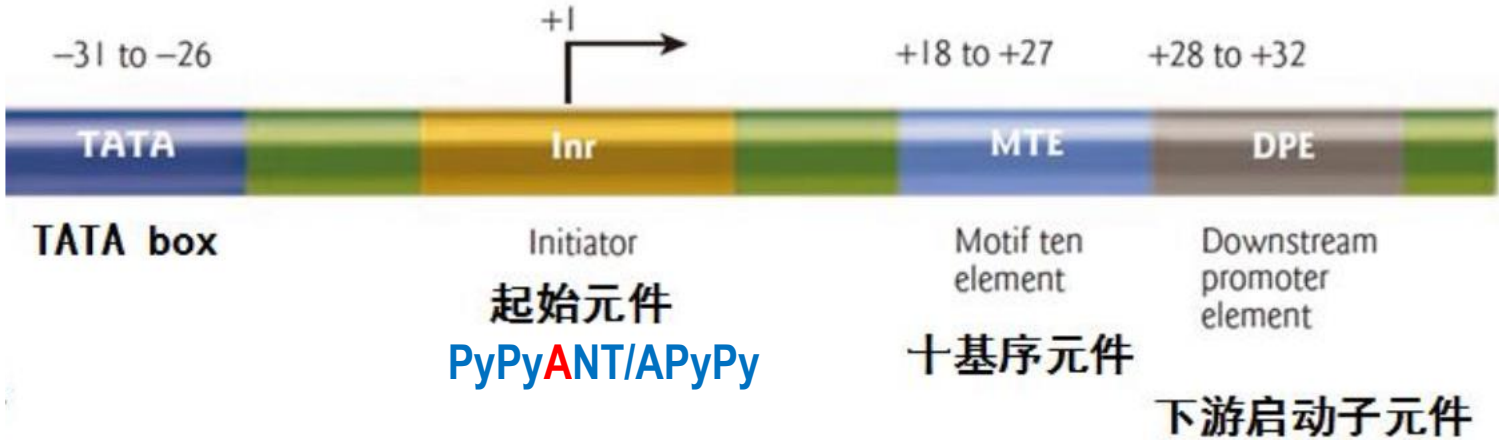
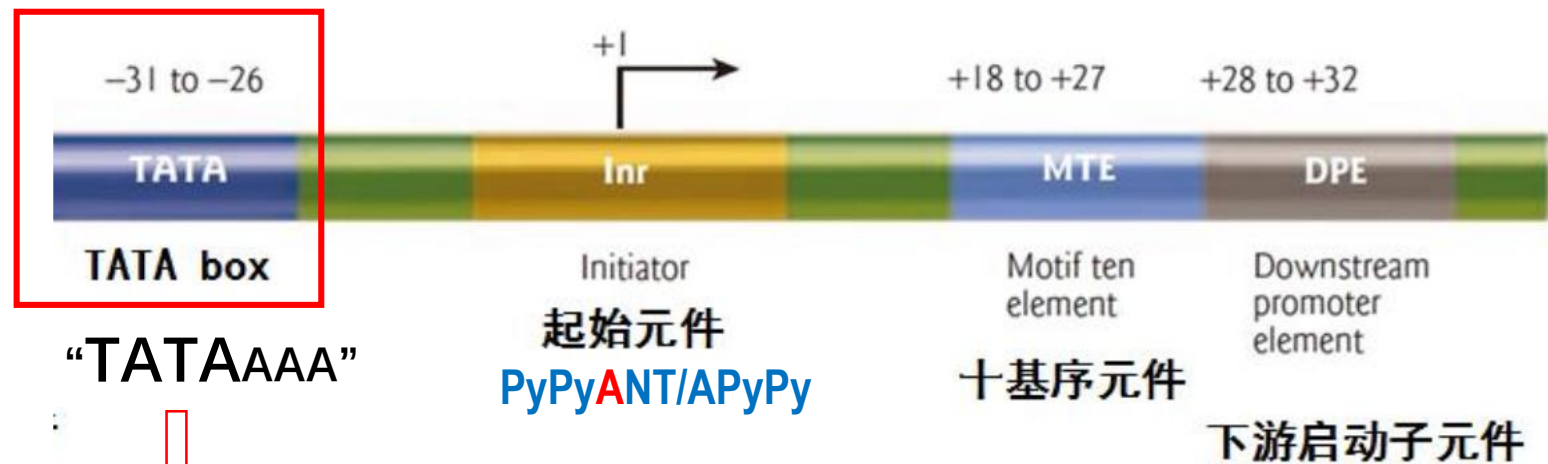


