AI Generated mRNA Cancer Vaccines

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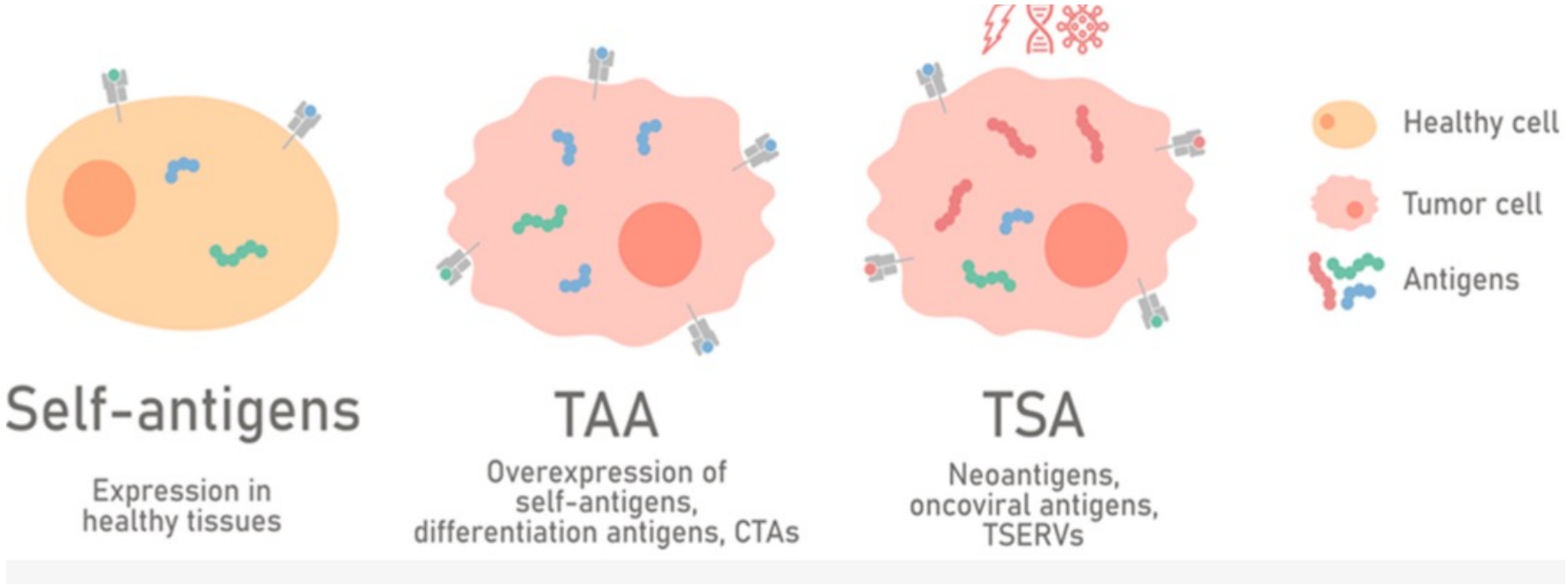
Children's Health Defense

