Patient-derived MicroOrganoSpheres (MOS)™ enable precision clinical decision-making for multiple myeloma patients

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Background

There are many equipoised multiple myeloma (MM) treatments and nearly all relapse patients undergo cycles of treatment, response, and relapse management. Selecting the right agents and right drug combination is thus of critical importance and an area of unmet need. We currently lack patient-derived MM models that can enable functional precision medicine to help real-time clinical decision-making to guide individual patient treatment.

Methods

We have created a method to grow MM patient avatars in MicroOrganoSheres (MOS)™, microscale droplet ECM that sustain the original tumor microenvironment (TME) including both stromal and immune compartments. MOS™ enable reliable testing of available drug combinations and experimental drugs within 10 days of bone marrow (BM) biopsy, making it feasible to guide treatment decisions in the clinic. In the current study, BMB-derived MM MOS were generated via droplet microfluidics and cultured in vitro, followed by live MOS staining and flow cytometry. Drug screen was performed on MOS with FDA-approved single agents and combinations.

Results

Figure 2. High throughput drug screen on MOS derived from MM biopsy sample. (a) Xillis MOS technology. (b) High throughput drug screen workflow. (c) Response to single agent dosing (CTG vs. live/dead imaging assay). (d) Response to combinations regimen.

Figure 3. Multiple myeloma patient-derived MOS response was consistent with clinical outcome. (a) Table depicting MOS readouts correlations with clinical outcomes. (b) Representative drug response curve from CTG data.

Results

MOS technology could enable clinical decision in multiple myeloma patient treatment. A clinical trial including 40 patients is starting in a month to further validate the predictability of the MM MOS assay for therapeutic decision-making in the clinic.

Conclusion and future directions


References