Oil & Gas Research

Distinct Roles of Alpha/Beta Hydrolase Domain relates Proteins

Ram Rajasekharan
Central Food Technological Research Institute, India

Abstract: Lipid atoms are not just fill in as building squares of organic layers but on the other hand are dynamically reported for their part in different natural cycles. Alpha/beta hydrolase area (ABHD) containing proteins are basically related with assorted reactant exercises. Individuals in this family incorporate different catalysts with wide substrate specificities. Proteins from these families are having a moderated ABHD area and lipase and acyltransferase themes. Nonetheless, little is thought about ABHD proteins in plants. This article examines about the natural jobs and the ramifications of ABHD area containing proteins in higher eukaryotes

Keywords: Alpha/Beta; Hydrolase; Lipid; Acyltransferas Lipase; *Arabidopsis*

Description: The ABHD family of proteins is rapidly becoming as structurally related enzymes with various biochemical functions in both synthesis and degradation. The proteins have a conserved lipase (GXSXG) and acyltransferase (HXXXXD) motifs, which suggests that they may have a role in lipid biosynthesis and turnover. In recent years, the mammalian ABHD proteins are likely to have regulatory functions of lipid metabolism and signal transduction. To date, eighteen human ABHD hydrolases and their expression in various tissues have been reported, but most need to be characterized. Mutations in ABHD5/CGI58 cause Chanarin– Dorfman syndrome, an autosomal recessive disorder in humans. Human CGI-58 has lysophosphatidic acid (LPA) acyltransferaseand lysophosphatidyl glycerol acyltransferase activities. In various cancers, high levels of ABHD11 mRNA transcripts have been reported, but the role of this enzyme in cancer metabolism is not known. ABHD11 has been identified as a possible biomarker for lung carcinoma. In vivo metabolite profiling disclosed that human ABHD3 overexpressing cells exhibited elevated levels of phospholipase activity. In a similar study, ABHD6 was shown to have an enzymatic activity that hydrolyzed both monoacyl- glycerol (MAG) and lysophospholipid. In a rodent model, ABHD12 was reported to be a major lysophosphatidyl serine and MAG lipase. Similarly, ABHD16A was shown to hydrolyze phosphatidylserine in mammalian systems. Disruption of these two enzymes showed altered phospholipid and lysophospholipid levels and caused neuro-immunological disorders in mice.

From the above research, it is clear that ABHD proteins in human are playing the vital roles with respect to lipid metabolism and various disease conditions.

Unlike human ABHD proteins, in plants, very few studies demonstrated the biochemical and physiological functions of these ABHD family proteins. Recombinant Arabidopsis CGI58 was shown to possess LPA acyltransferase activity. Accumulation of nonpolar

lipids in the leaves of Arabidopsis CGI58 mutants was also demonstrated. Our recent research on ABHD11 of Arabidopsis revealed that the heterologously overexpressed ABHD11 had the ability to hydrolyze lysolipids, phospholipids and to some extent monoacylglycerol. The mutant ABHD11 was shown to alter the expression levels of various chloroplast lipid biosynthetic genes and eventually increased the galactolipids in leaves and in addition, it also increased the plant growth as compared to wild-type.

Various attempts are upcoming to increase the oil content in plant seeds. Our studies on ABHD family proteins revealed that abolishing the enzyme activity influences the lipid biosynthesis more towards leaf lipids such as galactolipids and less towardsFrom the above research, it is clear that ABHD proteins in human are playing the vital roles with respect to lipid metabolism and various disease conditions.

Unlike human ABHD proteins, in plants, very few studies demonstrated the biochemical and physiological functions of these ABHD family proteins. Recombinant Arabidopsis CGI58 was shown to possess LPA acyltransferase activity. Accumulation of nonpolar lipids in the leaves of Arabidopsis CGI58 mutants was also demonstrated. Our recent research on ABHD11 of Arabidopsis revealed that the heterologously overexpressed ABHD11 had the ability to hydrolyze lysolipids, phospholipids and to some extent monoacylglycerol. The mutant ABHD11 was shown to alter the expression levels of various chloroplast lipid biosynthetic genes and eventually increased the galactolipids in leaves and in addition, it also increased the plant growth as compared to wild-type.

Various attempts are upcoming to increase the oil content in plant seeds. Our studies on ABHD family proteins revealed that abolishing the enzyme activity influences the lipid biosynthesis more towards leaf lipids such as galactolipids and less towards