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Ana Catarina Silva



Biotechnology for Pharmaceutical Sciences

Concepts and Applications

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Chapter 1

General Concepts



1.1 Definition and Application Areas of Biotechnology

The overall concept of **Biotechnology** defines it as the technology that uses living organisms or parts of them, for the production of goods and services of interest to people.

Currently, the main application of **Biotechnology** is in medicine, through the production of therapeutic proteins by genetic engineering techniques. However, **Biotechnology** has also proven useful in improving industrial processes, in environmental cleaning and in agricultural production. Figure 1.1 summarises the main application areas of **Biotechnology**.

Green Biotechnology refers to the applications of Biotechnology in agriculture, food and livestock. In agriculture, it is mainly related to the development of **transgenic plants**, which grow in specific environmental conditions, being more productive and resistant to pests, diseases and herbicides. In livestock, it refers mainly to the use of **artificial insemination** techniques in cattle, which have grown rapidly after the discovery of genetic engineering techniques.

White Biotechnology is related to the use of biological systems for the **production, transformation** or **degradation** of **molecules**, using enzymatic and fermentative processes, with applications in various industrial sectors, such as: chemical (for example, in the production of butanol, acetone, glycerol, enzymes and metals); electronic (for example, in the manufacture of biosensors) and energy (for example, in the production of ethanol and biogas).

Blue Biotechnology refers to the creation of sustainable technological solutions, which help to protect the environment, such as **bioremediation**. This can be defined as any process that uses microorganisms, fungi, green plants or their enzymes, to restore the original (or natural) environmental conditions, which were altered by contaminants. Examples of applications of **blue Biotechnology** include: marine and aquatic; oil recovery, waste treatment, water purification, etc.