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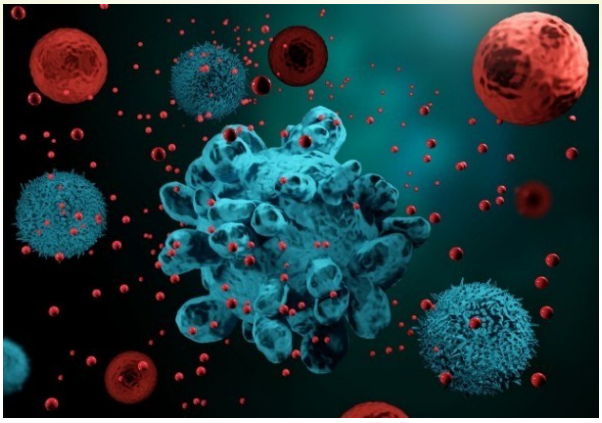
What you need to know about Exosomes



“Huge opportunities”. “Many hurdles”. “Enormous potential”.

It's just an excerpt of the several terms you'll come across if you search for them on the web.
What am I talking about? Exosomes. Also referred to as Prostasomes, Tolerosomes, Dexosomes, or Nanovesicles.
Markers of cancer diseases, the basis of broad diagnostic platform, and potential future therapeutics, exosomes have now surpassed 2,000 annual scientific publications.
But why are exosomes so unique?

1) What are exosomes?

Historically, the term "exosomes" comes from the Greek exo "out of" and soma “body”.
In 1981, Trams and his collaborators stumbled upon 40–90-nm exfoliated membrane vesicles issued from cultures of various normal and neoplastic cell lines. Not able to qualify them based upon their physiologic function, they decided to refer them as “exosomes” (1).
The definition of exosomes, as we use it today, was later described by Harding and Johnstone in 1983, following observations in electron microscopy of traffic intracellular transferrin receptor by maturing reticulocytes (2, 3). The authors defined exosomes as microvesicles of endosomal origin, secreted into the extracellular medium after plasma membrane fusion of a multivesiculate endosome.
Up until the 90’s, we thought that exosomes were a means of removing intracellular material. Since then, Grasa Raposo found that B-lymphocytes secrete antigen-presenting exosomes (4) and so a new function was assigned and studied in depth: vector in the intracellular communication. Indeed, the exosomes contain many elements such as lipids, enzymes, proteins and RNAs capable of modifying the physiology of recipient cells.

2) How exosomes are formed?

Contrary to microvesicles, ectosomes, and membrane particles that are formed from the budding of the plasma membrane, the exosomes have an intracellular origin and are released into the extracellular medium after fusion to the plasma membrane of an endosome.
Once endocyted, the surface molecules reach the early endosomes where they are sorted for recycling or degradation. The molecules to be recycled are redirected to the plasma membrane via endosomes. The molecules to be degraded are selectively clustered in areas of the endosomal membrane that invaginate to form intraluminal vesicles (ILVs). These vesicles accumulate in the lumen of the endosomes, which then take the name of multivesicular endosomes (MVEs). MVEs will then merge with the lysosomes. This process leads to the hydrolysis of the vesicles intraluminals and their cargoes.
However, MVEs can also merge with the plasma membrane and thereby release the vesicles they contain. The intraluminal vesicles thus released into the medium extracellular are then called exosomes.
The membrane deformation allowing the formation of ILVs is ensured by the ESCRT machinery (Endosomal Sorting Complex Required for Transport) composed of four multiprotein complexes: ESCRT-0, I, II and III.

3) Why are exosomes so popular?

Exosomes can be found in many biological fluids, including blood, urine (5), saliva (6), breast milk (7), cerebrospinal fluid (8), semen (9), amniotic fluid (10), and ascites (11).
They can be released from a broad spectrum of healthy and tumor cells (12), such as fibroblasts, epithelial cells, neurons, adipocytes, and have even been mentioned in leishmania (13).
And thanks to this diversity of origin, exosomes have been found to play many roles in various biological processes, such as angiogenesis (14, 15, 16, 17), antigen presentation (18, 19, 20), apoptosis (21, 22, 23, 24, 25), and inflammation (26, 27, 28).
Since these processes are key pathways in cancer, neurodegenerative diseases, infections, and autoimmune diseases, exosomes may be the Holy Grail we have been searching for so long.
But searching within the body such tiny elements, which markers can help us?

4) Markers of exosomes

Exosomes carry on their surface characteristic elements:

- Tetraspanins (29), or membrane organizer proteins: **CD9** (30), CD37, **CD53**, **CD63**, **CD81** (30), **CD82**, and **CD151**.
- Cell adhesion proteins: integrin, lactadherin, **ICAM**, **EpCAM**
- Immunoglobulin supergene family members: MHCI, MHCII, **CD86** and **CD54**
- Lipids: Phosphatidylserine, cholesterol, ceramide and other sphingolipids, LBPA
- Intracellular trafficking elements: RAB, GTPases, annexins

Targeting the membrane proteins on the surface of exosomes is quite useful, as researchers can directly track and isolate compounds of interest with specific monoclonal antibodies linked to magnetic beads or to the affinity column.

Diaclone has developed a large range of antibodies for your Exosome Research.

All the above-mentioned markers in bold and green are already available at Diaclone!

Why are you waiting to test them?

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