

Critique of a paper

Synthetic Gene Networks That Count

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1 Summary

Friedland et al. introduced an idea how to construct synthetic gene counter which can count events. In this paper, they described two different counters that capable to count up to two and three. The first counter is the riboregulated transcriptional cascade (RTC) counter. In this counter they use the constitutive promoter PLtet0-1 that drives transcription of T7 RNA polymerase (RNAP), whose protein binds the T7 promoter with turn on the transcription of the green fluorescent protein (GFP). The second counter use DNA invertase cascade (DIC). Modular DNA counting units was chained together and were able to flip by using of the restriction enzyme. After activating of one counting unit, it flips and activate the second. After activating the second unit, it turns, and activate the third one, which activate producing of GFP.

Friedland et al. verified their counters worked by adding inducer to *E. coli* transformed with the RTC or DIC plasmid. They said that their counters are working. They estimate the pulse length and intervals ranges by Flow cytometry. Their counters have different ranges, and they claimed this ranges can be programmed for different purposes.

Friedland et al. suppose that such counter can be used for example for programming cell death, studying different events in the cell and etc.

2 Critique

It's obviously a very interesting paper. There are many possible applications for the counter that was created.

The problem I see are:

1. They tell nothing about the inducing density. How many promoters have delivered in one pulse?
2. The constant leakage. When cells are induced we can see increasing of fluorescence even if next pulse doesn't occur.
3. Length and interval range of pulse are restricted. That may be a difficulty for using this counters.
4. Short memory interval. The fluorescence degrade fast enough after last pulse have occurred.

I believe they have created the counters that will be helpful for future biological researches and medical applications.