EXPERIMENTAL BIOLOGY

Chromosomal Genes of *E.coli* and Activity of the Fin V Genetic System in Plasmid Transfer Regulation

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Previous studies have demonstrated a contribution of the bacterial genome to the control of plasmid genetic transfer, along with plasmid systems of genetic regulation, or fin systems [2,5]. The role of the donor cell genome has been shown in experiments with *E.coli* recipient strains and serologically typed strains. As for the recipient cell genome, its role is still unclear. Thus, the task we ste up ourselves was to elucidate the possibility of the simultaneous functioning of the fin V genetic

TABLE 1. Efficacy of Inhibition of Plasmid pAP18−2 Conjugative Properties by Plasmid pAP18−1 in Various *E. coli* K−12 Cells

Donor cells	Plasmid composition of donor cells	Recipient cells	Plasmid pAP18-2 transfer frequency	Transfer inhibition index (TII)
14R525	pAP18−2		$(4.6-5.4)\times10^{-8}$	
	pAP18−1			133.3−156.5
	pAP18−2		7.2×10^{-6}	
		C600 (Rif)		
AP132	pAP18−2		$(6.7-9.5)\times10^{-5}$	
	pAP18−1			3.7−5.2
	pAP18−2		3.5×10^{-4}	
AP115	pAP18−2			
	pAP18−1		$(1.3-1.5)\times10^{-4}$	2.3−2.5
	pAP18−2		3.0×10^{-4}	
	pAP18−2		$(2.3-3.1)\times10^{-6}$	
	pAP18−1	14R525		112.9−152
	pAP18−2		3.5×10^{-4}	
	pAP18−2		$(1.6-2.1)\times10^{-6}$	
	pAP18−1	AP132		123.8−162.5
	pAP18−2		2.6×10^{-4}	
C600 Rif				
	pAP18−2		$(3.0-3.4)\times10^{-6}$	
	pAP18−1	AP115		105.8−120
	pAP18−2		3.6×10^{-4}	

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TABLE 2. Index of pAP53::Tn5 Plasmid Transfer Inhibition by Plasmid pAP18−1 in Tis$^+$ Recombinants in *E. coli* K−12 Cells

Donor cells	Tis$^+$ recombinants	Recipient cells	TII ratio
C600 Rif	Thr$^+$ − Leu$^+$	AP132	6.2−8.8
		C600 Str	1.3−1.9
AB1157	Thr$^+$ − Leu$^+$	AP132	0.05−0.5
		C600 Rif	5.4−19.7

regulation system in both donor and recipient cells of nontyped strains of *E.coli*.

MATERIALS AND METHODS

The study was performed on *E.coli* strains 14R525 (Nal), C600 (Thr-Leu-Str), AP132 (Nal), AP115 (Met-Nal), C600 (Thr-Leu-Rif), and AB1157 (Thr-Leu-Pro-His-Arg-Str), as well as conjugative plasmids pAP18-1 (Tc Col V), possessing type fin V plasmid transfer genetic regulation system [4], and pAP18-2, and pAP53::Tn5 sensitive to this type of transfer inhibitor [3].

Plasmid conjugation transfer and selection of transconjugates and genetic recombinants were carried out in standard bacterial hybridization experiments. The transfer inhibition index (TII) was defined as the ratio of the frequency of plasmid transfer from monoplasmid donor cells to the frequency of transfer of this plasmid from diplasmid transconjugate cells. The TII ratio is the quotient obtained by dividing the TII value of Thr$^+$Leu$^+$-recombinant cells by the TII value of initial Thr$^-$Leu$^-$ cells.

RESULTS

The first step was to obtain diplasmid transconjugates containing plasmids pAP18-1 and pAP18-2 in donor cells of various nontyped strains, including *E.coli* K-12 derivatives. The results of analysis of the efficacy of pAP18-2 plasmid transfer inhibition by pAP18-1 plasmid in various *E.coli* K-12 donor strain cells are presented in Table 1.

This table shows that plasmid pAP18-1 inhibition of plasmid pAP18-2 transfer into various recipient cells is the most potent (increased by 50-60 times) in *E.coli* donor cells 14R525 and C600 (Rif). Plasmid pAP18-1 TII dropped markedly with *E.coli* donor cells AP132 and AP115, this being paralleled by a rise in the frequency of plasmid pAP18-2 transfer.

These conclusions are consistent with previous data that the Thr-Leu chromosomal region of the *E.coli* C600 (Rif) chromosome denoted by tis is responsible for the functioning of fin V genetic regulation system [1].

To elucidate the relationship between the efficacy of the tis genetic region of the *E.coli* C600 (Rif) and AB1157 genomes and the recipient genome cells of these strains were used as plasmids pAP18-1 and pAP53::Tn5 donors to reveal the degree of pAP53::Tn5 plasmid transfer inhibition by plasmid pAP18-1 in various *E.coli* recipient cells. The results of these experiments are summarized in Table 2.

The table shows that the TII values in Tis$^+$ recombinants are indicative of an increased inhibition of plasmid pAP53::Tn5 transfer (by 6-9 times) with *E.coli* AP132 cells used as recipients.

On the other hand, if *E.coli* C600 (Str) recipient cells are used, transfer inhibition of this plasmid is decreased 5-6-fold.

Hence, our experiments demonstrated a certain relationship between tis region functioning and the recipient strain cells used in hybridization. A similar relationship was revealed in experiments with *E.coli* AB1157 Tis$^+$ recombinants as donor cells.

We may draw the conclusion that the genomes of both donor and recipient cells of *E.coli* influence the efficacy of the plasmid pAP18-1 genetic regulation system (type fin V).

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