

Cell lines used for microbeam and track segment studies at RARAF

Experiments conducted at RARAF have used a host of adherent cell lines for various experiments. While the primary method of attachment to the required polypropylene film has been CellTak, other attachment proteins have also been tested (e.g. Collagen and Fibronectin). In addition, there have been recent efforts to develop protocols for irradiation of non-adherent cells using poly L-lysine. **Interested users are encouraged to contact RARAF personnel to discuss their favorite cell line.** Listed below are cells used for experiments at RARAF. Selected publications or RARAF users using each cell line are reported.

Cell line	Description	Source	Reference
WI-38	Human lung fibroblasts	Coriell cell repositories (Camden, NJ, USA)	(1)
V79-4	Chinese hamster lung fibroblasts	American Type Culture Collection (ATCC) (Manassas, VA, USA)	(2)
C3H 10T1/2	Mouse sarcoma fibroblasts	ATCC	(2-4)
NHLF	Normal human lung fibroblasts	Clonetics (Walkersville, MD, USA)	(5, 6)
MEF	Mouse embryo fibroblasts	ATCC	(7)
A _L	Human-hamster hybrid cells		(8-16)
ρ ₀	Mitochondrial DNA-depleted human skin fibroblasts		(17)
A549	Human lung carcinoma cells	ATCC	Lucas' group
HeLa	Cervice adenocarcinoma cells	ATCC	Azzam's group
LNCaP (FGC)	Human prostate carcinoma cells	ATCC	(18)
NCI-H460	Human lung carcinoma cells	ATCC	Hei's group
HT1080	Human fibrosarcoma cells	ATCC	Chen's group
AG1522	Human fibroblasts	ATCC	(6)
MCF7	Human Brest Cancer		Amundson's group
MES	Mouse embryonic stem cells		Lieberman's group
H1299	Human non-small cell lung carcinoma	ATCC, NCI-Frederick	Lieberman's group

Selected references

1. Smilenov LB, Hall EJ, Bonner WM, Sedelnikova OA. A microbeam study of DNA double-strand breaks in bystander primary human fibroblasts. *Radiation protection dosimetry*. 2006;122(1-4):256-9. Epub 2006/12/14. doi: 10.1093/rpd/ncl461. PubMed PMID: 17164279.
2. Sawant SG, Zheng W, Hopkins KM, Randers-Pehrson G, Lieberman HB, Hall EJ. The radiation-induced bystander effect for clonogenic survival. *Radiation research*. 2002;157(4):361-4. Epub 2002/03/15. PubMed PMID: 11893236.