# 真核生物蛋白质编码基因的启动子 (Class II promoter)

### RNA pol II core promoter motifs.



### RNA pol II core promoter motifs.



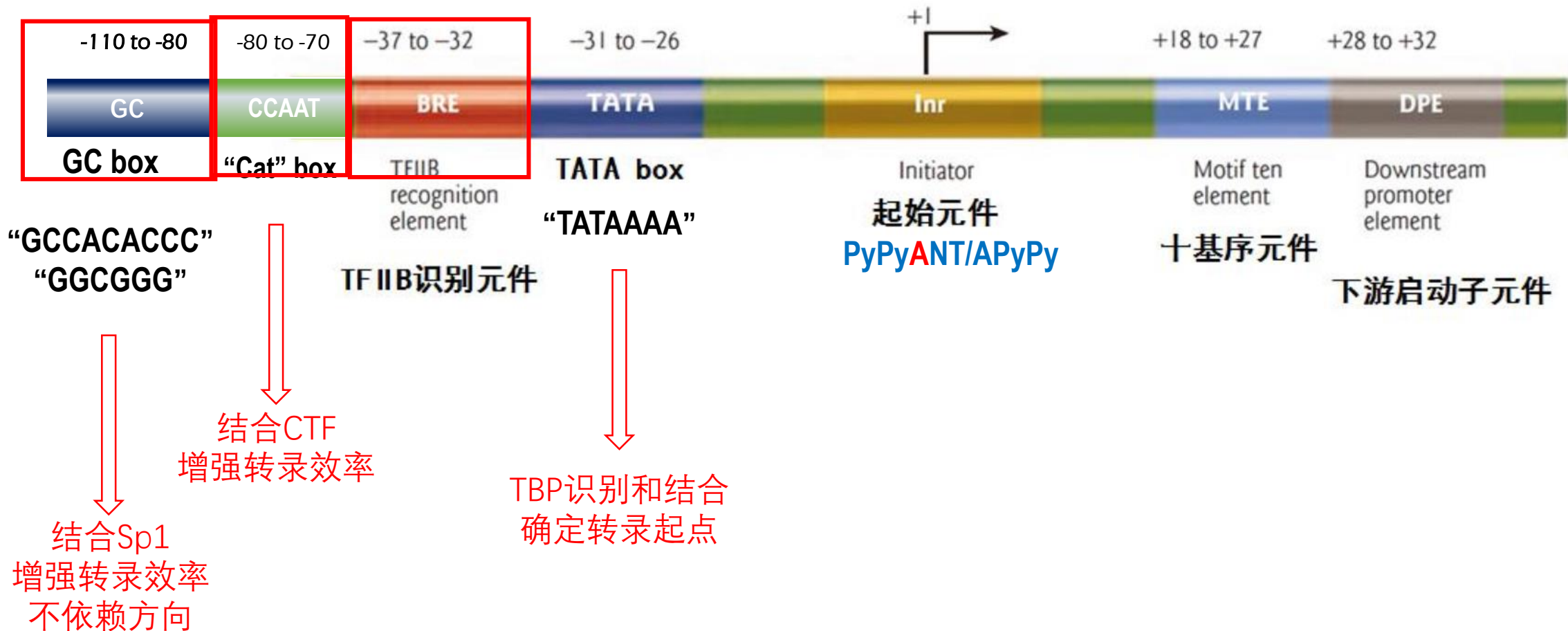
TBP识别和结合  
确定转录起点

# TATA box-less Gene

- 缺乏TATA box 的基因
- 约占所有基因的50%
- 两类：
  - 在各种细胞类型中共同的生化途径的看家基因，如腺嘌呤脱氨酶基因，胸腺嘧啶核苷酸合成酶的基因
  - 一些奢侈基因，如控制果蝇发育的同源盒基因，哺乳动物中免疫系统发育的基因
- 有些在上游有GC box，补偿TATA box的缺失
- 有些基因在转录起始位点下游 24 bp 左右有 DPE 元件 (Downstream Promoter Element, 下游启动子元件)

