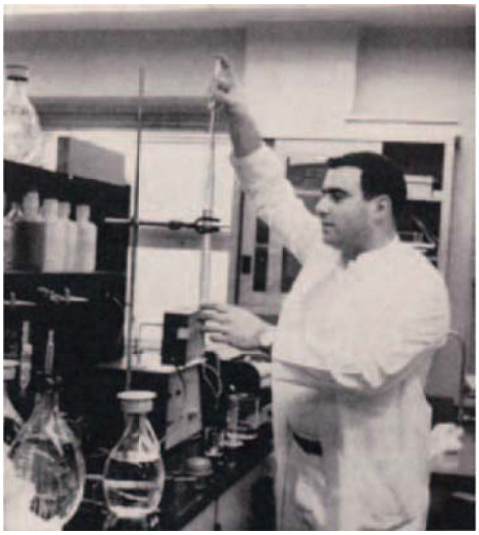
Even though Dr. Phil Gold is not a clinical chemist, his landmark research led to an immunoassay that is one of the cornerstones of the clinical biochemistry laboratory. It is for this reason that I have asked his colleague and close friend for more than forty years, Dr. Joseph Shuster, to write a biography as part of the CSCC series on notable Canadian contributors to clinical chemistry for the UNESCO Year of Chemistry.

In Dr Shuster's words: "Phil and I grew up in Montreal in the region known as the 'main', an area popularized in Canadian fiction by Mordecai Richler. He fondly recalls growing up in the era described and attributes the values of the neighbourhood and the importance of education and knowledge to his future academic success."

Dr Mary-Ann Kallai-Sanfaçon, Editor-in-Chief, CSCC News

The decade beginning in 1960 heralded the onset of modern immunology. At that time, the major research journals devoted to publishing papers dealing with immunological topics published an explosion of classic papers that described the structure and function of immunoglobulin molecules, the role of the thymus in immune cell development, the molecular basis for immunodeficiency and the description of functional subsets of lymphocytes.

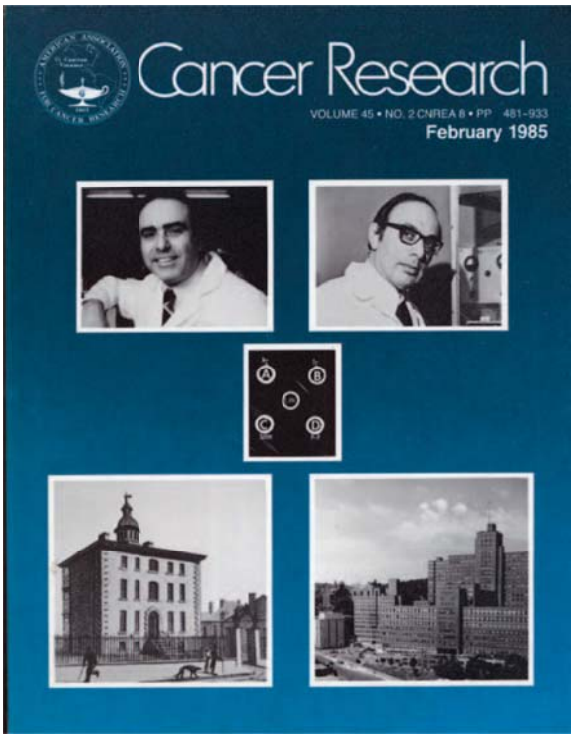
In 1965 Dr. Phil Gold published a landmark paper describing the discovery of carcino-embryonic antigen (CEA) in the Journal of Experimental Medicine. Dr. Gold was then working both as a medical resident on the wards and as a graduate student in the laboratory of Dr. Sam Freedman at the Montreal General Hospital. Their selection of human bowel tumours for study was a wise decision indeed. The experimental model was elegantly simple. Drs Gold Freedman injected rabbits with extracts of bowel tumours. The rabbit antiserum so produced contained a mixture of antibodies to both normal and tumour tissue antigens. They needed a way to separate these antibodies. At the time of colonic tumour resection, the surgeon removes significant amounts of tissue on either side of the tumour that contains normal non-cancerous colon tissue giving the researchers a source of noncancerous tissue. This normal colon tissue was then used to adsorb and remove the normal anti–normal tissue antibodies found in the rabbit anti-colon tumour antiserum. When they then reacted the rabbit anti-colon cancer antiserum so produced against tissue extracts from colon cancer tumours, normal colon and other normal and cancer tissues by



precipitation in agar gel (so called Ouchterlony technique), they discovered that the antiserum detected an antigen (tumour marker) that was unique to colon cancers. Furthermore, this antigen was also found in the developing foetal gastrointestinal tract so they named this marker carcino-embryonic antigen (CEA).

In 1968, Dr. Freedman recruited Dr. David Hawkins and myself to the Montreal General to build an academic Clinical Immunology Division (a rarity at the time). When I arrived at the Research Institute of the hospital, Dr. Gold's lab was energetically pursuing the isolation and purification of the CEA molecule. The molecule was eventually purified, chemically characterized, and fortunately, was readily radio-labelled with I 131. A radioimmunoassay was developed to measure CEA in the serum. Studies were then undertaken to measure serum CEA levels in a variety of clinical situations. Phil and I were carpooling to work at the time. Those were heady times as we eagerly looked forward to going to work and ascertaining what new information we would derive from the day's CEA assay results.

The first clinical data, published in the Proceedings of the National Academy of Sciences, created profound interest internationally, and generated a flurry of studies that replicated the results of Dr. Gold's and Freedman's initial study thus demonstrating the value of serum CEA measurement and its value as a tumour marker for colon cancer. Historically, it should be noted that the CEA assay was only one of four clinically useful radio-immunoassay's available at the time. The discovery of CEA was a monumental event. Now, forty-five years later, it is the most widely used tumour marker and the standard of practice for monitoring patients with colon cancer. The discovery of CEA marked the development of the field of Tumour Immunology. It sparked research into the development of Cancer Vaccines. Finally, after many years of research, this avenue has begun to show clinical promise.



Following the discovery of CEA and the subsequent demonstration of the clinical value of serum CEA measurement, Dr. Gold became the recipient of many prestigious national and international awards including the Killam and Gairdiner Prizes, and the Order of Canada. Dr. Gold was recently inducted into the Canadian Medical Hall of Fame. He subsequently was named Physician-in-Chief at the Montreal General Hospital and led the Department for 15 years with much success through many difficult funding periods for both health care and health care research. He has been a tireless fundraiser for the Montreal General Hospital and McGill University and a strong supporter of the Medical Research Council of Canada and its successor the C.I.H.R. and the entire research community in this country.

On the personal side, he is an excellent lecturer, raconteur and storyteller, making a strong point through humour to illustrate his unique point of view. His greatest pride and joy is to teach and mentor medical students. He profoundly enjoys watching young physicians mature and grow and, for this reason, never misses his regularly scheduled weekly sessions with them.

Dr. Gold married his wife Evelyn in 1960. They have three children and are the doting grandparents of six grandchildren.

Dr. Phil Gold is the prototype clinician-scientist, a Canadian who has made a major and lasting contribution to medical science and to the health care of patients all over the world.