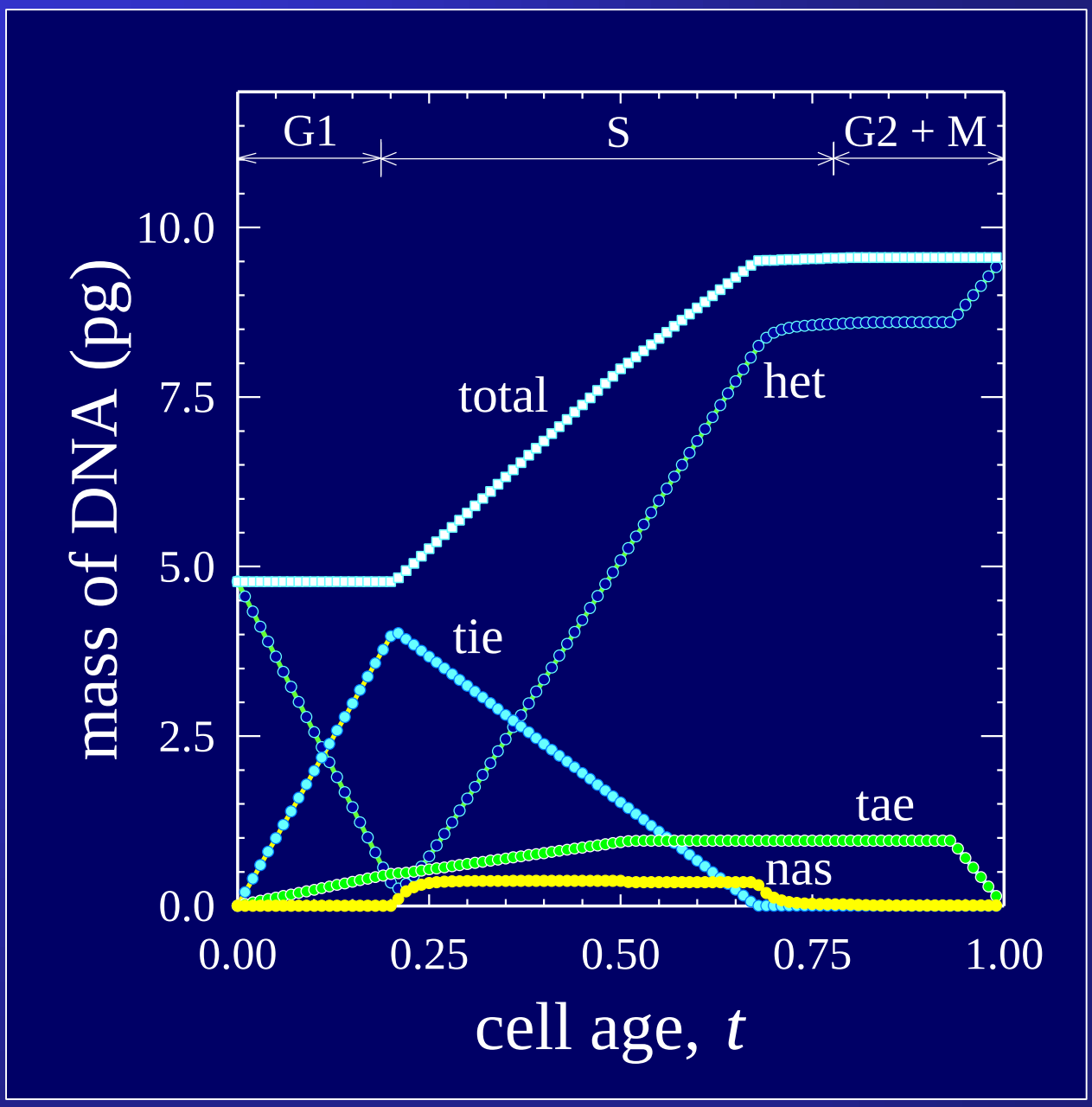

Fig. 1. Model calculated distribution of DNA among chromatin states for Chinese hamster V79 cells. The duration of the G1, S, G2, and M cell cycle phases is 2.25, 6.5, 1.5, and 0.75 hours, respectively (T_{pot} = 11 hours).

