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Cellular O-glycome reporter/amplification to explore O-glycans of living cells

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Mucin-type O-glycosylation of proteins is one of the most abundant protein post-translational modifications and plays important roles in many biological processes but the repertoire of mucin-type O-glycans synthesized by cells is difficult to determine. Here we developed a novel technology termed cellular O-glycome reporter/amplification (CORA), a sensitive and versatile method to profile and amplify mucin type O-glycans in any living cells. Cells took upper acetylated benzyl- α -N-acetyl galactosamine, Benzyl- α -GalNAc(Ac)₃ into cytosol where it was de-acetylated to form Bn- α -GalNAc and Benzyl- α -GalNAc was then transported into the Golgi apparatus where it was converted to a large variety of complex O-glycans (Benzyl-O-glycans) by O-glycosyl transferases and these Benzyl-O-glycans were finally secreted from cells, allowing easy purification for analysis by HPLC and mass spectrometry (MS). CORA resulted in ~100-1000-folds increase in sensitivity over conventional O-glycan analyses such as β -elimination-MS and identified a more complex repertoire of O-glycans in more than a dozen cell types analyzed. Thus, the high sensitivity and amplification nature of CORA technology makes it possible to analyze entire human O-glycome and others and offers new opportunities to identify novel glycan biomarkers for human diseases. Furthermore, CORA technology may shed light on facilitating the development of similar technologies for analyzing/amplifying other types of cellular glycomes.

Biography

Tongzhong Ju has received his MD degree from the Qingdao Medical College in 1986 and his PhD in Biochemistry from Fudan University Shanghai, Medical School (former Shanghai Medical University, China) in 1994. He has completed his Post-doctoral training in Biochemistry/Glycobiology in 1999, worked as a Research Associate (1999-2002) and Research Assistant Professor (2002-2006) at the University of Oklahoma Health Sciences Center (OUHSC). Since 2006, he has been an Assistant Professor and currently an Associate Professor in the Department of Biochemistry at Emory University School of Medicine. He has published more than 50 papers in many different reputable journals.

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