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Access to health – breast cancer awareness and screening camps in rural India

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Breast cancer is the most common cancer of urban Indian women and the second most common in rural women. Owing to lack of awareness of the disease in India and in absence of breast cancer screening programs, majority of breast cancers are diagnosed at a relatively advanced stage. Government agencies, NGOs and charity organizations have put great emphasis on improved breast cancer awareness among masses for promotion of early detection, providing comprehensive treatment module, providing support for breast cancer management and for screening and rehabilitation. The efforts have resulted in an improved survival and quality of life of Indian breast cancer patients but the improvement is more pronounced in urban population. In rural areas, there is still a lack of good health care and awareness among masses regarding the importance of early breast cancer screening and thus cases of late diagnosis are more prevalent. In addition, there is still an identified lack of breast cancer screening programs in rural areas which further causes late diagnosis. The other common factors that lead to late diagnosis include delays on the part of womenfolk of rural areas to seek advice for a recognized health problem which is mainly due to financial reasons, social/cultural reasons such as general inhibition of women to see the doctor for breast ailments, general scare of people towards cancer like disorders and a general indifference of women towards their health. In rural areas illiteracy is widespread and also people are inhibited and not motivated to come to the hospitals for screening/checkup. Considering various factors of cancer incidence rate, to address the most common barriers such as lower cancer literacy, lesser availability and accessibility of proper medical facilities, three Indian states were shortlisted to initiate the project ECHO by organizing breast cancer awareness and screening programs for rural and semi-urban Indian population. In addition to being a CSR approach, project ECHO also increased the cancer literacy amongst the rural population and emphasized on health education, early diagnosis of breast cancers and more public facilities for breast cancer treatments.

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Development of 3D implantable liver organoids

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Development of *in vitro* model to accurately predict *in vivo* drug toxicity is one of the greatest challenges of the pharmaceutical industry today. Freshly isolated human adult hepatocytes are considered to be the gold standard tool to evaluate human drug metabolism and safety *in vitro*. However, primary hepatocyte scarcity, cell cycle arrest and the rapid loss of liver-phenotype post isolation are major limitations. Immortalized and hepatoma cell lines have therefore been employed as potential alternatives, however, their poor functionality, karyotypic instability and higher tolerance to toxicological insult limit their widespread application. Human embryonic and induced pluripotent stem cells provide renewable resources to obtain hepatocyte-like cells (HLCs) *in vitro*. Although HLCs can be derived efficiently from pluripotent stem cells under conventional monolayer protocols, they exhibit foetal features and have a transient phenotype which limits their applications. We have successfully developed a protocol to derive functional HLCs under three- dimensional (3D) condition. Unlike their 2D counterpart, the 3D HLCs exhibit mature and stable phenotype for over 200 days *in vitro*. More importantly, the cells remained metabolically active and drug-inducible during the culture period providing a better *in vitro* platform to evaluate long-term effect of new lead compounds in more physiologically relevant setup.

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