IUFoST 2006
DOI: 10.1051/IUFoST:20060142

IUFOST2006/142
Sequence-specific enzymes for totally new food ingredients

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There is a steadily rising demand for bioactive peptides as functional food ingredients, as well as for the avoidance of anti-nutritional factors. Direvo addresses this demand for improved functional foods, using two powerful technologies:
a) Direvo's application-relevant, high-output Directed Evolution System for enzymes b) Creation of totally new products by engineering custom-order, sequence-specific proteases that can create or remove any peptide or protein in functional food formulations (our proprietary "NBE©"-technology) Direvo has already selected a number of targets for which the NBE technology can provide a solution. One of these targets is angiotensin II, a common cause of hypertension. This potent bioactive peptide is formed by the angiotensin-converting enzyme (ACE). ACE inhibitors thus represent a validated means to reduce the generation of angiotensin II. Direvo announces the successful application of the NBE© technology to obtain ACE inhibitors using new enzymes that specifically cut ACE inhibitory peptides from bulk proteins already used as common food ingredients. Direvo's proprietary NBE© technology has already been used to create an enzyme that inactivates TNF-alpha, another causative agent in chronic human diseases. Successful animal studies performed in 2005 using this enzyme underline the breadth and impact of this novel technology. In the development of NBE©-derived ACE inhibitors, Direvo had the choice between multiple approaches. One of them was to screen for NBE© proteases that will cut a known peptide sequence from a given substrate (bulk protein). Such peptides have been described in literature and Direvo has successfully targeted pre-selected peptide sequences. For this project, however, the decision was made to develop a screen based on ACE inhibition, in order to select even better inhibitors. How does Direvo make enzymes with a specificity that does not occur in nature? First, we select suitable enzyme scaffolds: a lipase for lipid substrates, a hemicellulase for carbohydrate substrates, or, as in this case, a protease for a protein or peptide substrates. Using our proprietary approach, we prepare NBE© protease libraries containing millions of variations in the Specificity Determining Regions. Each of these NBE© proteases have a different specificity. These libraries are then screened at a rate of up to a million different NBE© proteases per day, using the predictive screen developed for this project. We finally selected the best NBE© proteases that generated the most potent ACE-inhibitors from the bulk food ingredient. The NBE© technology can be applied to a wide range of different applications which will be discussed.