

# **Dual targeting of carbonic anhydrase and vascular endothelial growth factor as an innovative approach in developing potential cancer-fighting candidates for the management of hypoxic malignancies**

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Cancer poses a global challenge, and the Middle East is not immune to its impact. According to a 2020 published study, nearly half a million new cancer cases were detected in Arab countries, which equates to approximately 100 patients per 100,000 people. Additionally, cancer is the second to third leading cause of mortality in the majority of Arab nations. Our scientific team is adamant about avoiding succumbing to this sickness. We did a thorough literature study in order to create anti-cancer molecules. We intend to use the findings and recommendations from existing research to develop new medications that will battle cancer and lessen its destructive consequences.

Through an innovative and previously unexplored approach, our drug candidate design focuses on limiting cancer cell proliferation and preventing metastasis. Carbonic anhydrase (CA) and vascular endothelial growth factor (VEGF) are both targeted in this strategy. Both are required for the survival and growth of cancer cells. When cancer cells divide uncontrollably, they produce an oxygen-deficient (hypoxic) environment. To adapt to this challenge, cells activate a metabolic pathway that leads to the production of these enzymes, ensuring cancer cell survival in the face of hypoxia-induced stress.

Our research team's medications have undergone comprehensive testing on a large number of cancer cells under both normal oxygen (normoxia) and hypoxic environments. Surprisingly, these drug candidates impeded cancer cell proliferation in both conditions. What's more amazing is that these medications have had no effect on healthy cells. This quality reduces the likelihood of adverse side effects when administered to patients. Furthermore, laboratory investigations and computer simulations have shown the candidates' potential to suppress the action of the examined enzymes, CA and VEGF, on cancer cells.