ATG:biosynthetics
Solutions
in biosynthetics

CODONEWS
Issue 30
May 29, 2013

Gene Synthesis and Optimization

more than just adjusting codon usage

ATG's gene optimization service – drive your research!

Trying hard to re-establish that biosynthetic pathway in a heterologous host but you're just not getting the yields you wish? Maybe suboptimal transcript stability or translation could be the problem...

Use ATG's gene optimization service!

From straightforward codon optimization of single genes to designing and streamlining entire complex pathways – **we have solutions at every level**!

Codon Usage Analysis and Gene optimization has shown its value in many applications (e.g. Menzella, 2011; Hutterer et al., 2012; Zhou et al., 2013).

It is not simply restricted to adjusting codon usage but gene optimization can do more for you:

- Pick the right promoter(s) for your project from detailed comparative computational analysis within and between species
- Optimize/modify and test co-translational folding properties, e.g. slow codon cluster
- Optimize Translation Initiation and Elongation, especially frequency of initiation versus elongation rate. This helps avoid crowding or run-away of ribosomes to get the optimum packing density
- optimizing/adjusting SD interaction with the mRNA leader
- Remove inihibitory secondary structures in the 5'- and the 3'-UTR, especially for polycistronic constructs
- Improve mRNA stability
- Optimally utilize tRNA pools and charged tRNAs by adjusting codon usage frequencies
- Build artificial hybrid leaders/ promoters with variably adjusted sequence stretches

This is a selection of the things we can do for you. If you need a practical example, refer to this recent publication on an **epothilone biosynthetic pathway**.

For more information, just ask our experts!

ATG:biosynthetics ... experts in synthetic biology and bioinformatics

References

- Hutterer et al (2012). Targeted codon optimization improves translational fidelity for an Fc fusion protein. *Biotechn Bioeng* 109: 2770 ff.
- Menzella (2011). Comparison of two codon optimization strategies to enhance recombinant protein production in *Escherichia coli*. *Microbial Cell Factories*10:15

- **Zhou et al (2013). Non-optimal codon usage affects expression, structure and function of clock protein FRQ. *Nature* 495: 111 ff.**