NOTA DE PRENSA

New nanomaterials to move towards better cancer diagnosis

- *A study of CIC biomaGUNE opens the possibility of designing a new generation of nanomaterials that act as probes able to better distinguish different types of cells.*
- *The study has been published in the prestigious Proceedings of the National Academy of Sciences of the United States of America (PNAS).*
- *"The work helps us to understand how nature uses superselectivity to perform biological functions," says Dr. Ralf Richter.*

(Viernes, 15 Mayo 2015).- One of the main challenges in biomedicine is the correct selection of cells and tissues to make accurate diagnoses and develop effective therapies. A study led by the Centre for Cooperative Research in Biomaterials CIC biomaGUNE has concluded that the identification of these cells can be more efficient if you can manage to design a new generation of nanomaterials that function as probes with high selective capacity to distinguish different types of cells from the cell surface receptors.

The study opens the door to a better understanding of biological interactions and the development of more effective treatments for cancer and inflammatory processes as well as enhance the immune response.

Nanomaterials display ligands, whereas cells have receptors on their surface. The two molecules - ligands and receptors - recognize and fit to each other like a key and a lock.

This CIC biomaGUNE study, which is the result of three years of work, reveals how nanomaterials that present multiple ligands simultaneously can accurately discriminate between different densities of receptors presented by the cell surface, and how this capacity can be tuned.

Stem cells and cancer cells have specific receptors on their surface that allow their identification with probes that recognize these receptors. However, there are other types of cells that display the same receptors, albeit at lower density.

"Conventional probes distinguish effectively cells having a receptor from others which have not, but their effectiveness is limited when the cells to be isolated just have receptors at a different density," says CIC biomaGUNE scientist Ralf Richter, who has led the research.

The study, which was published in the prestigious Proceedings of the National Academy of Sciences of the United States of America (PNAS), has been supported by the Marie Curie and the European Research Council programs of the European Commission.

”Superselectivity”

"Multivalent probes that bind to multiple receptors simultaneously have the potential to discriminate clearly between receptor densities. This ability is called 'superselectivity' "says Richter.

The experts have employed the polysaccharide hyaluronan to demonstrate how the cell selection procedure can be tuned through the design of the nanomaterials.

"With hyaluronan, which is naturally present in the cellular environment, and increased in inflammatory processes and cancer, we have shown how that superselectivity can be tuned through the design of probes to recognize the desired density of receptors" adds the expert.

"The work also allows us to understand how nature uses superselectivity to perform biological functions, which in the future may help to design better ways to control inflammation, immune response and metastasis," adds Richter.

This research has had the participation of the chemist Galina Dubacheva and the collaboration of Rachel Auzély-Velty from the Centre de Recherches sur les Macromolécules Végétales (CERMAV) in Grenoble and of soft matter physicists at the University of Cambridge (team of Daan Frenkel).

About CIC biomaGUNE

The Center for Research in Biomaterials, CIC biomaGUNE, based in the Technology Park of San Sebastian, carries out cutting-edge research at the interface between Chemistry, Biology and Physics with a focus on the study of properties of biological nanostructures at the molecular scale, and their applications.