An innovative flow-based biophysical method to perform the mass-density characterization of 3D tumor spheroids with preserved viability

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3D cell models, such spheroids and organoids, are becoming key to narrowing the gap between *in vitro* and *in vivo* outcomes reliability.

When analyzing such samples, techniques such as Brightfield imaging may not sufficient, or may need invasive protocols to extrapolate relevant data. Techniques capable of obtaining appropriate outcomes are often expensive or require expert users. Moreover, the general control vs treated approach may include intrinsic natural sample diversities, leading to enhanced errors related to heterogeneity and standardization.

In this poster we present a novel flow cytometry method1 to measure mass-density, size and shape of live 3D tumor spheroids, as well as the post-analysis data2 of the collected samples to prove the preserved viability.

The device calculates the terminal velocity of a free-falling sample, positioned in a vertical flow-channel immersed in a controlled solution at rest. Stokes' law, combined with shape recognition algorithm and sample-motion tracking, allows the physical measurements to be recorded. (Figure 1A).

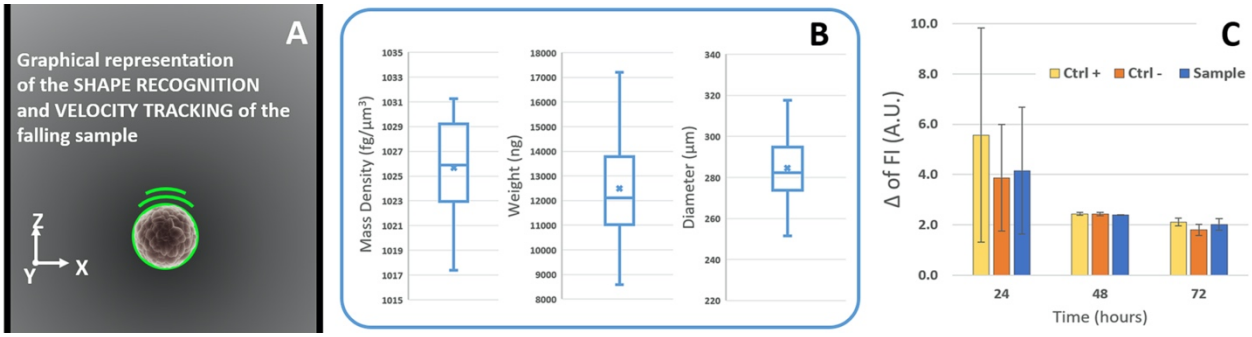

Figure 1 A) *Graphical representation of the W8 working principle;* ***B)*** *Output of the physical measurements;* ***C)*** *Viability results.*

MCF7 cell line spheroids were seeded (700 cells/well), and cultured for 7 days in DMEM with 10% FBS at 37 °C & 5% CO2. On day 7 of formation, fully mature and organized spheroids were washed and resuspended into the analysis buffer (WAS). The dataset distribution analysis was performed and the collected spheroids (SPLE) were compared to spheroids maintained at room temperature in WAS (CL–) and spheroids kept in culture medium at 37°C and 5% CO2 (CL+), Figure 1B.

Viability results were obtained for the three test conditions (Figure 1C). No statistically significant differences were found after comparing the mean values of the post-characterized samples (SPLE) with CL+ and CL– confirming the preserved viability.

References

1. Cristaldi A et al., *Micromachines*, 11, 465, 2020.
2. Bacchi F et al., *Biomed Sci Eng*, 4, 2021.

Disclosures

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