

# Citalopram

by

Palle Høy Jakobsen  
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## Introduction

**Citalopram** is an example of a small molecule pharmaceutical product used for treatment of depression. Citalopram (brand names: Cipramil and others) belongs to the Selective Serotonin Reuptake Inhibitor (SSRI) class of antidepressant pharmaceutical drugs. Citalopram was first synthesized in 1972 by scientists at the pharmaceutical company Lundbeck. It was first marketed in Denmark in 1989 and subsequently in European countries and then in the United States in 1998. The drug was approved by the U.S. Food and Drug Administration for use as treatment of major depression, but Citalopram has also been prescribed off-label for other conditions. Citalopram is typically taken in one dose, either in the morning or evening.

Citalopram has one stereocenter, to which a 4-fluoro phenyl group and an *N,N*-dimethyl-3-aminopropyl group bind. As a result of this chirality, the molecule exists in two enantiomeric forms (mirror images). They are termed *S*-(+)-citalopram and *R*-(-)-citalopram. Citalopram is sold as a racemic mixture, consisting of 50% (*R*)-(-)-citalopram and 50% (*S*)-(+)-citalopram. Only the (*S*)-(+) enantiomer has the desired antidepressant effect.

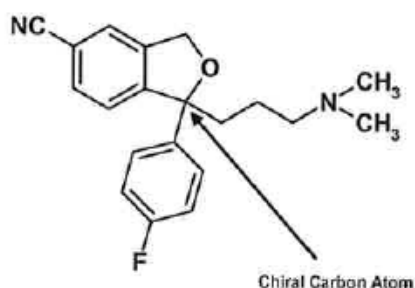


Figure. Citalopram structure.

Lundbeck had exclusive rights to sell Citalopram in the early years, as the company had patent protection of the compound. The patent for Citalopram

*expired in 2003, which gave freedom to other companies to produce generic versions of Citalopram.*

*Lundbeck later obtained a new patent covering the (S)-(+)  
enantiomer, the generic name of which is Escitalopram (more on Escitalopram later), and then marketed Escitalopram on the communication that Escitalopram worked better than Citalopram. In the United States, Forest Labs manufactures and markets the drug. The story is a commonly used example of the commercial importance of having patent protection of pharmaceutical drugs.*