## Upstream promoter elements

## RNA pol II core promoter motifs.

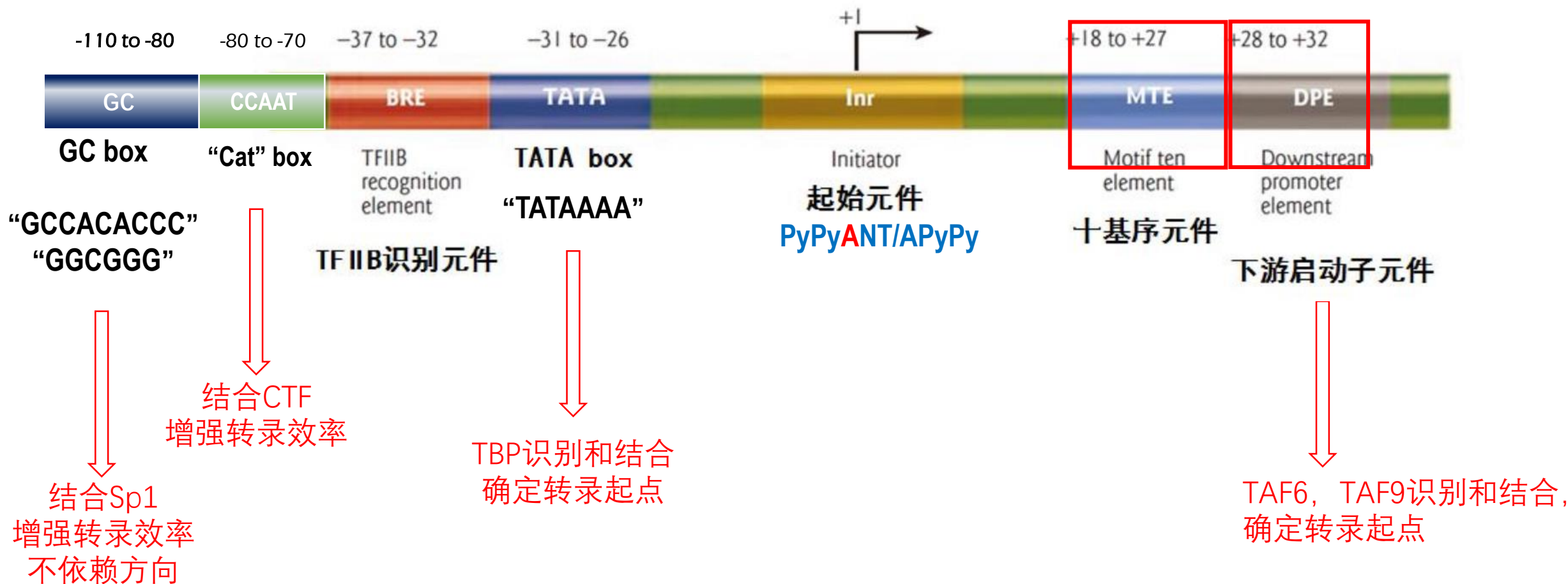


## The number of intact GC box affects the gene expression of SV40 Early Promoter

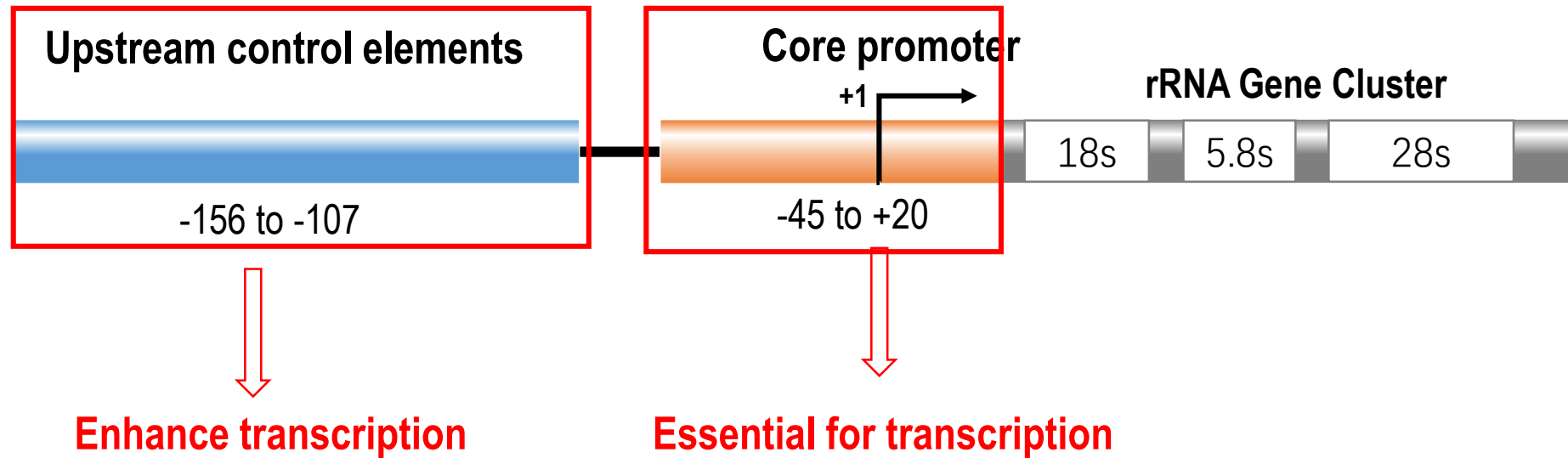
Number of mutations	Number of Intact GC Boxes	Expression(%)
0	6	100
2	5	66
4	4	13
4	3	30
6	2	40
13	1	9
16	0	13

## Upstream promoter elements

## RNA pol II core promoter motifs.



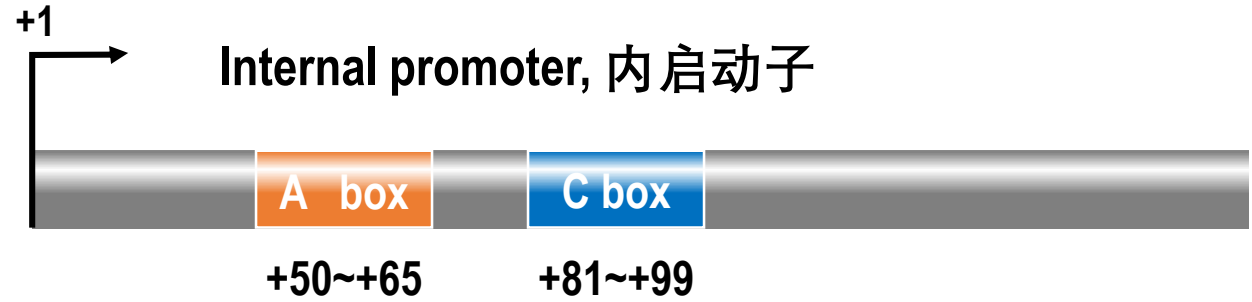
# Class I promoter



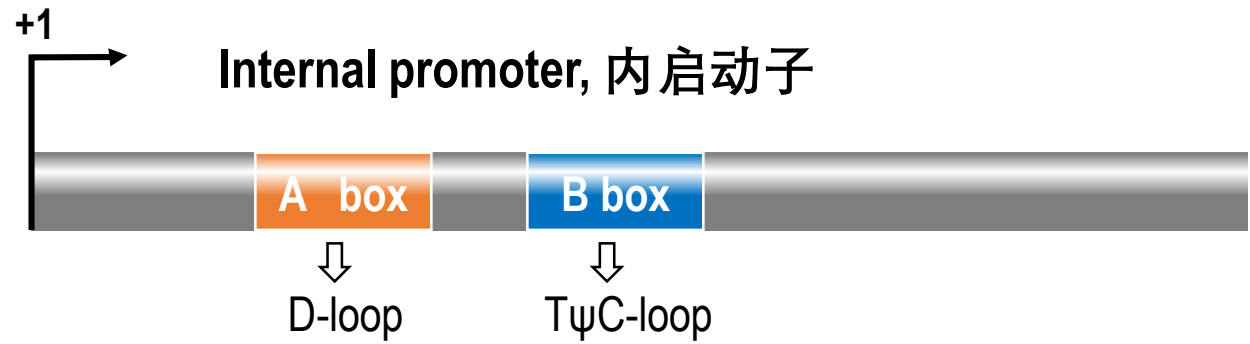


