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+1 (929) 224-5068

TITLE: Radiobiological effects of wound fluid on breast cancer cell lines and human derived tumor spheroids in 2D and microfluidic culture

Name: Shabnam Jeibouei[1,2,14], Ali Hojat[1,14], Ebrahim Mostafavi[3,4], Amir RezaAref[5,6], Alireza Kalbasi[7], Vahid Niazi[8], MohammadAjoudanian[2], Farzaneh Mohammadi[9], Fariba Saadati[10], Seyed Mohammadreza Javadi[11], Forough Shams[2], Maryam Moghaddam[12], Farshid Karami[8], Kazem Sharif[2], Farid Moradian1[3], Mohammad EsmaeilAkbari[1*] & Hakimeh Zali[8*]

Affiliation:

1-Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
2-Department of Medical Biotechnology, School of Advanced Technologies in Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
3-Stanford Cardiovascular Institute, Stanford University School of Medicine, Stanford, CA, USA.
4-Department of Medicine, Stanford University School of Medicine, Stanford, CA, USA.
5-Xsphera Biosciences Inc.,
6-Tide street, Boston, USA. 6 Belfer Center for Applied Cancer Science, Dana-Farber Cancer Institute, Boston, MA, USA.
7-Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA.
8-Department of Tissue Engineering and Applied Cell Sciences, School of Advanced Technologies in Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
9-Department of Biology, Central Tehran Branch, Islamic Azad University, Tehran, Iran.
10-ZIK Plasmatis, Leibniz Institute for Plasma Science and Technology (INP), Greifswald, Germany.
11-Department of Surgery, School of Medicine, Besat Hospital, Hamadan University of Medical Sciences, Hamadan, Iran.
12-Department of Molecular and Cell Biology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran.
13-Shohadaye Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
14-These authors contributed equally: Shabnam Jeibouei and Ali Hojat. *email: profmeakbari@ gmail.com; h.zali@sbmu.ac.ir

Country: Iran
Email ID: profmeakbari@gmail.com

ABSTRACT (up to 300 words)

Intraoperative radiotherapy (IORT) could abrogate cancer recurrences, but the underlying mechanisms are unclear. To clarify the effects of IORT-induced wound fluid on tumor progression, we treated breast cancer cell lines and human-derived tumor spheroids in 2D and microfluidic cell culture systems, respectively. The viability, migration, and invasion of the cells under treatment of IORT induced wound fluid (WF-RT) and the cells under surgery-induced wound fluid (WF) were compared. Our findings showed that cell viability was increased in spheroids under both WF treatments, whereas viability of the cell lines depended on the type of cells and incubation times. Both WFs significantly increased sub-G1 and arrested the cells in G0/G1 phases associated with increased P16 and P21 expression levels. The expression level of Caspase 3 in both cell culture systems and for both WF-treated groups was significantly increased. Furthermore, our results

revealed that although the migration was increased in both systems of WF-treated cells compared to

cell culture media-treated cells, E-cadherin expression was significantly increased only in the WF-RT group. In conclusion, WF-RT could not effectively inhibit tumor progression in an ex vivo tumor-on-chip model. Moreover, our data suggest that a microfluidic system could be a suitable 3D system to mimic in vivo tumor conditions than 2D cell culture.

BIOGRAPHY (upto 200 words)

Prof Mohammad Esmaeil Akbari is the head of Cancer Research Center and Comprehensive Cancer Control Center at SBMU, a board member of EURAMA (Europa-Asian Breast Cancer Association), member of Iranian Association of Surgeons, member of American Association of Surgeons, President of the Association of World with No Tobacco. He was the chancellor of Isfahan University of Medical Sciences and deputy for health at Ministry of Health and Medical Education. He has published a considerable number of articles and books in the field of cancer management.

Presenter Name: Mohammad Esmaeil Akbari
Mode of Presentation: Oral
Contact number: +98 912 019 3314