

### R & D information

So as to take the maximum advantage of the possibilities that the liposome is able to provide, we should have certain factors in mind. Some of these factors will be or will come already determined and another might be variable. At first, we can divide them into two groups:

#### **Group #1:**

#### **Dependent factors of the environment and the function or objective desired**

These factors, that may be or not biological, are hardly variable and we will have to adapt ourselves to them when formulating the liposomal preparation.

#### **Group #2:**

#### **Dependent factors on the liposomal preparation**

These may be mostly varied and/or combined trying to control its behaviour as much as possible. We can divide basically these factors into:

- Dependent factors on the active principle: All physico-chemical characteristics of the selected molecule to be liposomated will influence their behaviour. The solubility, that is, that the product is wetted, liposoluble or that the degree of lipofilia or hidrofilia as well as other factors of them (spacial configuration, charge), determine the way of encapsulation and the intensity of the active principle anchor to the liposome. And they also influence considerably the encapsulation capacity and behaviour of the liposomed active principle.
- Dependent factors on the type of liposome. The type of liposome is another of the factors that influence considerably on the behavior of the liposome/ active principle. This factor is totally dependent on the manufacturing technique. The size and number of bilayers will be the determining factors of its behaviour. Problems such as the low stability, the low capacity to incorporate certain active principles, the low homogeneity and reproducibility as well as its large size that decreases considerably its diffusion and penetration capacity, makes that the most used are the unilamellar, followed by the oligo and barely the multilamellar.
- Dependent factors on the composition and another physico-chemical characteristics of the liposomal preparation. The composition of the liposome is doubtlessly the most important and determining factor in the control of the behaviour of a liposomated active principle. From the balance and condition of this composition the most relevant behaviours of the liposome will be obtained (capacity of diffusion, type of interaction, time of circulation and liberation of the active principle, etc.). Between the components that are able to be part of a liposome, the lipids are those which are going to condition more behavior. The transition temperature, the larger or smaller unsaturation of the fatty acids chains, its length, the polarity of the phospholipidic heads or the inclusion or not of cholesterol in the formulation will influence these characteristics very much. The incorporation of the organic solvents, detergents and other physico-chemical factors can also influence it.

Depending on the needs or requirements of the institution concerned these formulations can be totally or partially carried out by us. For this purpose, a budget based on the type of product and on the working conditions required is set up, i.e. sterile, radioactive product, etc., time and material needed, tests to be carried out and another factors specified to be taken into account.