3. Mitchell SA, Randers-Pehrson G, Brenner DJ, Hall EJ. The bystander response in C3H 10T1/2 cells: the influence of cell-to-cell contact. *Radiation research*. 2004;161(4):397-401. Epub 2004/03/25. PubMed PMID: 15038773.
4. Sawant SG, Randers-Pehrson G, Geard CR, Brenner DJ, Hall EJ. The bystander effect in radiation oncogenesis: I. Transformation in C3H 10T1/2 cells in vitro can be initiated in the unirradiated neighbors of irradiated cells. *Radiation research*. 2001;155(3):397-401. Epub 2001/02/22. PubMed PMID: 11182789.
5. Ponnaiya B, Jenkins-Baker G, Randers-Pehrson G, Geard CR. Quantifying a bystander response following microbeam irradiation using single-cell RT-PCR analyses. *Experimental hematology*. 2007;35(4 Suppl 1):64-8. doi: 10.1016/j.exphem.2007.01.013. PubMed PMID: 17379089.
6. Ponnaiya B, Jenkins-Baker G, Brenner DJ, Hall EJ, Randers-Pehrson G, Geard CR. Biological responses in known bystander cells relative to known microbeam-irradiated cells. *Radiation research*. 2004;162(4):426-32. PubMed PMID: 15447040.
7. Puck TT. Biochemical and genetic studies on mammalian cells. *In vitro*. 1971;7(3):115-9. Epub 1971/11/01. PubMed PMID: 4361039.
8. Wu LJ, Randers-Pehrson G, Xu A, Waldren CA, Geard CR, Yu Z, et al. Targeted cytoplasmic irradiation with alpha particles induces mutations in mammalian cells. *Proceedings of the National Academy of Sciences of the United States of America*. 1999;96(9):4959-64. Epub 1999/04/29. PubMed PMID: 10220401; PubMed Central PMCID: PMC21799.
9. Hong M, Xu A, Zhou H, Wu L, Randers-Pehrson G, Santella RM, et al. Mechanism of genotoxicity induced by targeted cytoplasmic irradiation. *British journal of cancer*. 2010;103(8):1263-8. Epub 2010/09/16. doi: 10.1038/sj.bjc.6605888. PubMed PMID: 20842121; PubMed Central PMCID: PMC2967061.
10. Hu B, Grabham P, Nie J, Balajee AS, Zhou H, Hei TK, et al. Intrachromosomal changes and genomic instability in site-specific microbeam-irradiated and bystander human-hamster hybrid cells. *Radiation research*. 2012;177(1):25-34. Epub 2011/11/15. PubMed PMID: 22077336; PubMed Central PMCID: PMC3410536.
11. Zhou H, Randers-Pehrson G, Waldren CA, Hei TK. Radiation-induced bystander effect and adaptive response in mammalian cells. *Advances in space research : the official journal of the Committee on Space Research*. 2004;34(6):1368-72. Epub 2005/05/11. PubMed PMID: 15881649.
12. Suzuki M, Zhou H, Hei TK, Tsuruoka C, Fujitaka K. Induction of a bystander chromosomal damage of He-ion microbeams in mammalian cells. *Uchu Seibutsu Kagaku*. 2003;17(3):251-2. Epub 2003/12/17. PubMed PMID: 14676402.
13. Zhou H, Randers-Pehrson G, Suzuki M, Waldren CA, Hei TK. Genotoxic damage in non-irradiated cells: contribution from the bystander effect. *Radiation protection dosimetry*. 2002;99(1-4):227-32. Epub 2002/08/27. PubMed PMID: 12194291.
14. Zhou H, Suzuki M, Randers-Pehrson G, Vannais D, Chen G, Trosko JE, et al. Radiation risk to low fluences of alpha particles may be greater than we thought. *Proceedings of the National Academy of Sciences of the United States of America*. 2001;98(25):14410-5. Epub 2001/12/06. doi: 10.1073/pnas.251524798. PubMed PMID: 11734643; PubMed Central PMCID: PMC64695.
15. Zhou H, Randers-Pehrson G, Waldren CA, Vannais D, Hall EJ, Hei TK. Induction of a bystander mutagenic effect of alpha particles in mammalian cells. *Proceedings of the National Academy of Sciences of the United States of America*. 2000;97(5):2099-104. Epub 2000/02/19. doi: 10.1073/pnas.030420797. PubMed PMID: 10681418; PubMed Central PMCID: PMC15760.
16. Hei TK, Wu LJ, Liu SX, Vannais D, Waldren CA, Randers-Pehrson G. Mutagenic effects of a single and an exact number of alpha particles in mammalian cells. *Proceedings of the National Academy of Sciences of the United States of America*. 1997;94(8):3765-70. Epub 1997/04/15. PubMed PMID: 9108052; PubMed Central PMCID: PMC20515.

17. Zhou H, Ivanov VN, Lien YC, Davidson M, Hei TK. Mitochondrial function and nuclear factor-kappaB-mediated signaling in radiation-induced bystander effects. *Cancer research*. 2008;68(7):2233-40. Epub 2008/04/03. doi: 10.1158/0008-5472.CAN-07-5278. PubMed PMID: 18381429; PubMed Central PMCID: PMC3715144.
18. Matthews Q, Brolo A, Lum J, Duan X, Jirasek A. Raman spectroscopy of single human tumour cells exposed to ionizing radiation in vitro. *Physics in medicine and biology*. 2011;56(1):19-38. doi: 10.1088/0031-9155/56/1/002. PubMed PMID: 21119222.