Rinat Arbel-Goren, Biol Syst Open Access 2017, 6:1(Suppl)
DOI: 10.4172/2329-6577-C1-008

Dynamic location of integration sites on host genomes during lateral gene transfer processes in live bacteria

Rinat Arbel-Goren
Weizmann Institute of Science, Israel

During horizontal gene transfer processes, imported exogenous DNA sequences integrate at unique sites in the host bacterial genome, driving genetic diversity. One example is viral infection, which is known to allow the acquisition of pathogenic traits. After entering an *Escherichia coli* cell, the $<5x10^4$-long bacteriophage λ DNA must locate a unique site among $<5x10^6$ possible sites on the bacterial genome, with high efficiency and within physiological times, to integrate and establish lysogeny. What are the mechanisms that allow it to do so? We followed the targeting process in individual live *E. coli* cells in real-time, by marking fluorescently both the phage DNA after entry into the host, and a chromosomal sequence near the integration site. Surprisingly, we found that λ DNA does not carry out an active search. Instead, it remains confined near its entry point into the cell following infection, preferentially at the poles, where it undergoes limited diffusion. The encounter between the 15 bp-long target sequences on the chromosome and the recombination site on the viral genome is facilitated by the directed motion of bacterial DNA generated during chromosome replication and segregation. A different mechanism of target location is observed during conjugation between *B. subtilis* cells: integrating conjugating elements imported from donor cells carry out anomalous diffusion within host cells in their search for their target insertion sites, which move concomitantly, driven by replication of the host genome. These finding demonstrate that there are different solutions to the target location problem during horizontal gene transfer processes.

Biography

Rinat Arbel-Goren has completed her PhD in 2002 in Life Sciences in the Department of Molecular Biology of the Cell, Weizmann Institute of Science Rehovot, Israel, under Professor Y Zick. From 2002-2005, she carried out her Post-doctoral studies in the Department of Immunology, under Prof Y Reisner. Since 2006, she is a Staff Scientist in the Department of Physics of Complex Systems, Weizmann Institute of Science, in the lab of Professor J Stavans. Her current research topics include: Effects of post-transcriptional regulation by small-RNAs on phenotypic variability; and effects of phenotypic variability during development in cyanobacteria.

rinat.goren@weizmann.ac.il

Notes: