Tunable promoters in synthetic and systems biology.

Synthetic and systems biologists need standardized, modular and orthogonal tools yielding predictable functions in vivo. In systems biology such tools are needed to quantitatively analyze the behavior of biological systems while the efficient engineering of artificial gene networks is central in synthetic biology. A number of tools exist to manipulate the steps in between gene sequence and functional protein in living cells, but out of these the most straight-forward approach is to alter the gene expression level by manipulating the promoter sequence. Some of the promoter tuning tools available for accomplishing such altered gene expression levels are discussed here along with examples of their use, and ideas for new tools are described. The road ahead looks very promising for synthetic and systems biologists as tools to achieve just about anything in terms of tuning and timing multiple gene expression levels using libraries of synthetic promoters now exist.

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