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**Therapeutic Functions of HDAC inhibitors**

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To create better effects in cancer treatment, various therapies such as chemotherapy, biologic therapy, or radiation therapy are employed either in either a separate or combined way. Recently, researchers have started to reconsider the scene from a different perspective and they found the epigenetic control of gene expression played an important role in cancer progression and resistance. Therefore, agents that modify the epigenetic environment of tumor might be an innovative solution for this problem. As shown by preclinical data, HDAC inhibitors are very effective anticancer agents either as monotherapies or in conjunction with other treatments. Since then, many HDAC inhibitors are actively studied and two of their representatives - vorinostat and depsipeptide – has recently gained FDA approval for treating T-cell lymphoma.

**What are HDAC inhibitors?**

HDAC (histone deacetylase) inhibitors are a family of eleven zinc-dependent enzymes that have gained major interest as therapeutic targets, mainly in cancer research. HDAC inhibitors have a long history of use in a wide range of diseases, including neurological diseases, immune disorders, cancers, parasitic and inflammatory diseases. In this article, we are going to focus on two main diseases.

**HDAC inhibitors to treat breast cancer**

As the most frequently diagnosed cancer, breast cancer has inflicted unspeakable pain to women worldwide. Based on statistics from the American Cancer Society, nearly one in eight women in industrialized countries will develop breast cancer during their lifetime. It also shows that more people are dying from this disease recently. Considering that HDACs play an impactful role on chromatin remodeling and epigenetics, their inhibitors have become very promising anticancer treatment candidates for breast cancer, either as single agents or in combination therapy. Molecules having been actively researched include: trichostatin A, panobinostat, valproic acid, sodium butyrate, FTY720, YCW1, etc. All are showing positive preclinical effects.

Overall, HDAC inhibitors presents an attractive field for targeted therapy against breast cancer. To target multiple oncogenic signaling pathways, future therapies will focus more on combining HDAC inhibitors with other already well-established strategies like chemotherapy.

**HDAC inhibitors to treat Alzheimer’s disease**

Despite the fact that HDAC inhibitors were initially applied to the cancer therapy, another group of scientists found in 2008 that HDAC inhibitors might also be an effective strategy for treating neurodegenerative disorders. Alzheimer’s disease (AD) is one of them with symptoms like learning and memory impairment in the elderly. Recent studies have found that HDACs inhibitors are novel promising therapeutic agents for treating AD as well as other neurodegenerative diseases. The future is bright while key issues still exist and need to be addressed in terms of the enhancement of specificity, efficacy and avoiding side effects.

**About the author**
BOC Sciences has a comprehensive collection of chemicals with inhibitors being its featured products, covering mTOR inhibitors, Hsp90 inhibitors, HDAC inhibitors, Akt inhibitors, IDO inhibitor and more.