Tumor antigens

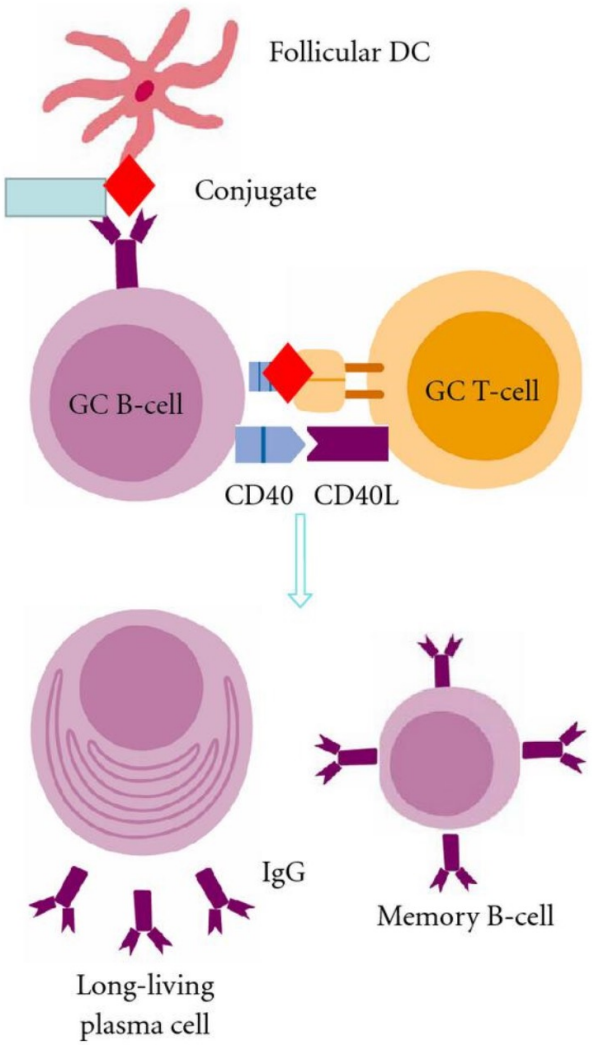


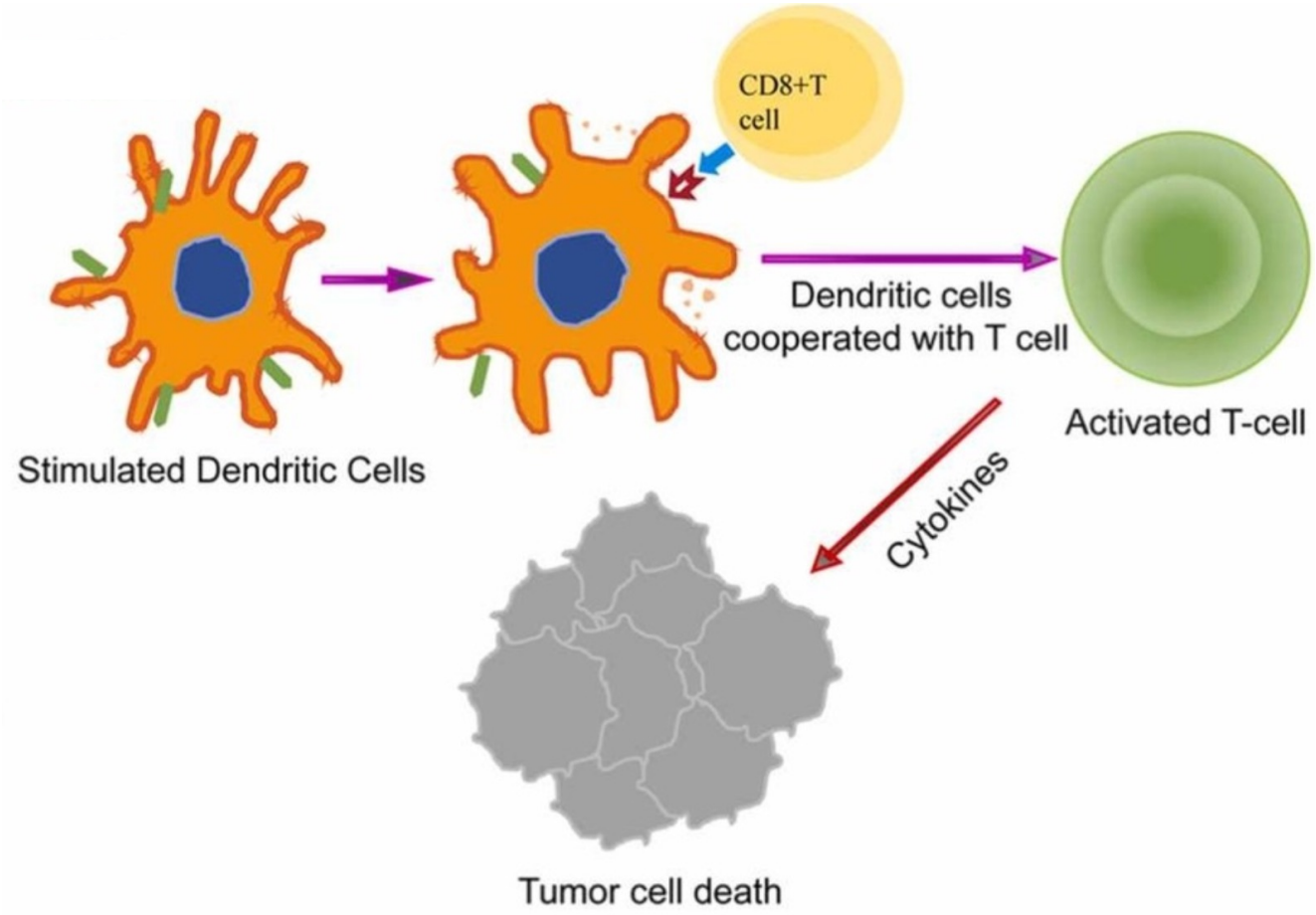
Traditional cancer vaccines

- Make portions of the tumor-specific antigens (proteins) and inject them into the body
- The immune system will recognize the TSAs and proliferate antibodies to tag and neutralize them (B-cell response-ineffective killing)
- The immune system will recognize the TSAs and proliferate specialized T-cells to kill the cancer cells (T-cell response-effective killing)
- The ability to elicit a T-cell response in cancer vaccines (or vaccines in general) is often limited

Inadequate T-cell responses from cancer vaccines

- Tumor specific antigens bind weakly to helper T-cells/weaker binding equates to a weaker T-cell (cytotoxic) response
- Cancer cells can suppress the immune system
- Vaccination can suppress the innate immune system
- Traditional cancer vaccines target a single tumor specific antigen whereas tumor cells are covered with a diversity of these antigens
- B-cell responses help ”mark” the cells for destruction but don’t actually eliminate cancer cells


Follicular DC
Conjugate
GC B-cell
GC T-cell
CD40
CD40L
IgG
Memory B-cell
Long-living
plasma cell


CD8+T
cell
Dendritic cells
cooperated with T cell
Activated T-cell
Stimulated Dendritic Cells
Cytokines
Tumor cell death

mRNA cancer vaccines

- Antigens are encoded by mRNA produced from a DNA backbone
- mRNA *not the actual antigen* is delivered in a lipid nanoparticle
- mRNA invades human cells and hijacks the mechanism to produce proteins
- Genetically modified people then produce their own tumor antigens
- The rest of the process works like a traditional cancer vaccine
- Only with all the disadvantages of mRNA vaccines

AI-generated mRNA cancer vaccines

- AI aids in epitope (portion of antigen) design
- AI could identify idiotypic antigens more quickly (personalized medicine)
- AI may not be able to reflect tumor heterogeneity
- AI may not be able to reflect genetic diversity

Parting thoughts

- The best cure for cancer is prevention
- The childhood cancer epidemic started in the 1950s
- Childhood cancers increased by 67% between 1950 and 1995
- SV40 is a known carcinogen that contaminated the polio vaccine between 1955 and 1965
- mRNA vaccines are associated with turbo cancers – why prevent cancer with something that causes cancer
- Currently 37% of all individuals will contract cancer in their lifetime