# Class III promoter

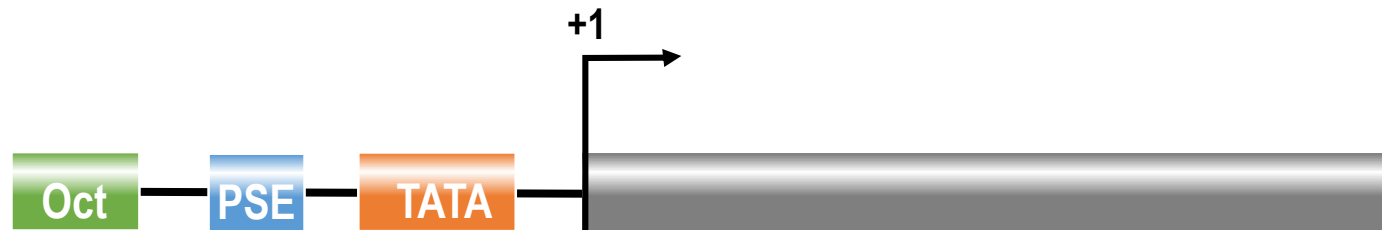
5s rRNA gene, Type I

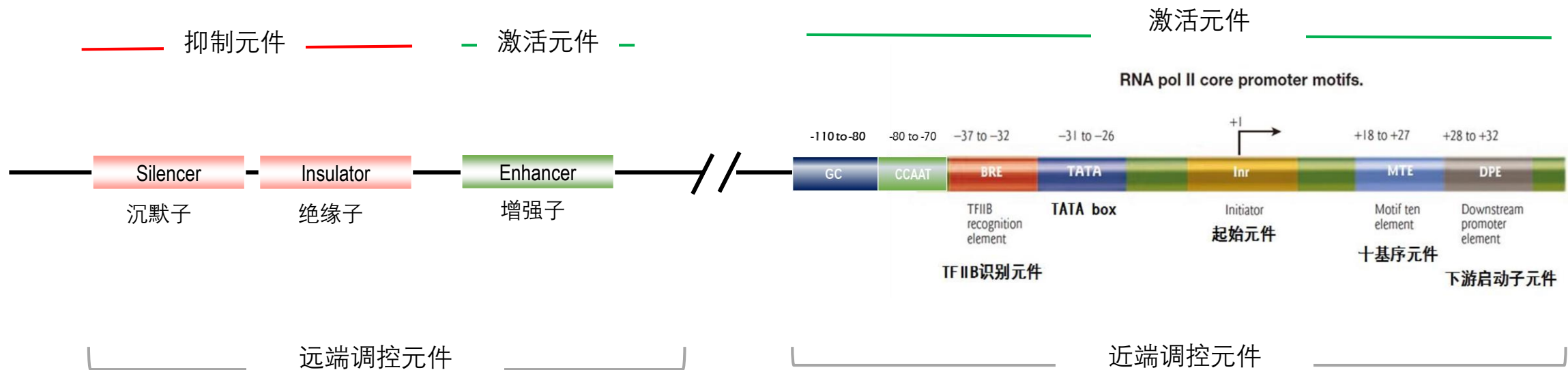


tRNA gene, Type II



U6 snoRNA gene, Type III