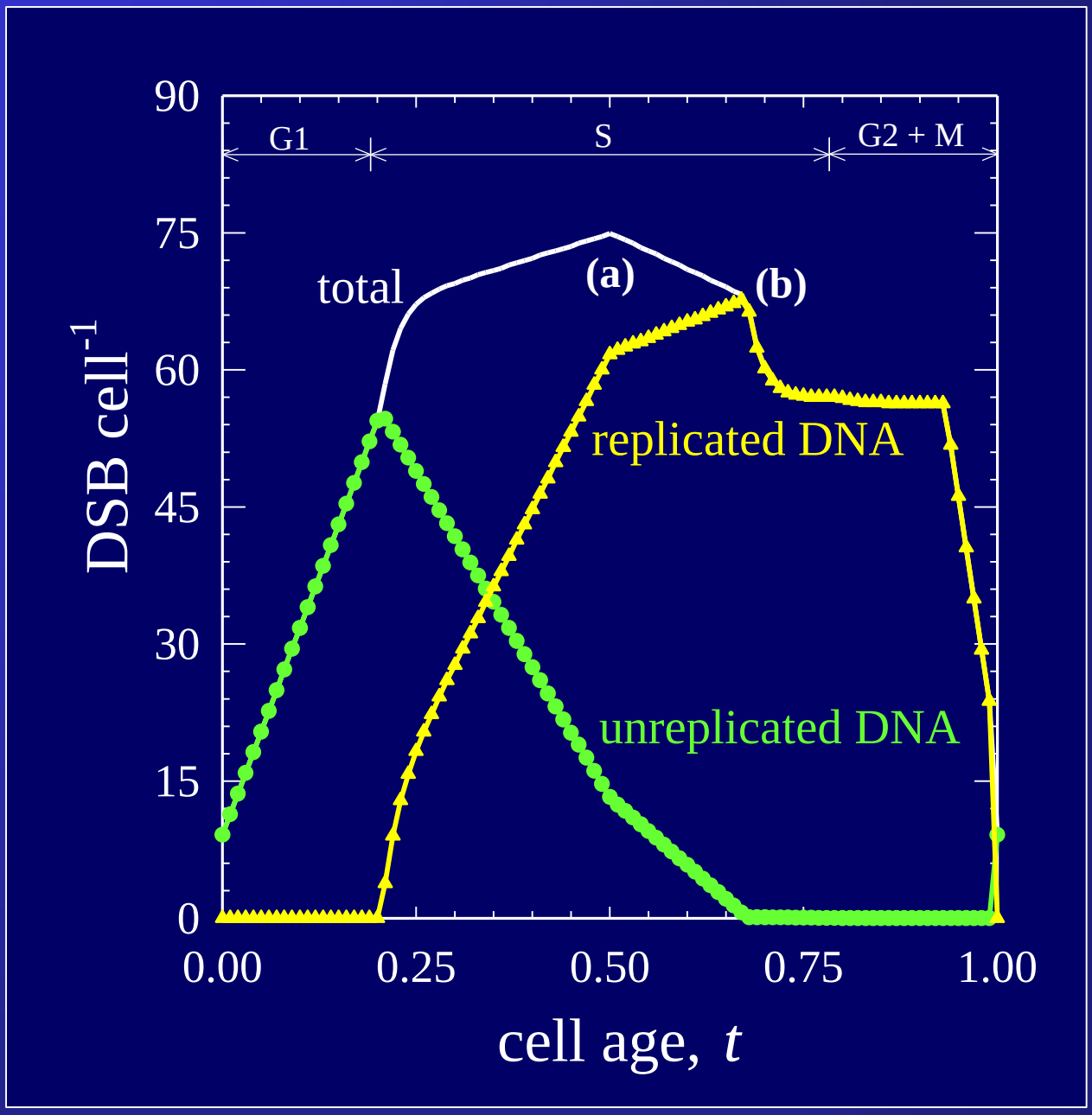

Fig. 2. Model calculated number of DSBs cell^{-1} initially produced in a V79 cell by 1 Gy of low-LET radiation. (a) replication of *tae* is complete. (b) replication of *tie* is complete. G1 phase DNA content is 4.68×10^{9} bp. Cycle-averaged yield = 7.8×10^{-9} DSB bp^{-1} Gy^{-1} (36.5 DSB cell^{-1} Gy^{-1})

