H2020 project fact sheet:

Evolving reversible iMmunocapture by membrane sensing peptides: towARds scalable extracellular VEsicLes isolation

MARVEL

Project ambition:

Extracellular vesicles (EVs) are cell-derived membranous structures found in all biological fluids that act as signalling vehicles in both physiological or pathological mechanisms. Accordingly, a flourishing of interest in EV research is constantly advancing towards their exploitation in precision healthcare, with particular focus on **Regenerative Medicine** and **Liquid biopsy**. EV market size and prospect potentially already worth billions, yet it is still confined to a very tiny niche by the current readiness level of EV technologies. Revolutionary, versatile, and cost-effective methodologies to enable scalable EV isolation in high purity from bio-samples, from laboratory analysis (µL to mL) to the manufacturing (>1L) scale, are still necessarily demanded to open new perspectives in EV-based therapeutics and diagnostics. **MARVEL mission** is to combine and implement reversible capturing and peptide science, towards the first and best performing ever affinity-based technology for scalable small EV (<200nm) isolation. The modularity in scaling-up of the novel protocols and kits will be demonstrated on medium/large sample volumes in relevant environments for therapeutic and diagnostics use of EVs.

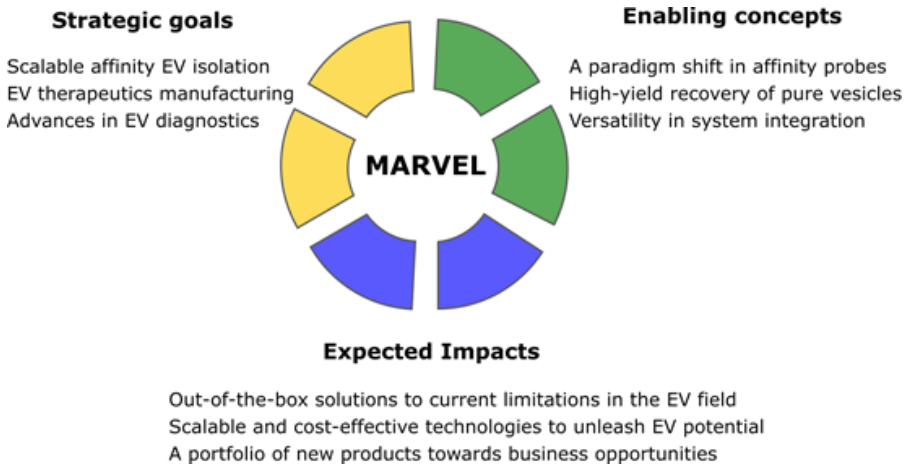

Figure 1. The MARVEL project at a glance

Project facts:

Start date: 01/11/2020
End date: 31/10/2022

Duration in months: 24

Project budget: € 1.8 M

H2020 Research and Innovation Action

Grant Agreement: 951768

Call: H2020-EIC-FETPROACT-2019

Topic: FETPROACT-EIC-06-2019
EIC Transition to Innovation Activities

Keywords:
Extracellular Vesicles; Exosomes; Peptides; Membrane sensing peptides; Affinity capture scaling up; Cardiac repair; Bladder Cancer; Liquid Biopsy; Cell-free therapy; EV manufacturing; Entrepreneurship

Project description:

MARVEL out-of-the-box solution is a paradigm shift from antibodies to peptides as an alternative class of affinity ligands characterized by high efficiency of EV capturing (Figure 2). In particular, MARVEL will introduce the use of membrane-sensing peptides (MSP) as novel ligands for the size-selective capturing of small EV, unbiased by differential surface protein expression (membrane as universal EV marker); in parallel, specific peptide probes (SPP) with high affinity for clinically relevant EV protein markers will be developed to enrich selective EV subpopulations. The versatility and modularity in scaling-up of the technology will be demonstrated on medium/large sample volumes in:

1) the manufacturing of GMP-compliant EV as a medicinal product for cardiac repair;

2) laboratory scale urine-based liquid biopsy for bladder cancer stratification and monitoring.

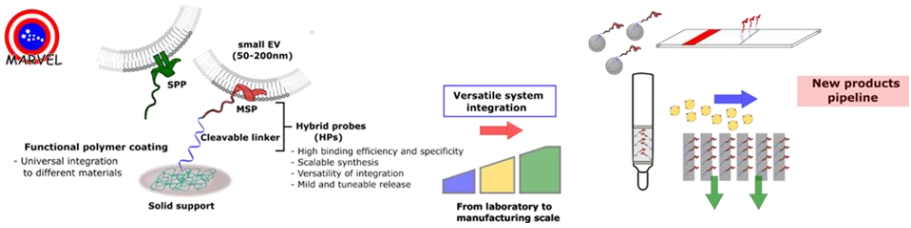

Figure 2. MARVEL will introduce an alternative class of affinity ligands (MSP) and (SPP) towards a modular and versatile platform for scalable EV isolation possibly generating an entire new products pipeline.

Expected impact:

MARVEL platform will produce direct and heavy impacts on the field of EV by empowering the sustainability of their use in both **regenerative medicine** (EV-based cell-free therapies) and diagnostics (EV-based liquid biopsy). Such empowerment is expected **to increment readiness level of EV technologies and endow them with clinical grade maturity.**

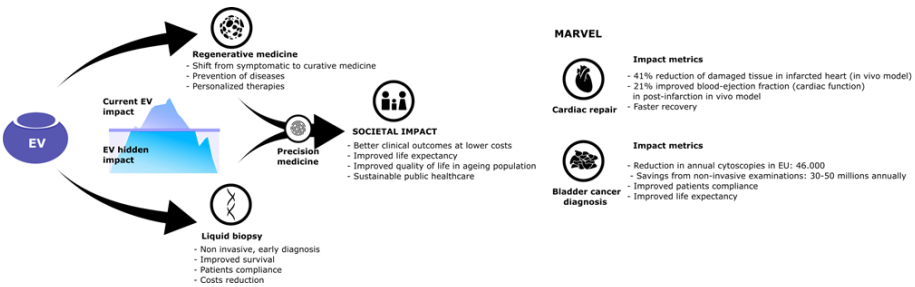

Figure 3: Precision medicine paradigm for patients implies increased chances of treatment success and means fewer side effects. For healthcare systems this produces increased sustainability. MARVEL will increment readiness level of EV technology in both regenerative medicine and diagnostics.

Consortium:

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