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Analysis of regulatory mechanism of plasticity towards cancer stemness by hydrogels

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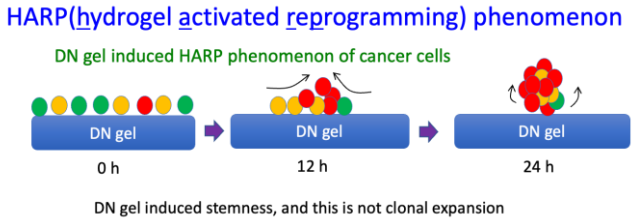
Tumor heterogeneity related to plasticity is one of the important factors contributing therapy resistance of cancer tissues including cancer stem cells (CSCs). Although recent studies uncovered the diversity of cancer tissue, identification of effective targets of heterogenous cancer remain as difficult issue. Recently, we discovered the novel potential of hydrogels as biomaterial to rapidly generate heterogenous cancer cells into CSCs termed HARP (hydrogel activated reprogramming) phenomenon (Fig. 1a, Ref. 1). By placing cancer cells onto acrylamide-based hydrogel, spheroids were rapidly observed within 24 hours expressing *Sox2* and *Nanog* (Fig. 1b)and these CSCs were highly tumourigenic in vivo. To understand the mechanism of HARP phenomenon, we analyzed the physical factors of hydrogels including elastic modulus or electric charge related to metabolic state and epigenetical change along with the induction of plasticity. Previously, we reported that hydrogel could bound to integrin (Ref. 2) and hydrogel had reservoir function for cytokines produced by cells (Ref. 3). Thus, analysis of hydrogel may contribute to profound understanding of tumor microenvironment regulating reprogramming of cancer cells and rapid induction of CSCs should provide systematic platform for identification of effective therapeutic reagents against CSCs.

a



b

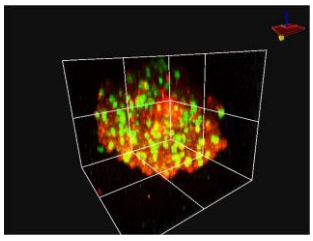


Fig. 1. a. Schematic process of HARP phenomenon. b. Immunofluorescence of Sox2 (green) and actine (red) in DN gel-induced spheroid of CSCs.

References

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