Therapeutic potential of extracellular vesicles

Amy Kauffman, Pei-Chen Chiang, Samantha Haller & Linda Hsu

A panel of experts from Corning Life Sciences took part in a podcast with Cell & Gene Therapy Insights to discuss extracellular vesicles (EVs). What are they, what their therapeutic potential is, and what work is currently occurring at research and pre-clinical levels? Here, we summarize some of their key thoughts from the discussion.

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"The way I like to describe EVs to folks who may not be familiar with them is that they are like the 'text messages' of cells. They are small nanoparticles that have lipid membranes that are naturally released by cells, and they are used to communicate with one another. Inside of these nanoparticles, there is a series of genetic information, sugars and proteins, that are like the texts that one cell sends to the other and are read in order to elicit a response.

When we think about what they can bring to the table for advanced therapies, something that is on the horizon is the idea of acellular therapies – thinking about ways we can use cellular products to help make therapies without having to deliver an entire cell. You can imagine trying to receive a text message as opposed to a whole phone. It's a lot easier to have that same message in a tiny little package that you can give and hopefully get a healthy response.

I predict that EVs are just on the cusp of showing the potential of what they can do in the clinical environment, and I am very excited to see where they are going to go in the next five years."

– **Amy Kauffman,** Senior Development Engineer of Biomaterials

"Regeneration from stem cell-derived EVs could presumably prevent implantation rejection side effects, but still maintain the growth stimulation ability, like a stem cell itself.

In terms of the impact on disease treatment, such as COVID or chronic infection, stem cell-derived EVs could probably do even better than steroids at decreasing inflammation, based on the research. This immunomodulation ability from stem cell-derived EVs could go beyond our imagination.

There are only a few clinical trials that have directly applied EVs so far, but things look promising."

– **Pei-Chen Chiang,** Senior Research Scientist,
Corning Research Centre Taiwan

"In various models, EVs have a similar or even better therapeutic capacity compared to their parental cells. EVs have advantages compared to stem cells: they are non-immunogenic, they can bypass the blood-brain barrier, and another point to consider is their tropisms. The tropisms of the EVs will depend on the parental cells, and EVs can be engineered so you can better direct where they could go.

There are a lot of promising approaches, but there are also some considerations to take into account. For now, in many of the therapeutic effects seen with EVs, the mechanism of action is not fully understood. We definitely need more studies to better understand the mechanism of action in order to facilitate, for example, FDA drug approval."

– **Samantha Haller,** Research Scientist,
Corning European Technology Centre

"In EV production, host cell selection and culture conditions are critical. The parent cell needs to be selected based on the activity and tissue-homing property of EVs, and on potential immunogenetic and oncogenetic configurations.

We still need criteria to determine the identity and purity of EVs. In 2014, the International Society for Extracellular Vesicles (ISEV) established the most fundamental characteristics that should be evaluated when working with EVs."

– **Linda Hsu,** Research Scientist, Corning Research Centre Taiwan

To find out more, listen to the podcast here or read the transcript here.

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