Phosphatase

Phosphatases and cancer have been related for many years now, as these enzymes regulate key cellular functions, including cell survival, migration, differentiation and proliferation.

A phosphatase is an enzyme that uses water to cleave a phosphoric acid monoester into a phosphate ion and an alcohol.

Because a phosphatase enzyme catalyzes the hydrolysis of its substrate, it is a subcategory of hydrolases.

Phosphatase enzymes are essential to many biological functions, because phosphorylation (e.g. by protein kinases) and dephosphorylation (by phosphatases) serve diverse roles in cellular regulation and signaling.

Whereas phosphatases remove phosphate groups from molecules, kinases catalyze the transfer of phosphate groups to molecules from ATP. Together, kinases and phosphatases direct a form of post-translational modification that is essential to the cell's regulatory network.

Phosphatase enzymes are not to be confused with phosphorylase enzymes, which catalyze the transfer of a phosphate group from hydrogen phosphate to an acceptor. Due to their prevalence in cellular regulation, phosphatases are an area of interest for pharmaceutical research.

Dysfunctions or mutations affecting these enzymes have been demonstrated to be key factors for oncogenesis.

The aim of a review is to shed light on the role of four different phosphatases (PTEN, PP2A, CDC25 and DUSP1) in five different solid tumors (breast cancer, lung cancer, pancreatic cancer, prostate cancer and ovarian cancer), in order to better understand the most frequent and aggressive primary cancer of the central nervous system, glioblastoma [1)]

1)
Dedobbeleer M, Willems E, Freeman S, Lombard A, Goffart N, Rogister B. Phosphatases and solid tumors: focus on glioblastoma initiation, progression and recurrences. Biochem J. 2017 Aug 11;474(17):2903-2924. doi: 10.1042/BCJ20170112. Review. PubMed PMID: 28801478.