TECHNOLOGY

Biosensors or how the doctor will be able to detect the tumor on the first visit

A simple technology similar to that of blood glucose will allow the family doctor to extract a blood sample "and in one minute analyze the tumor marker of a hormone"

Blood glucose analysis using a biosensor. / (CAD)

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Society in recent centuries has developed different tools to **measure physical and chemical parameters such as weight, electric current, voltage, shape, acidity or basicity** , etc.

But to quantify molecules, microorganisms, cells or molecular markers, it was necessary to overcome the second half of the 20th century and develop more complex analytical procedures, which required specialized technicians, time and higher costs. " **The discovery of biosensor technology in the 1970s and 1980s made a further step possible** : directly quantifying molecules, microorganisms or cells specifically, without the need to use complex analytical strategies," explain the experts in the subject.

These devices made it possible to obtain the results of the **analyzes** easily, in a short time and with less expense.

FIRST BIOSENSOR

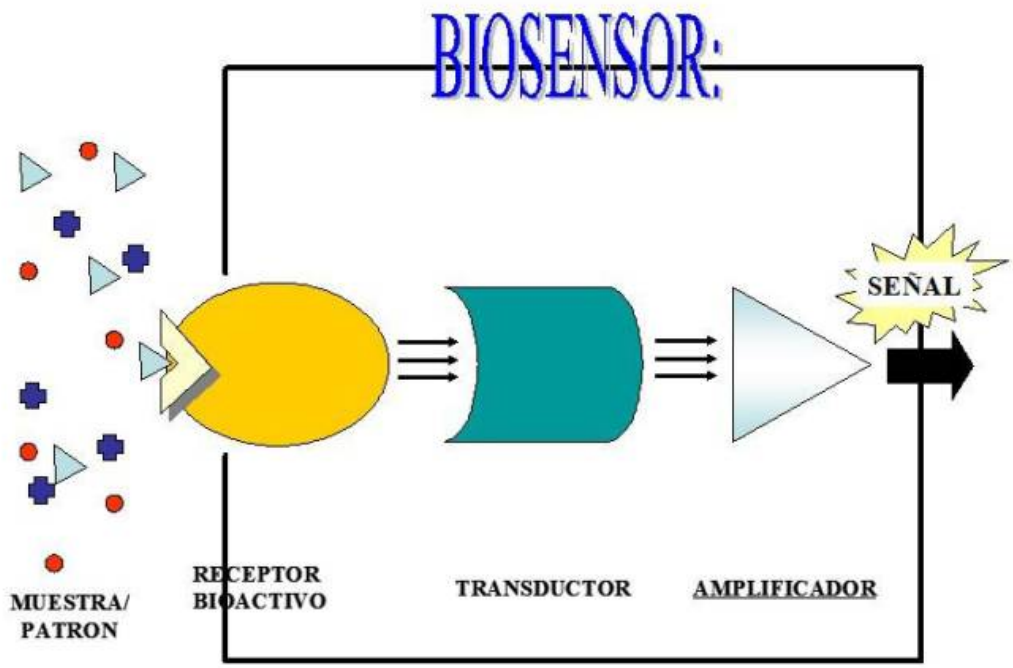
The first biosensor **was developed for the quantification of blood glucose and began to be marketed in 1975 by the North American company YSI** .

lytical tools and their applications, proving

And certainly, in the imminent future, in terms of health, molecular affinity biosensors – with a simple technology similar to that of blood glucose – " will make it possible for, during a first visit to the doctor, the doctor to take a blood sample from the patient and analyze, directly and in less than a minute, the presence in their blood of a tumor marker or a specific hormone . "This speeds up the diagnosis and reduces patient travel."

It is explained by the researcher and businessman Teófilo Díez-Caballero, manager of Biosensores SL, the first private company dedicated to R&D&I in this technological field that was created in Spain.

This technology firm is based in Moncofa and turns 30 this October . "One of the specific objectives for which we created Biosensores SL was to develop, as a pioneer in 1990, molecular affinity biosensors to quantify small concentrations of the molecules of interest, as well as for the monitoring and automation of measurements."



Basic scheme of a biosensor.

FIRST SPANISH COMPANY

Initially, the company was installed in the European Center for Innovation Companies (CEEI) of the Paterna Technology Park (Valencia) but within a year it moved to a family laboratory, in Moncofa, where it has continuously maintained its research work until today . .