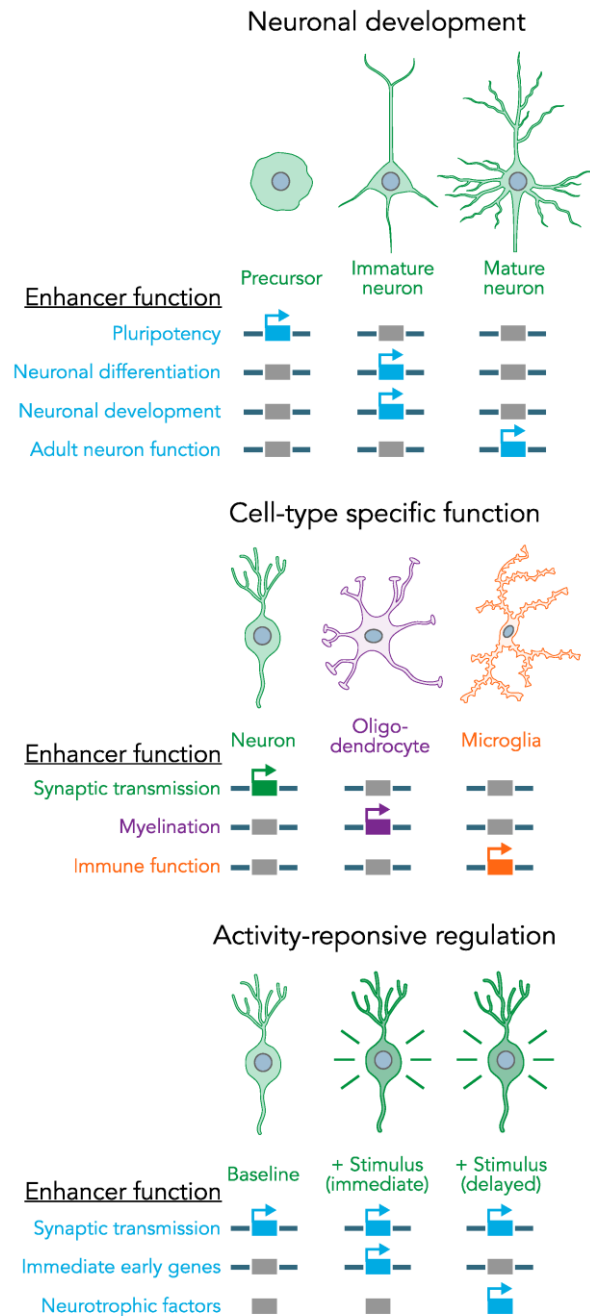




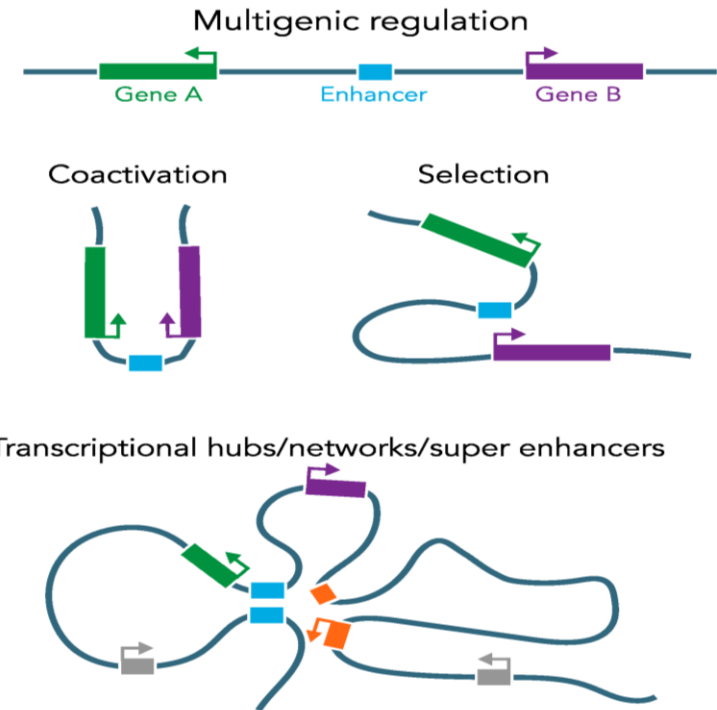
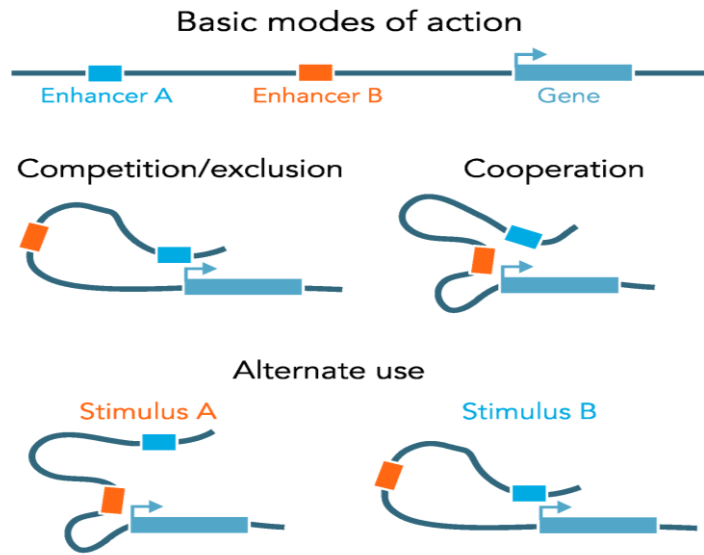
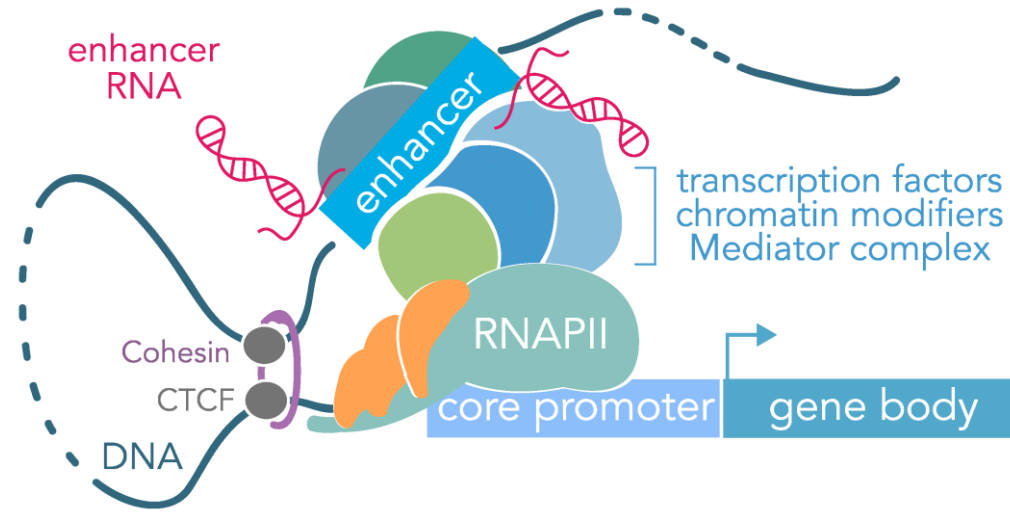
# 增强子/沉默子的特点