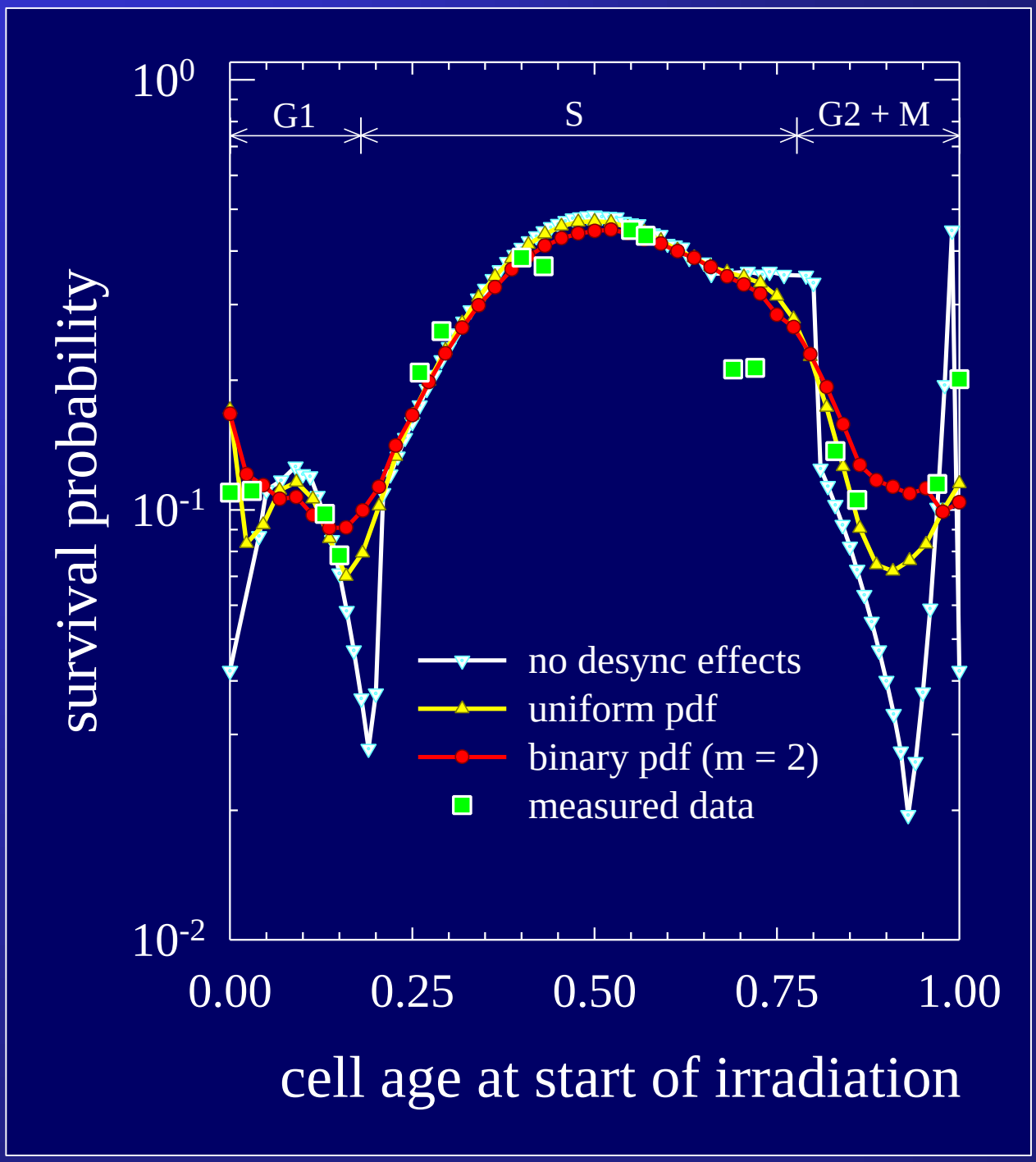

Fig. 3. A comparison of measured and calculated survival probabilities for synchronized Chinese hamster V79 cells irradiated by 250 kVp x-rays (7.1 Gy at 63 Gy/hr). Measured data are from *Radiat. Res.*, **39**, 135-154, 1969.

