

ARTIFICIAL CELLS: WHAT? HOW? WHEN? WHERE? WHO?

Greatest McGillian in the university's 190 years history A 2011 worldwide poll voted the inventor of artificial cells, Chang, as the "Greatest McGillian" out of 20 finalists from 700 nominee in McGill University's 190 years history. <http://www.medicine.mcgill.ca/artcell/votingresult.pdf>

The Canadian Academy of Health Sciences "Dr. Chang's original ideas were years ahead of the modern era of nanotechnology, regenerative medicine, gene therapy, stem cell/cell therapy and blood substitutes. Evidence of his stature within the international scientific community was confirmed by 2 nominations for the Nobel Prize".

United Kingdom journal, New Scientist: In 1957, Thomas Chang was completing his final year as an undergraduate at McGill University in Montreal. ... He would make the first artificial cell....has grown into a dynamic field....worldwide ... now a sophisticated marriage of microbiology, chemistry and biotechnology, the concept remains as straightforward as Chang's original notion. can contain virtually anything: oxygen, drugs, enzymes, antibodies, cell extracts and even cells themselves...can now create artificial cells with different polymers, as well as proteins.in 1961(Bangham) also added lipids to the list"liposomes"

Journal of the British Royal Society of Chemistry , "Chemistry in Britain": Professor Tom Chang.....when he started work in the 1950's he was ploughing a lone furrow. Chang is credited with inventing microencapsulation, can emulate both in vitro and in vivo the behaviour of some natural cells."Artificial cells"already have many medical applications. Chronic renal failure,drug poisoning,liver failure, enzyme therapy and metabolic function replacement. He told Chemistry in Britain: "When I first started work it was considered too far-fetched, but by 1966 when I demonstrated the value of artificial cells in hemoperfusion and detoxification there was a surge in interest and curiosity. ... interest in artificial cells has taken off".

The role of artificial cells in the fight against COVID-19: deliver vaccine, hemoperfusion removes toxic cytokines, nanobiotherapeutics lower free radicals and pCO2 and replenish blood supply (Chang 2022) (Artificial Cells, Nanomedicine & Biotechnology). 50:1, 240-251, Open access at DOI: [10.1080/21691401.2022.2126491](https://doi.org/10.1080/21691401.2022.2126491)

"American Medical News(American Medical Association)" (Mark Moran):"For nearly 40 years, Dr. Chang has pursued the development of artificial blood, and his work has laid the foundation for products that may be available in coming years. These products, however, are not true red blood cells but modified hemoglobin molecules for short-term transport of oxygen. Today, Dr. Chang is working on products that more closely resemble nature's own creation"

Blood Substitutes with enhancement of all 3 major red blood cell (rbc) functions: Crosslinking hemoglobin with up to 6 times the rbc catalase, superoxide dismutase and carbonic anhydrase (Bian & Chang 2015) doi:10.3109/21691401.2014.964554). The 3 enzymes can be artificially prepared chemicals (Hoq & Chang 2023 Frontiers <https://www.frontiersin.org/articles/10.3389/fbioe.2023.1231384>)

Modern Drug Discoveries, ACS Publications: "The first encapsulated cells were developed as far back as the 1960s, when T.M.S. Chang and colleagues first reported the microencapsulation of cells. The vision of using these cells for therapeutic purposes was present from the start

Nature Medicine, "Cell encapsulation: promise and progress" G. Orive et al "In 1964 Chang (Chang. **Science** 146(3643):524-525) proposed the idea of using ultrathin polymer membrane microcapsules for the immunoprotection of transplanted cells and introduced the term "Artificial Cells" to define the concept of bioencapsulation. Since then ... has provided a range of promising therapeutic treatments for diabetes, hemophilia, cancer and renal failure".

From 50th Anniversary Special Gold Edition of the Official Journal of The American Society for Artificial Internal Organs The 1966 paper by Chang is one of the 25 landmark papers selected for this Gold edition. The editorial "...Chang is the originator of artificial cells..." (Others included Kolff, inventor of artificial kidney; Scribner for chronic hemodialysis; Gibbon on heart-lung machine; Cooley first human implant of artificial heart; Kantrowitz on intra-aortic balloon pumping; Kolobow on oxygenator)

Artificial Cells by Marie Walker, McGill Tribune 2022 for all with no need for science background <https://www.mcgilltribune.com/sci-tech/artificial-cells-offer-hope-for-covid-19-cancer-patients-04102022/>

