

Combination of Fumaric Acid Esters and Vitamin D Derivatives as a Novel therapy for Blood Cancers

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Technology

Our research identified a potent anti-acute myeloid leukemia (AML) activity for novel combinations of known pharmaceutical agents, such as Fumaric acid esters (FAE), e.g., dimethyl fumarate, and vitamin D derivatives (VDD), e.g., Paricalcitol. In addition, we successfully validated the intracellular mechanism of action (MoA) of these combinations. Importantly, based on understanding the MoA we believe that VDD/FAE combinations may also be active against non-cancerous pathologies, such as multiple sclerosis and psoriasis.

Application

The 2019 estimation for leukemia in the US indicates that ~61,780 new cases and ~22,840 deaths are expected to occur. Among them, the number of new cases of AML will be around 21,450 with 10920 deaths. Today, despite initial responses to standard chemotherapy, prognosis is poor for most AML patients especially since they are typically old and unfit for intensive cytotoxic therapy. Thus, there is an urgent need for more effective and less toxic therapeutic modalities for this disease. The global AML market was valued at USD 0.7 billion in 2018, and is estimated to be valued at USD 1.54 billion in 2024, witnessing a CAGR of 14.0%. The key factors propelling the growth of this market are high incidence and prevalence of AML as the world's population grows older, advancements in pharmacology and molecular biology to promote drug development, and increasing investments in R&D by the pharmaceutical companies.

Advantages

- The technology is based on approved drugs with validated activity. The use of VDD/FAE compositions for effective low-toxic differentiation therapy of AML as an alternative to chemotherapy.
- These compositions may also be used to prevent leukemia in individuals at high risk for the development of AML, e.g. patients with myelodysplastic syndromes (MDS) and those previously exposed to alkylating agents for the treatment of solid tumors.
- VDDs and FAEs are derivatives of natural compounds with low toxicity. VDD/FAE combinations produce enhanced anti-leukemic effects in vivo without enhanced toxicity.
- Paricalcitol (Zemplar) and dimethyl fumarate (Tecfidera) are already approved by FDA and EMA for the treatment of secondary hyperparathyroidism and relapsing multiple sclerosis, respectively.

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