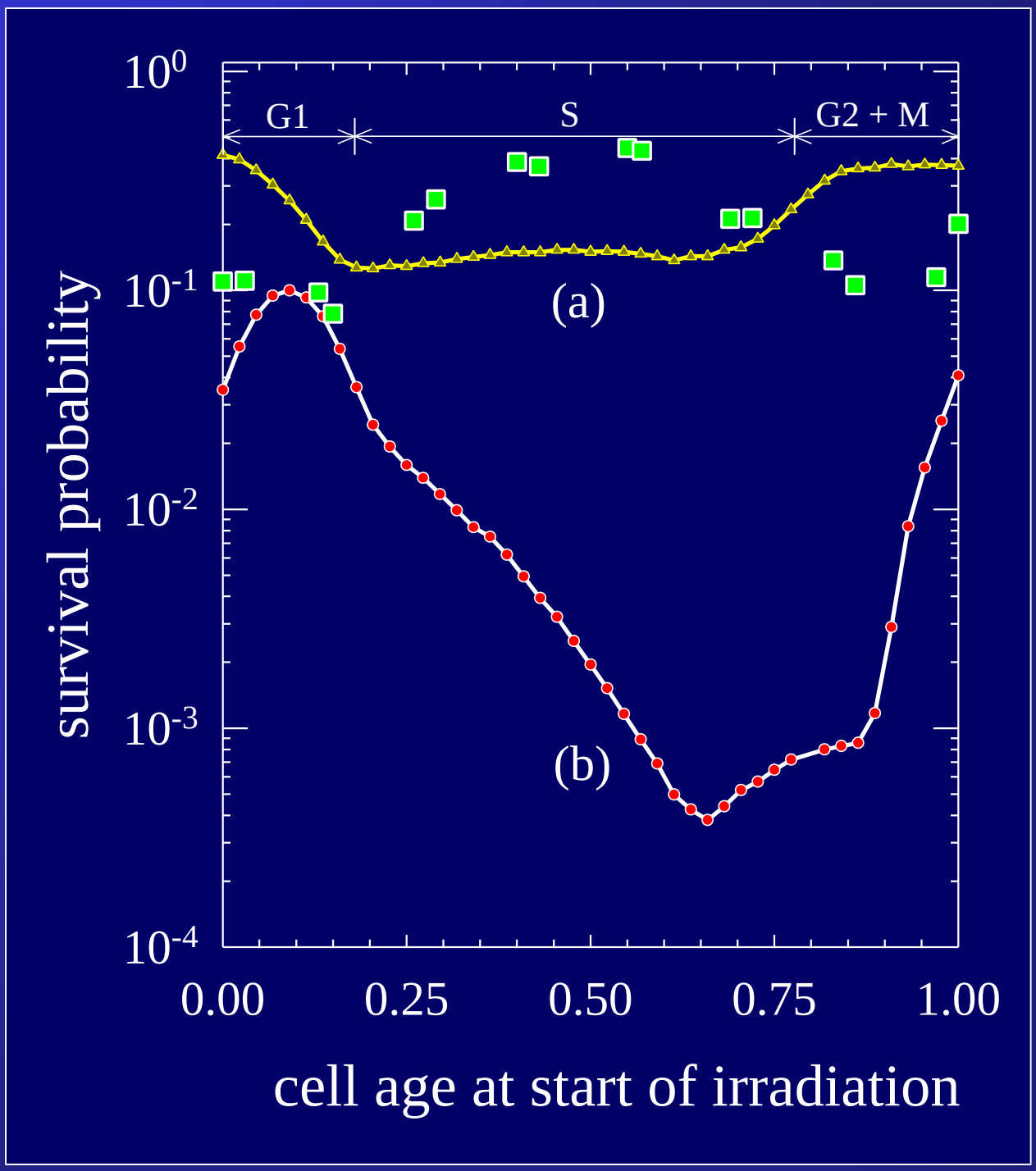

Fig. 4. (a) model parameters are almost identical to best estimate parameters for quiescent CHO cells. (b) DSB interaction probabilities increased for *het* and *tie* to obtain better agreement between measurements and calculations during the G1 phase.