- 顺式调节
- 远距离效应；无方向性；位置不依赖性
- 无物种和基因特异性
- 对内外源信号产生反应；具有组织特异性
- 具有相位性

神经细胞中增强子影响基因表达

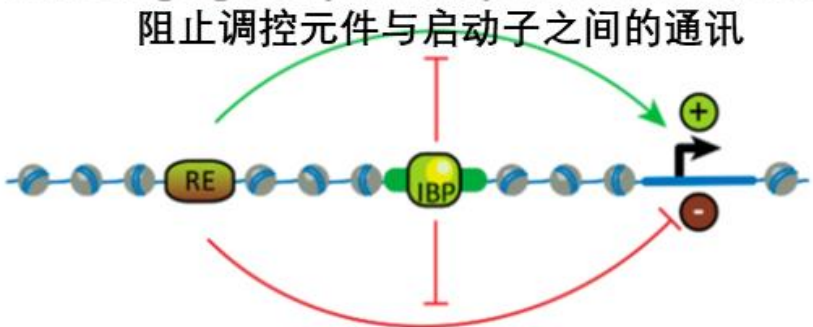


# Enhancer-driven gene regulation

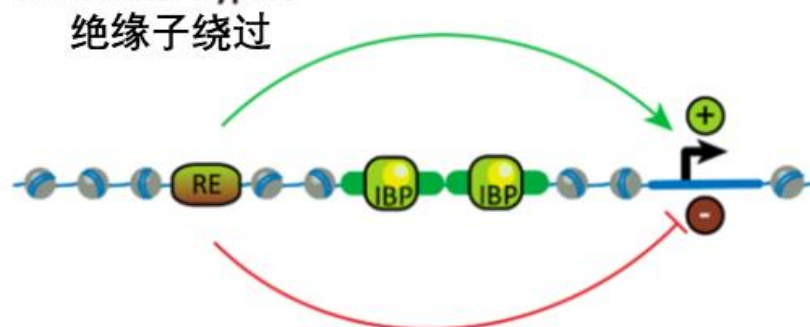


# 绝缘子的工作模型

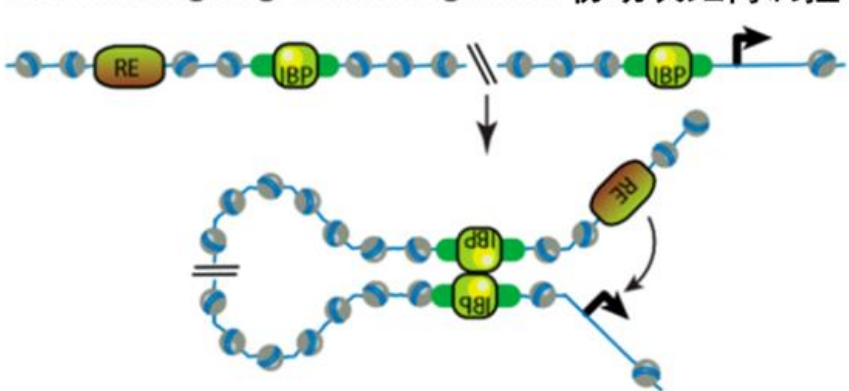
A. Blocking regulatory element-promoter communication 阻止调控元件与启动子之间的通讯



