ABSTRACTS

Why do rodent cells frequently immortalize? - study on telomere dynamics

In order to know why rodent cells are more susceptible to immortalization in culture than human cells, we studied changes of telomere length and telomerase activity during long-term cultures in three different rodent embryo cells such as mouse, rat and Syrian hamster. The cells were inoculated into a 25 cm² culture flask at a density of 2 x 10⁵ cells and subcultured every 10 day. In all cells examined, the growth rates gradually decreased until population doubling numbers (PDN), almost 40. However, after 40 PDN, the growth ability was enhanced to show the similar or more growth rates to those at the beginning of the culture. They all grew over 100 PDN and finally immortalized. We measured telomere length and telomerase activity of those rodent cells at different PDN during culture. At the beginning of the culture, telomere lengths were 40-50 kb in mouse and rat embryo cells and 18 kb in Syrian hamster embryo cells, and all three cells retained telomerase activity. With increasing PDN, their telomere lengths shortened and their telomerase activities decreased gradually. In contrast to human cells, however, their telomerasess reactivated after the growth rates were enhanced and the cells retained long telomeres at PDN over 100. The results suggest that the retaining of long telomere and the telomerase reactivation during a long-term culture may crucially contribute to the frequent immortalization in the rodent cells.