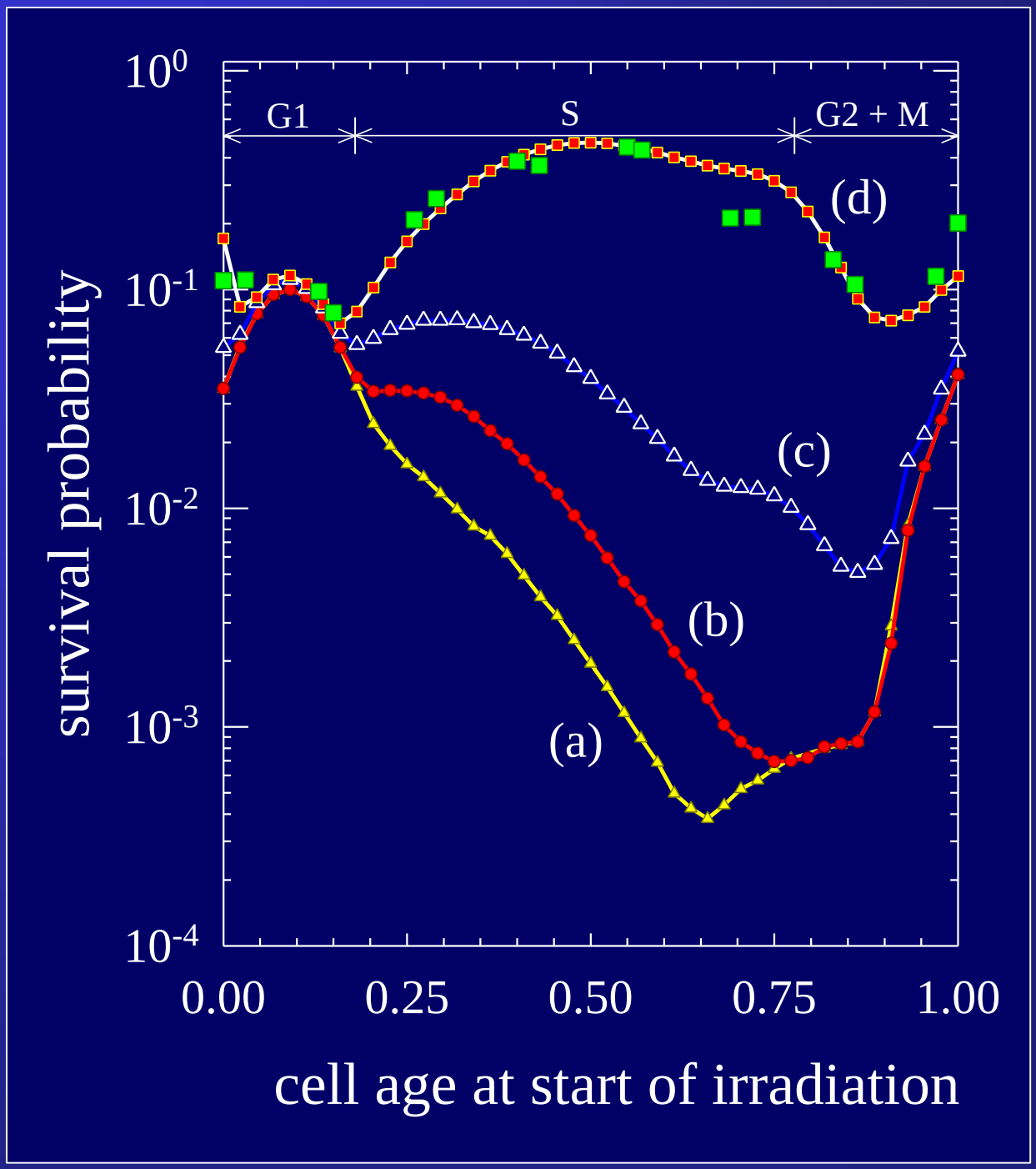

Fig. 5. (a) same as Fig 4b. (b) $\Sigma_{dsb}(nas) = 0$. (c) DSB repair in replicated DNA is twice as fast as in unreplicated DNA. (d) best estimate model parameters; DSB repair in replicated DNA is about four times as fast as in unreplicated DNA.

