Enantiomers meaning for drug affects

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In the review has been considered mixture of enantiomers and its action in the drug on the example of thalidomide. The importance of stereochemistry in drug action is gaining greater attention in medical practice, and a basic knowledge of the subject will be necessary for clinicians to make informed decisions regarding the use of single-enantiomer drugs. Enantiomer known as an optical isomer (and archaically termed antipode or optical antipode) is one of two stereoisomers that are mirror images of each other. The geometric structure of a molecule can also have a dramatic effect on how that molecule tastes or how it functions as a drug. The geometric structure of a molecule is also responsible for its chemical properties, such as its strength as an acid or base. The antibacterial drug chloramphenicol is commercially produced as a mixture of the two compounds. One three-dimensional arrangement of atoms is an active drug, the other geometric structure is ineffective as an antibacterial agent. Many of the drugs currently used in psychiatric practice are mixtures of enantiomers. For some therapeutics, single-enantiomer formulations can provide greater selectivity's for their biological targets, improved therapeutic indices, and/or better pharmacokinetics than a mixture of enantiomers. The human body is stereo specific, therefore enantiomers frequently exhibit very different biological activity because of interactions with active sites of enzymes resulting in differences in pharmacological activity and pharmacokinetic and pharmacodynamics effects. Chirality is thus a critical factor having a large impact on drug profiles, action, metabolism, and toxicity. In many cases, one enantiomer may produce the desired therapeutic effect, while the other may be inactive or even toxic. Example of these is Thalidomide – drug with tragic side effects. Thalidomide was synthesized in West Germany in 1953 by Chemie Grünenthal. It was a sedative that was found to be effective when given to pregnant women to combat many of the symptoms associated with morning sickness. Thalidomide consists of two rings with different chemical makeups. The ring on the right resembles a structure similar to hypnotic drugs and is thought to have sedative properties. The period of pregnancy when the symptoms of morning sickness are most severe coincides almost exactly with the period of most rapid limb growth in the fetus, so, unfortunately, the drug was taken at the worst possible time during the pregnancy to damage the fetus. In cases of drug toxicity like this when one enantiomer is active (often called the eutomer) and the opposite enantiomer is toxic (called the distomer), the obvious solution is to resolve the racemic mixture into the two enantiomers and administer only the safe (R) isomer as a pure enantiomer. Unfortunately, it is now known that, in the case of thalidomide, administration of the enantiomerically pure (R) isomer would not have prevented the disaster since this isomer undergoes racemization in vivo; in other words, administration of the pure enantiomer results in formation of a 50/50 racemic mixture in the bloodstream. The geometric structure of a molecule can also have a dramatic effect on how that molecule tastes or how it functions as a drug. The geometric structure of a molecule is also responsible for its chemical properties, such as its strength as an acid or base. The antibacterial drug chloramphenicol is commercially produced as a mixture of the two compounds. One three-dimensional arrangement of atoms is an active drug, the other geometric structure is ineffective as an antibacterial agent.

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