Paroxetine Hydrochloride

Paroxetine Hydrochloride (P0297) is an antidepressant commonly used in the treatment of major depression, obsessive-compulsive disorder, post-traumatic stress disorder, and both social and generalized anxiety. Paroxetine is a selective serotonin reuptake inhibitor (SSRI), that increases extracellular levels of serotonin by inhibiting presynaptic reuptake. As a result, more serotonin is available to bind to the postsynaptic receptor. Serotonin helps regulate mood, appetite, and sleep; it also facilitates some cognitive functions, such as memory and learning.

Paroxetine is a phenylpiperidine derivative, unrelated to tricyclic or tetracyclic compounds traditionally used as antidepressant medication. Those compounds are less selective and exhibit more undesirable side effects than their newer counterparts[1].

Though paroxetine has been used as an antidepressant for over a decade, new studies continue to support its efficacy, revealing new mechanisms of action. Epigenetic processes have been identified as possible crucial regulatory mechanisms in psychiatric disease, and a link between compounds such as paroxetine and epigenetic machinery in the brain are under exploration.

In one study, paroxetine indirectly targets DNA methyltransferase 1 (DNMT1), an enzyme responsible for methylating CpG dinucleotides in mammalian DNA. Paroxetine alters DNMT1 activity through modulation of histone methyltransferase (HMT) G9a, an activator of DNMT1. Administration of paroxetine decreases G9a protein levels and inhibits interactions between G9a and DNMT1[2]. Thus, as paroxetine affects DNMT1 activity via G9a, the connection between small molecules, epigenetics, and psychiatric disease warrants further exploration.

References:
1. Anderson I. J Affect Disord. 2000 Apr;58(1):19-36.
2. Zimmermann N, Zschocke J, Perisic T, et al. Biochem J. 2012 Nov 15;448(1):93-102.