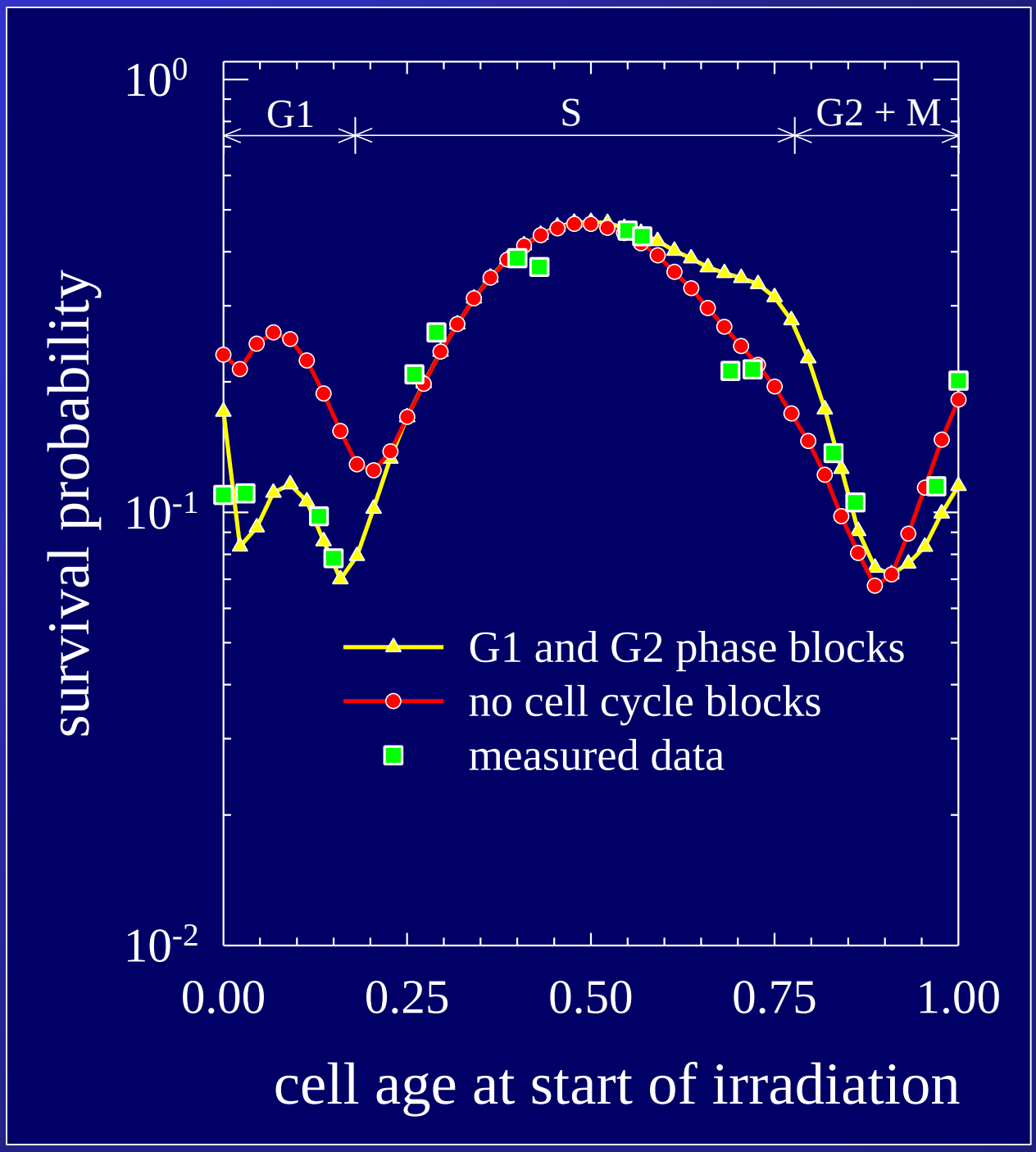

Fig. 6. The effects of cell cycle blocking. The G1 phase block decreases cell survival while the G2 phase block tends to increase cell survival. These V79 cells may not have a functional G2 phase block.

