Prova Inglês PPGQUIM – 23° Processo seletivo

Chave de resposta

Leia o texto para responder as questões que seguem:

"In the past decade, a new concept in chemical synthesis has emerged, in which the ordinarily unreactive central framework — the skeleton — of organic molecules is altered through the selective deletion, insertion or replacement of atoms. This innovative approach, called skeletal editing, is an attractive strategy for altering a drug candidate's physical and chemical properties. However, practical methods that enable precise skeletal editing of structurally complex compounds have been limited in scope. Writing in Nature, Uhlenbruck et al. report a potentially transformative skeletal editing method that can convert compounds known as pyrimidines — analogues of benzene rings, with two of the carbon atoms replaced by nitrogen — into a variety of other 'heteroarene' ring systems that contain nitrogen atoms, including one that contains both a nitrogen and an oxygen atom. Given that nitrogen-containing heteroarenes are extremely common structural frameworks in pharmaceutical compounds, the authors' method is likely to benefit drug discovery immediately.

Access to large libraries of analogues of drug candidates, with varied structural features, can aid this work. These analogues are used to determine how the molecular structures of candidates affect their biophysical properties. Conventionally, library synthesis involves making systematic and modular changes at reactive peripheral chemical groups — those that are attached to a pre-prepared molecular skeleton. By contrast, the skeleton is usually relatively chemically inert, and is therefore untouched by the reactions used to manipulate the peripheral groups.

In fact, once the skeleton has been constructed, it is usually difficult to modify at all. This means that analogues of drug candidates that have different skeletons often need to be prepared from scratch using bespoke synthetic routes, which is inefficient and time-consuming. Skeletal editing solves that problem by allowing the skeleton of a drug candidate to be converted directly into another framework.

Scientists from the same research group as Uhlenbruck et al. had previously reported that pyridine rings — variants of pyrimidines that contain only one nitrogen atom — can be broken open to form linear molecules called Zincke imines. Unexpectedly, Uhlenbruck et al. found that an analogous reaction of a pyrimidine resulted instead in the formation of a compound known as a pyrimidinium salt — in effect, a nitrogen in the pyrimidine had been swapped for a nitrogen with a benzene ring attached. The authors realized that such pyrimidinium salts had the potential to react with readily available compounds to synthesize pharmaceutically valuable heteroarene molecules. If they could, then pyrimidine compounds could serve as versatile starting points for making large libraries of heteroarene analogues. This would be quite an achievement, given that pyrimidines are typically chemically inert."

Fonte**:** https://www.nature.com/articles/d41586-024-02017-0 (acesso em 17/07/2024)

1. This passage is mostly about:

   (a) A new strategy for synthesis of compounds for drug discovery.
   (b) The difficulties to the development of new methods of drug administration.
   (c) The impossibility of use pyrimidines in the drug discovery process.
   (d) Strategies for reduce the time required to synthesize a new drug.

2. According to the text, the skeletal editing of an organic molecules can be achieved, except:

   (a) Selective removal of atoms.
   (b) Selective addition of atoms.
   (c) Selective fusion of atoms.
   (d) Selective replacement of atoms.

3. According to the text, library synthesis is conventionally made by:

   (a) Skeletal editing of drug candidates.
   (b) Merging two molecular skeletons from different analogues of drug candidates.
   (c) Breaking the molecular skeleton of know analogues of drug candidates.
   (d) Making changes to reactive peripheral chemical groups attached to a pre-prepared molecular skeleton.

4. Choose the word that is closest in meaning to "varied" in the sentence:

   "Access to large libraries of analogues of drug candidates, with varied structural features, can aid this work."

   (a) Identical
   (b) Diverse
   (c) Limited
   (d) Simple

5. In the sentence “Unexpectedly, Uhlenbruck et al. found that an analogous reaction of a pyrimidine...”

   The word “unexpectedly” can be replaced with:

   (a) Recently
   (b) Conversely
   (c) As expected
   (d) Surprisingly

6. In the sentence “In fact, once the skeleton has been constructed, it is usually difficult to modify at all”, in the third paragraph, the word “it” refers to:

   (a) Once
   (b) Skeleton
   (c) Constructed
   (d) Difficult

7. Read the sentence: “The authors realized that such pyrimidinium salts had the potential to react with readily available compounds to synthesize pharmaceutically valuable heteroarene molecules."

   The word " realized " can be replaced with:

   (a) Ignored
   (b) Recognized
   (c) Misunderstood
   (d) Neglected

8. According to the text, the following statements are correct, except:

   (a) Techniques for precise skeletal editing of structurally complex compounds are broadly available in the pharmaceutical industry.
   (b) Skeletal editing is a technique to alter the central structure of organic molecules through the selective deletion, insertion, or substitution of atoms.
   (c) Skeletal editing can benefit drug discovery immediately.
   (d) Skeletal editing solves some problems of conventional methods by allowing the skeleton of a drug candidate to be converted directly into another framework.