

## Spectrum of Proton-Induced Mutagenesis of Escherichia coli crp Gene.

著者	Yamamoto K., Takimoto K.
journal or publication title	CYRIC annual report
volume	1992
page range	158-159
year	1992
URL	<a href="http://hdl.handle.net/10097/49718">http://hdl.handle.net/10097/49718</a>

### III. 15. Spectrum of Proton-Induced Mutagenesis of Escherichia coli crp Gene.

*Yamamoto K., and Takimoto K.\**

*Biological Institute, faculty of Science, Tohoku University, and Department of Biological Chemistry,  
Faculty of Agriculture, Yamaguchi University\**

Mutation of the adenosine 3', 5'-cyclic monophosphate receptor protein gene (crp) of Escherichia coli induced by protons, high LET ionizing radiation, was analyzed to determine the specificity of the mutational spectrum. The majority, 44 of 49 mutations detected, were base substitutions, and three frameshifts and two gross structural changes were also found. Base substitutions included 35 transversions and nine transitions. G:C to T:A transversions were the dominant type of base substitutions, followed by G:C to C:G and A:T to T:A transversions. Almost all transitions were G: C to A:T changes. The mutation spectrum suggests that 8-hydroxyguanine is the major lesion that is responsible for most of the induced mutations. The spectrum of proton mutagenesis was quite different from that of x-ray mutagenesis of the crp gene, in which G:C to A:T transitions dominated. The yield of 8-hydroxyguanine induced by protons is thus expected to be higher than that induced by x-ray.

#### Reference

- 1) Takimoto K. et al., *Mutat. Res.* 254 (1991) 199.

Table. 1 Spectrum of mutations induced by protons and x-rays in *E. coli* *crp* gene.

Type of Mutation	Number Observed		% of Total Base Substitutions	
	Protons	X-rays*	Protons	X-rays*
Base Substitution	44	74		
Transition	9	57	20.5	77.0
G:C → A:T	8	56	18.2	75.7
A:T → G:C	1	1	2.3	1.3
Transversion	35	17	79.5	23.0
G:C → T:A	20	10	45.4	13.5
G:C → C:G	10	7	22.7	9.5
A:T → T:A	5	0	11.4	0
A:T → C:G	0	0	0	0
Frameshift	3	18		
-1 Frameshifts	1	11		
+1 Frameshifts	1	7		
-3 Frameshifts	1	0		
Gross Structural Changes	2	7		
Total	49	99		

\*Data from Takimoto et al. (1991)