Designed endonucleases in gene therapy for the Bubble Boy syndrome

A collaborative work between research groups at CIC bioGUNE, CNIO, CRG and the company Cellectis shows how meganucleases can be tailored to induce homologous recombination in human cells and repair the defective gene causing severe combined immunodeficiency (SCID) - Bubble Boy syndrome - a monogenic disease leading to defective immune response.

Meganucleases recognize long DNA and can cleave single sites in whole genomes. This unique property allows development of potent tools for gene targeting by tailoring the enzymes' specificity. It can be accomplished using protein engineering and high throughput screening methods. When the target is a defective gene, and a DNA matrix with the correct gene sequence is introduced into the cells, the double strand break induces a homologous recombination event that repairs the gene and restores its functionality.

These results present the key features for *à la carte* procedure in protein–DNA recognition design, bringing new hope to SCID patients, whose illness could be treated *ex vivo*.

Links to the published article:

http://www.ncbi.nlm.nih.gov/pubmed/20846960

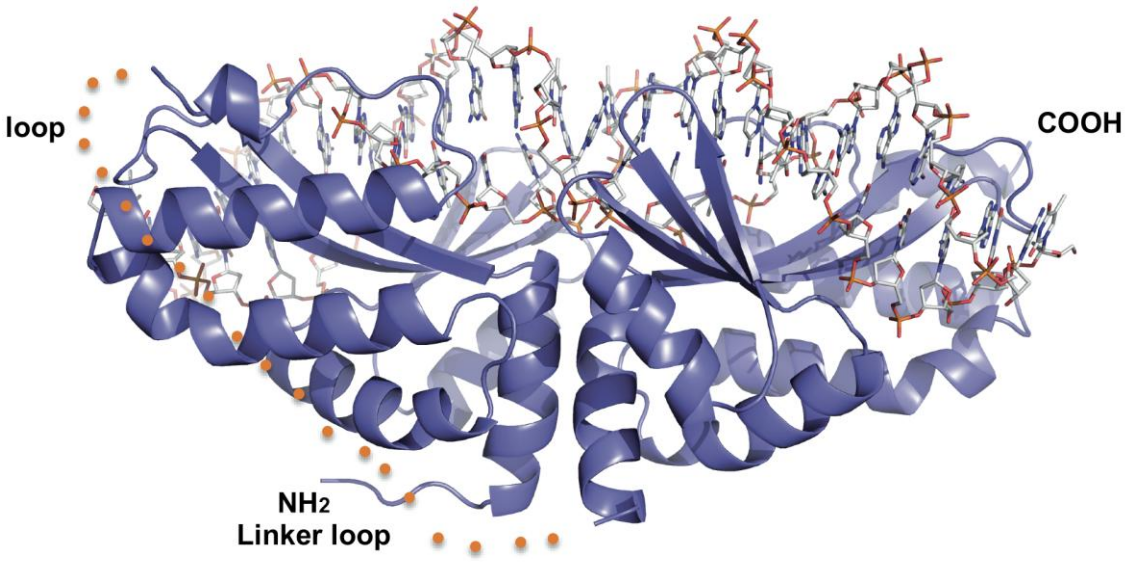

Figure: Ribbon diagram of the engineered meganuclease structure in complex with the RAG1 target DNA.