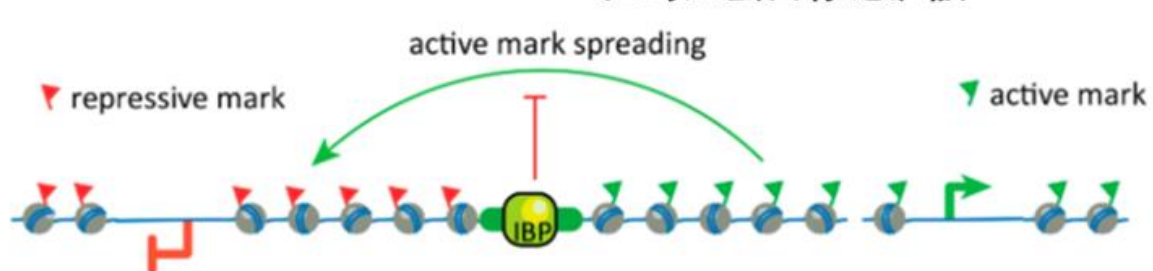
B. Insulator bypass 绝缘子绕过



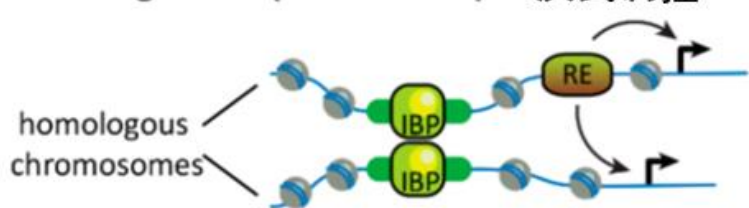
D. Facilitating long-distance regulation 协助长距离调控



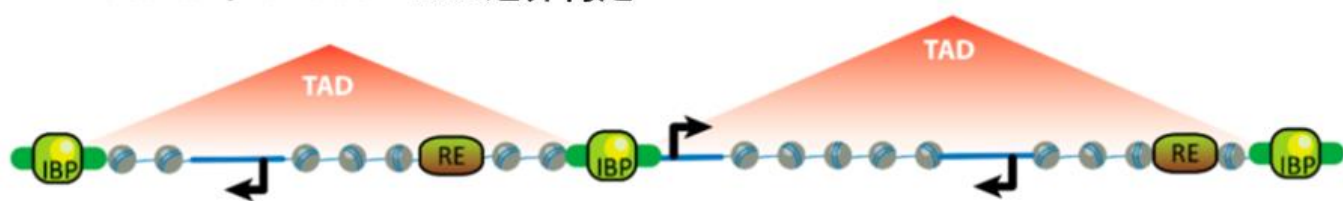
C. Barrier to histone mark spreading 阻碍组蛋白标记扩散



E. Trans regulation (Transvection) 反式调控



F. TAD boundary formation TAD边界构建



IBP: insulator-binding protein

