**Supplementary Figures**



**Supplementary Figure 1.** Western analysis to determine p53 functional status, by upregulation of p21 or stabilization of p53, for the cell lines assessed in figure 1b. ‘C’: control.



**Supplementary figure 2:** representative images of tumour spheroids for data shown in figure 2H



**Supplementary Figure 3.** Proportion of cells from figure 4 (E) which were negative for Rad51 foci.



**Supplementary Figure 4.** Immunocytochemistry to examine for Rad51 foci, in the DLD1 cell line paired model with wild type or null BRCA 2. Cells were stained to assess for Rad51 foci 8 h after 4 Gy or mock irradiation. No Rad51 foci were seen in the BRCA2 null cells, indicative of absent HR.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Cell line** | **SER** | **D0 without ATRi** | **TCD50 without ATRi** | **D0 with ATRi** | **TCD50 with ATRi** | **Dose modification factor** |
| **HCT116 wt** | 2.23 | 2.137 Gy | 45.07 Gy | 0.959 Gy | 20.24 Gy | 0.45 |
| **HCT116 p53 null** | 2.27 | 2.772 Gy | 58.46 Gy | 1.224 Gy | 25.81 Gy | 0.44 |
| **A549** | 1.54 | 3.117 Gy | 65.74 Gy | 2.023 Gy | 42.67 Gy | 0.65 |
| **FaDu** | 1.43 | 2.933 Gy | 61.86 Gy | 2.05 Gy | 43.23 Gy | 0.70 |
| **Cal27** | 1.9 | 2.959 Gy | 62.41 Gy | 1.555 Gy | 32.79 Gy | 0.53 |

**Supplementary Table 1:** Dose modification factors obtained from clonogenic survival curves presented in figure 2 of the manuscript. Derived senstitizer enhancement ratios (SER) produce a tumor control dose for 50% (TCD50) of theoretical tumors, using the equation where D0 is the radiation dose required to reduce survival from 1 to 0.37, and N0 is the initial number of clonogenic cells per tumor; assuming 109 clonogenic cells per tumor.