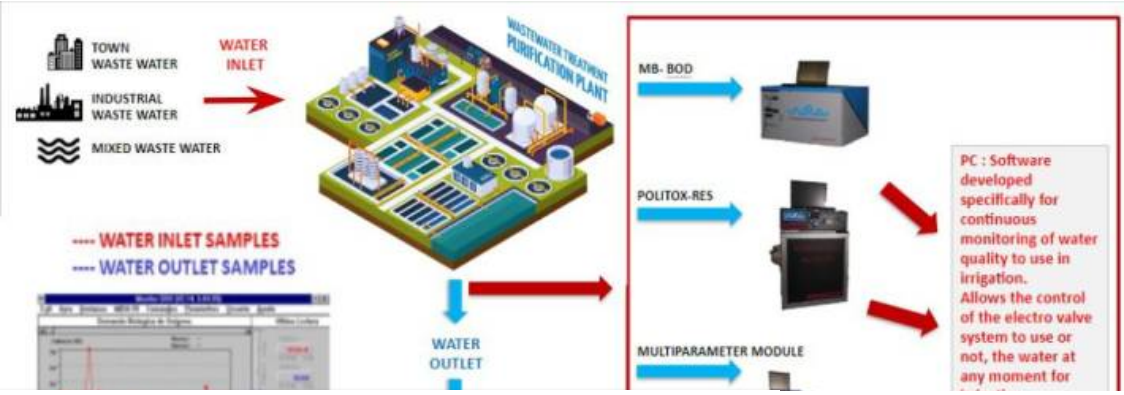
The project was ambitious and pioneering: to attract technological companies in the areas of health, environment, and biotechnology to the Plana Baixa, with the intention of diversifying the industry.

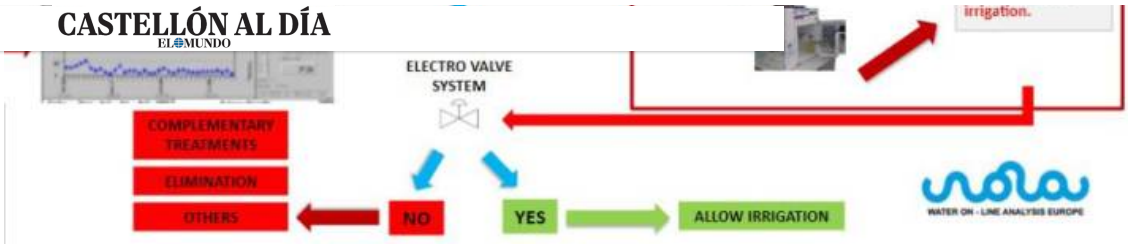
For this purpose, in 1998, together with the City Council and the University, they established the Institute of Environmental and Biomedical Technology (ITMAB).

However, that business park was frustrated by disagreements with the rulers of the Moncofense council in the early 2000s.

In 2007, the founders of Biosensores SL established a spin off called Water On Line Analysis Europe SL (WOLA) for the manufacture and marketing of analytical equipment already patented and validated by international organizations such as Promote ETV, Concerted Action of the EU, while the company parent company, Biosensores SL, focused on the purpose of R&D&i.

"Since the bankruptcy of Lehman Brothers in 2008, the international recession and the irregular urban planning actions that we had to endure in Moncofa since 2002," he says, the partners' finances suffered and the Díez-Caballero family sold part of their assets "to "that both companies could continue to have 35% of the annual research budgets."





Quality scheme of the technology applied to irrigation water.

EU CO-FINANCING

This, together with the co-financing of the European Union in R&D&I projects, "has allowed its maintenance in terms of technological activity until today. Not so with WOLA's manufacturing and marketing plan," says the engineer.

In his 30 years of activity, the researcher explains that between 1996 and 2023, the European Union has selected "for their social and technological interest" 11 of the 21 projects presented by Biosensores SL and by WOLA SL "It means the selection and co-financing of 52 % of the projects presented to the EU by the two companies," he points out.

The average co-financing for those 11 approved projects was 65% of the budget. The founding partners of both brands made up 35% of the remaining money "by selling heritage assets," adds Díez-Caballero.

Currently, WOLA is studying the creation of a Joint Venture with several environmental organizations in the Middle East "interested in these technologies , with the aim of starting the manufacturing and marketing in that market of some of the automated microbial biosensors that both companies have developed."

Research team

RESEARCH TEAM

The founder highlights the team of multidisciplinary scientists with whom he has worked since 1992: more than 35 senior researchers, such as biologists, doctors in Molecular Biology, physicists, doctors in Medicine, in Engineering, "which made it possible to advance in new analytical strategies of biosensors. "At the same time, in each project that was developed, the multidisciplinary team developed prototypes capable of carrying out analysis without human intervention," he says.

With this, important milestones were achieved such as: « **development of automated microbial biosensors to monitor fundamental parameters in water quality; environment; fish farms; aquaponics or aquaculture. Use of regenerated wastewater; bioremediation** , etc. In many cases it has been possible to reduce the analysis time from days to less than 30 minutes, reducing the cost of more than €50 per analysis that costs only 0.8 euros.

Furthermore, during these 30 years, **more than 70 university students** have been able to train and carry out research projects in the facilities that remain in Moncofa as a scientific reference in the area.

biotechnology Science Education R&D&i Moncofa Health Health Technology