CODO NEWS
Issue 47

Iterative Multi-Gene Expression Optimization by use of Synthetic Genes

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Dear customers,

Predictive Experimental Design

In artificial metabolic pathway engineering by use of synthetic genes the biggest challenge is balancing metabolite flux and to adjust the metabolic burden to an optimum compromise between cellular growth and productivity. In order to avoid reduced product titers several measures can be taken into account like to deploy combinatorial expression libraries for to adjust the individual expression levels for its harmonized catalytic action balanced in concerto.

The expression of proteins like enzymes can be modulated either by variation of translational elongation by directing the codon use or using leader libraries which are controlling the initiation frequency of gene expression. Both parameters can be adjusted for achieving the best ratio between initiation and elongation. In addition the promoter strength is more generally regulative.

Classically high throughput assays are used for screening approaches aiming on the identification of high and balanced production yields.

For this mode of action assays are not available for most of the target compounds, e.g. for those of economic value.

The cost for screening equipment and handling for high throughput formats are extraordinary high. Therefore alternative strategies are helpful and cost effective. Enhanced and predictive experimental designs can be applied to achieve the goal of higher product yield and/or quality at lower cost. But the most effective strategy depends on the problem at hand.

Just talk with ATG how we can support you for to realize your specific solution …

Recent Example:
Lee et al. (2013) Expression-level optimization of a multi-enzyme pathway in the absence of a high-throughput assay Nucleic Acids Research 41:10668-10678, doi:10.1093/nar/gkt809.

ATG Synthetic Genes Service at a Glance:

aiming on *de novo* planned and calculated synthetic gene sequences including its physical realization for:

synthetic genes without any sequence alterations according to your desires
synthetic genes according to your requirements based on your design
synthetic genes with ATG basic standard optimization design

synthetic genes according to your requirements based on our design in the expert mode

Synthetic gene clusters without any sequence alterations
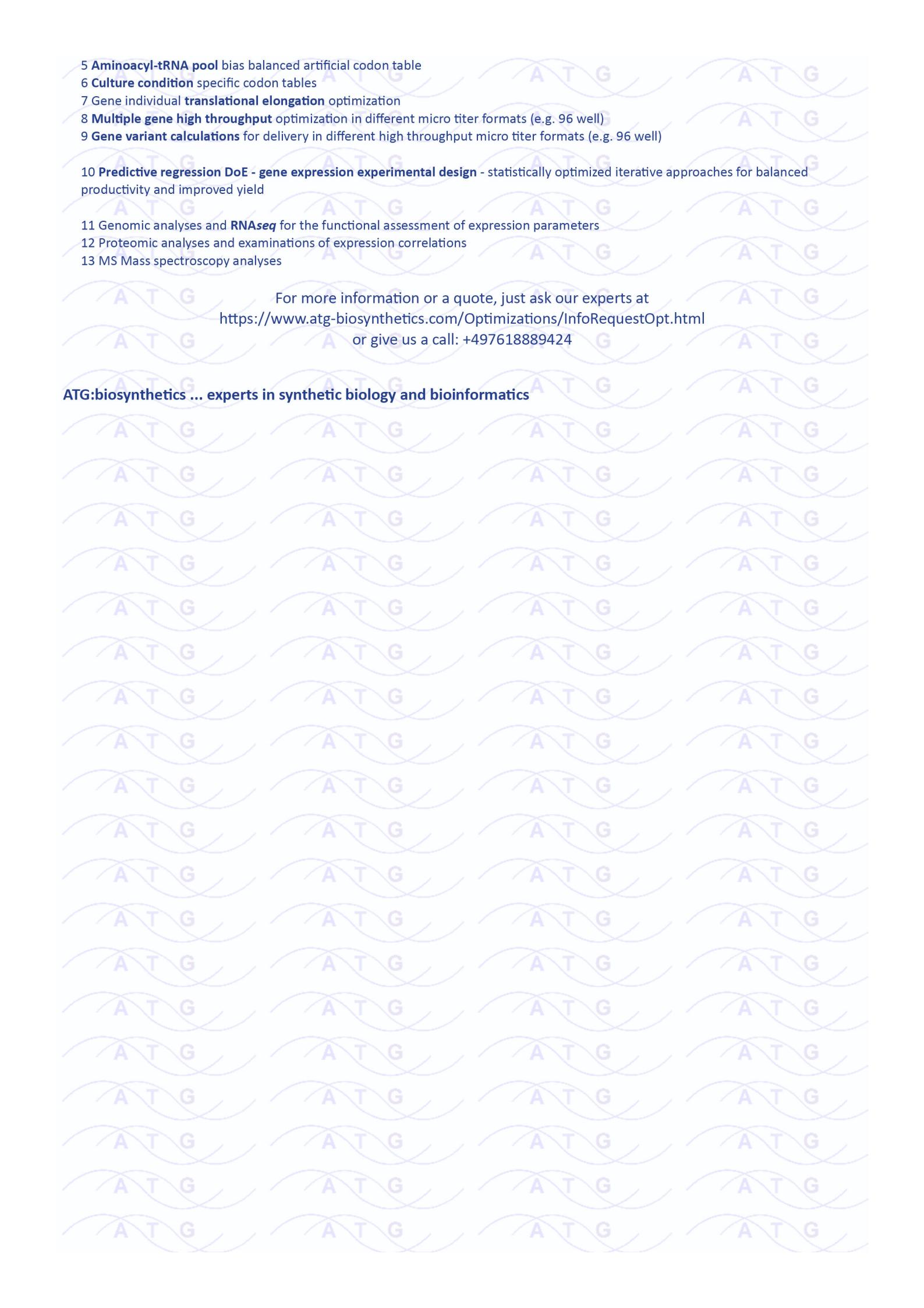**Synthetic gene clusters** according with basic standard optimization design
Synthetic gene clusters according to your requirements based on your design
Synthetic gene clusters according to your requirements based on our design in the expert mode

Expert mode:

INQUIRE/ORDER

1 **Structural gene cluster design** for specific cluster **assembly** requirements
2 **Structural gene cluster design** for specific **exchange** of genes in the cluster
3 Structural gene cluster design combining 1 and 2
4 Gene individual **translational initiation** optimization

5 **Aminoacyl-tRNA pool** bias balanced artificial codon table
6 **Culture condition** specific codon tables
7 Gene individual **translational elongation** optimization
8 **Multiple gene high throughput** optimization in different micro titer formats (e.g. 96 well)
9 **Gene variant calculations** for delivery in different high throughput micro titer formats (e.g. 96 well)

10 **Predictive regression DoE - gene expression experimental design** - statistically optimized iterative approaches for balanced productivity and improved yield

11 Genomic analyses and **RNA*seq*** for the functional assessment of expression parameters
12 Proteomic analyses and examinations of expression correlations
13 MS Mass spectroscopy analyses

For more information or a quote, just ask our experts at
https://www.atg-biosynthetics.com/Optimizations/InfoRequestOpt.html
or give us a call: +497618889424

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