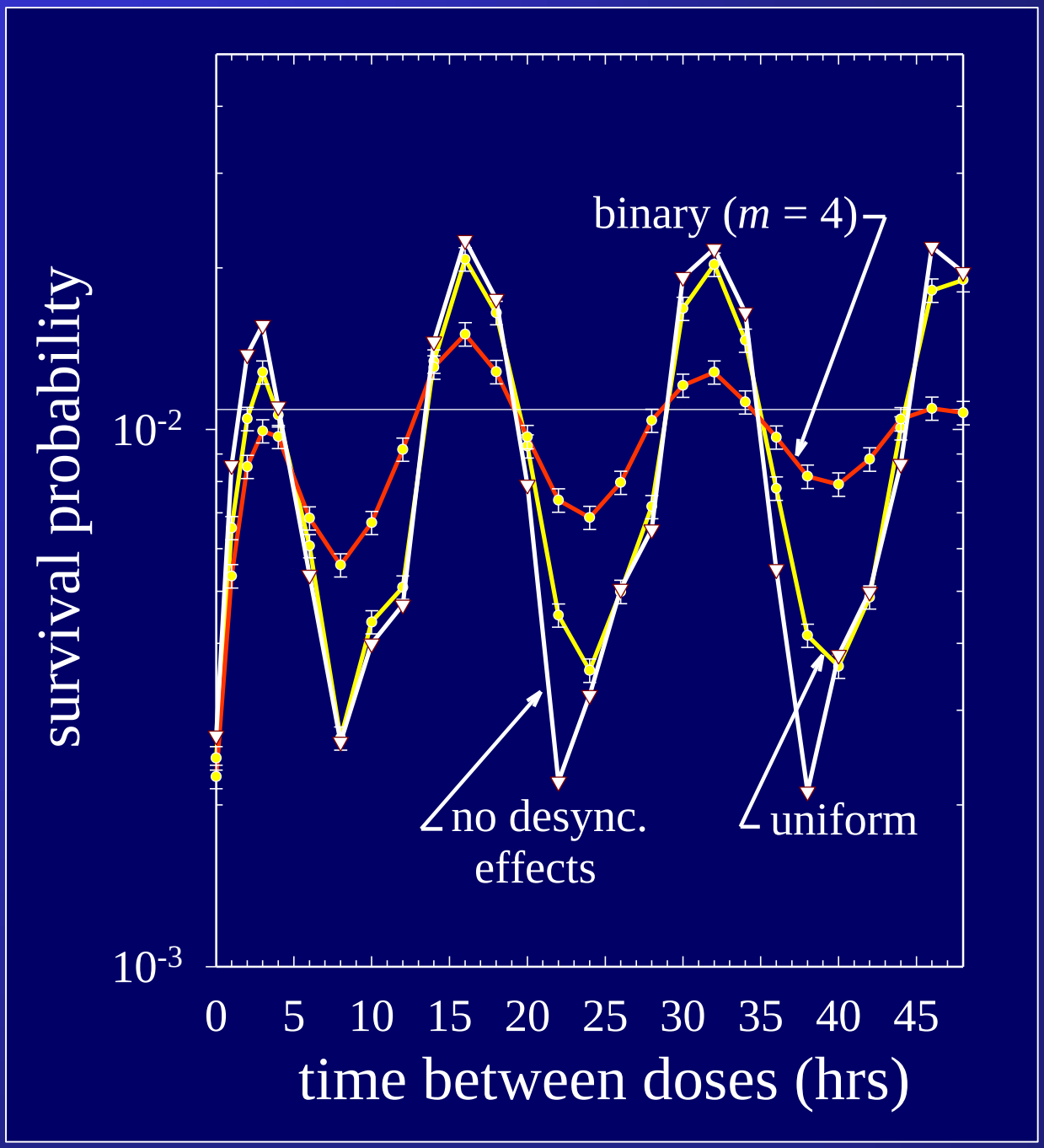

Fig. 7. Effects of cell desynchronization in a simulated split-dose experiment (20 Gy delivered in two 10 Gy fractions separated by various time intervals) with an asynchronous group of CHO cells. The reference line at 0.109 is the survival probability for two doses separated by an infinite amount of time.

