

PRACTICAL PROBLEM

Succinylcholine is a fast-acting muscle relaxant used in bronchial and tracheal explorations (bronchoscope). Within a few seconds of administration of succinylcholine, the patient experiences muscle paralysis that allows the use of the bronchoscope, but it requires the use of an artificial respirator. Succinylcholine is hydrolysed, immediately after administration, by plasma cholinesterase so its action disappears after a few minutes.

It has been made ADME studies about succinylcholine and about the characterization of human cholinesterase. In one of them we obtained the data that appear in the attached table. These data show the values of the initial rate of hydrolysis of succinylcholine in blood (neglecting the action of the kidneys) by the action of human cholinesterase at various concentrations of the substrate.

$[\text{Succinylcholine}]_0$ (mM)	Velocity ₀ (mM/min.)
1	0,83
2	1,18
3	1,36
4	1,48
5	1,56

A los pacientes sometidos a un broncoscopia se les administra, previamente, una cantidad de succinilcolina. Pero es esencial que su concentración en sangre no sea nunca inferior a 2 mM, ya que a partir de ese momento los efectos relajantes desaparecen.

An assessment of blood cholinesterase activity prior to the screening allows the identification of each patient's profile (personalized medicine). In some individuals there is a genetic abnormality that produces a higher cholinesterase activity than in normal condition (double value). In other cases, a mutation occurs in the cholinesterase gene that affects the affinity of the enzyme for succinylcholine. In these cases the enzyme has a K_m five times higher than that of the non-mutated enzyme.

Exercise. Develop a protocol that allows the correct completion of bronchoscopy. It should be taken into account that the duration of the test is at least 3 minutes, the time necessary for the clinician to be able to observe something. In addition, the minimum possible amount of succinylcholine should be administered in order to minimize possible side effects.