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Team research to develop lab-on-chip system vs cancer underway

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Keywords: [medicine](#) [conference](#) [lab-on-chip](#) [cancer](#)

At the Engineering in [Medicine](#) and Biology [Conference \(EMBC\)](#) in Buenos Aires (Argentina), nanoelectronics research specialist [IMEC](#), as well as its project partners have announced the launch of the European Seventh Framework Project MIRACLE.

The MIRACLE project aims to produce an operational [lab-on-chip](#) for the isolation and detection of circulating and disseminated tumor cells (CTCs and DTCs) in the blood. This new lab-on-chip will be an essential step towards a faster and cost-efficient diagnosis of cancer.

The detection of circulating and disseminated tumor cells in blood is a promising methodology to diagnose cancer dissemination or to follow up cancer patients on therapy. Currently, the detection analyses of these cells are only done in medical laboratories requiring labor intensive, costly and time-consuming sample processing and cell isolation procedures. A full tumor cell detection analysis may take more than a day to complete. In contrast, a lab-on-chip, with many processing steps integrated, would enable a faster, patient-friendly, cost-effective detection of tumor cells in blood. Thus, they are therefore labor-saving and minimally invasive, promoting patient's comfort and the efficiency of today's healthcare delivery.

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In this connection, a preceding joint project by some of the partners (MASCOT FP6-027652), individual microfluidic modules for cell isolation, cell counting, DNA amplification and detection have already been developed. Based on this expertise and further supported by additional partners, the development of a fully automated, lab-on-chip platform to isolate, count and genotype CTCs is envisioned within the framework of the MIRACLE project.

For genotyping, genetic material (such as mRNA) will be extracted from the cells and multiple cancer related markers will be amplified based on multiplex ligation dependent probe amplification (MLPA) followed by their detection using an array of electrochemical sensors. Full integration of all steps requires innovative research and processing steps which need a combination of the multidisciplinary and unique expertise of the different project partners (ranging from microfluidics to interfacing, miniaturization, and integration skills). The resultant lab-on-chip tumor detection system will be significantly advanced compared with current state-of-the-art systems, revolutionizing cancer diagnostics and individualized theranostics.

Within the framework of the MIRACLE project, IMEC (as project coordinator), works together with the Universitat Rovira I Virgili (Spain), the Institut für Mikrotechnik Mainz, AdnaGen, ThinXXs and Consultech (Germany), MRC Holland (The Netherlands), the Oslo University Hospital (Norway), the KTH Royal Institute of Technology, Multi-D and Fujirebio Diagnostics (Sweden), ECCO—the European CanCer Organisation and ICsense (Belgium) and Labman (UK). The project's aim is centered at the development of a fully automated and integrated microsystem providing the genotype (gene expression profile) of CTCs and DTCs primarily from clinical samples.

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