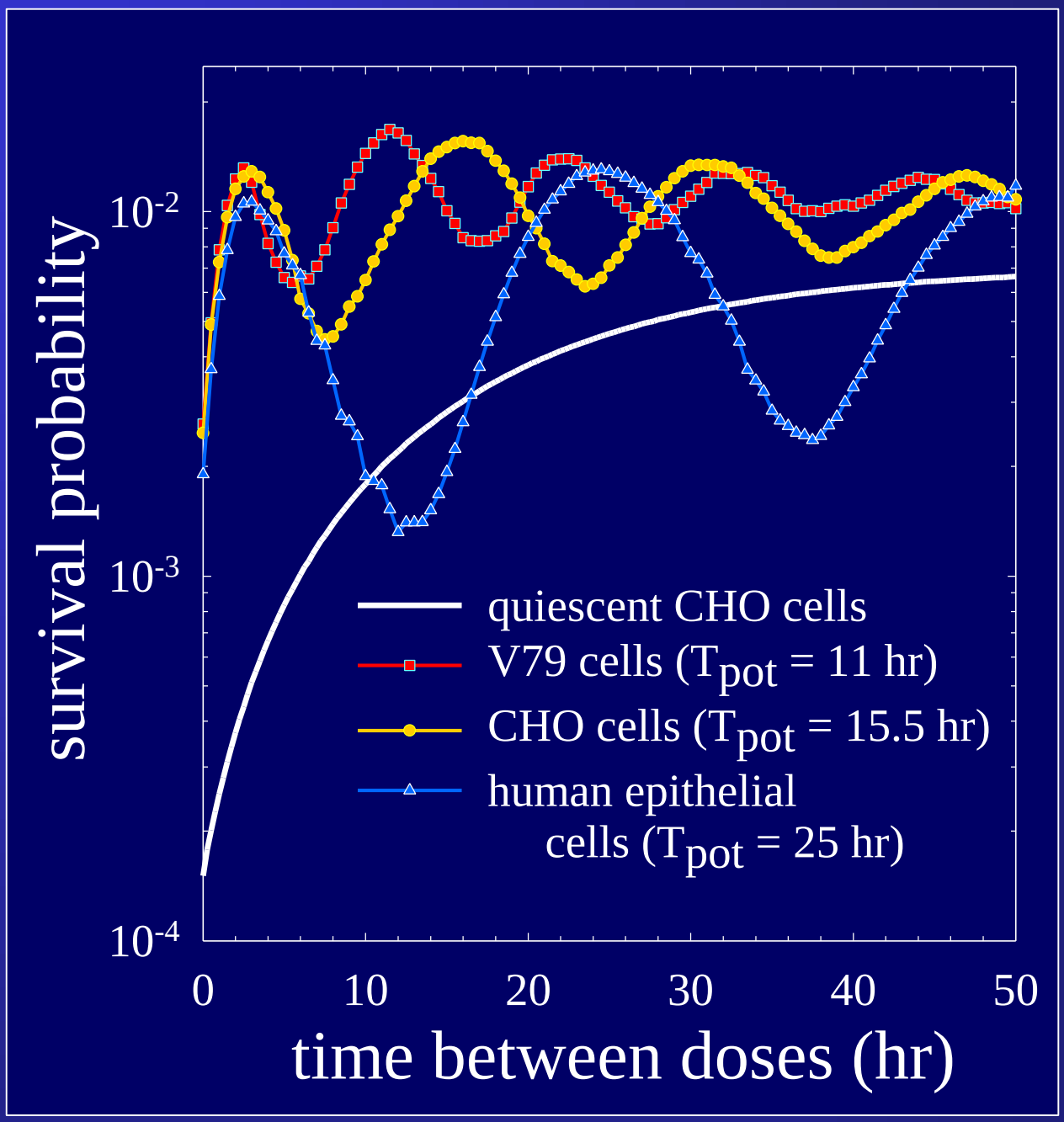

Fig. 8. The calculated survival probability for an asynchronous group of different cell types after 20 Gy of low-LET radiation delivered in two acute (100 Gy/hr) 10 Gy fractions separated by various time intervals. T_{pot} is the average duration of the cell cycle (the "potential doubling time").