

Supplemental Methods S1.

1. Derivation of the biological equivalent dose of 16 Gy in a single fraction

The concept of biologically effective dose (BED) with the LQ model is a well-established method in the field of radiation oncology and biology (Hall EJ. Radiobiology for the Radiologist, 4th ed.; J.B. Lippincott Company: Philadelphia, USA, 1993; pp. 211-229).

The biological equivalent dose can be calculated as follows:

$$BED = nd \left[1 + \frac{d}{\alpha/\beta} \right]$$

where n and d represent the number of fractions and the dose per fraction, respectively. In cancer cells, α/β is assumed as 10. The BED of 16 Gy in a single fraction is then calculated as follows:

$$BED = nd \left[1 + \frac{d}{\alpha/\beta} \right] = 1 \cdot 16 \left[1 + \frac{16}{10} \right] = 41.6 \text{ Gy}$$

If we deliver a certain dose in 3 fractions that is equivalent to 16 Gy in a single fraction, the following formula is obtained:

$$BED = 3d \left[1 + \frac{d}{10} \right] = 1 \cdot 16 \left[1 + \frac{16}{10} \right] = 41.6 \text{ Gy}$$

Then $d = 8$ is obtained.

This provides that 16 Gy in a single fraction is biologically equal to 8 Gy by 3 fractions.