

**Supplemental Table 1 : Selected studies that identified potential PTM biomarkers.**

Year	Disease	Sample	Methodology	Findings	Reference
1999	Thrombosis and Hemostasis	Human platelets	Flow cytometry	The phosphorylation levels of VASP-P may be used as marker of P2Y12 receptor inhibition during antiplatelet treatment.	1
2005	Type 2 diabetes, microangiopathy	Red blood cells	LC-ESI-MS	Increased levels of glutathionylated hemoglobin in diabetic subjects with microangiopathy	2
2006	Pancreatic cancer	Serum	Lectin affinity enrichment	Downregulation of Sialylated plasma protease C1 inhibitor and downregulation N83 glycosylation of $\alpha$ 1-antitrypsin in cancer serum.	3
2010	Diabetes	Whole blood	High performance liquid chromatography	Glycated hemoglobin may be used as a marker for diagnostic tests in diabetes.	4
2011	Breast cancer	Serum	MALDI-FTICR-MS of native glycans	Increased levels of high-mannose-type structures	5
2012	Ovarian cancer	Serum	MALDI-TOF-MS of permethylated glycans	Increased levels of tri- and tetra-branched sialylated and fucosylated N-glycans, decreased levels of glycans containing a bisecting GlcNAc	6
2014	Liver disease, kidney disease, diabetes mellitus	Plasma	ESI-TOF-MS of purified HSA	Increased Cys-34-cysteinylation of HSA	7
2015	Colorectal Cancer	Colon tissues	Carbon-LC-ESI-MS/MS of membrane protein glycans	Increased levels of high mannose, hybrid and paucimannosidic type N-glycans, decreased levels of complex N-glycans	8
2015	Alzheimer's disease	Postmortem frontal cortex tissue	Phosphopeptide enrichment by IMAC, LC-MS/MS	253 significantly altered phosphopeptides, 21% of which from tau	9
2016	Alzheimer's disease	Cerebrospinal fluid	Phosphopeptide enrichment by IMAC and TiO <sub>2</sub> , TMT quantification	31 different phosphorylation sites on tau	10
2017	Gastric cancer	Serum	MALDI-TOF-MS of ethyl esterified glycans	Increased levels of hybrid N-glycans and multi-branched type (tri-, tetra-antennary glycans), decreased levels total bisecting type N-glycans, monoantennary N-glycans, galactose and total fucose	11
2018	Ovarian cancer	Serum	MRM of glycopeptides	Increased glycosylation of alpha-1-antitrypsin, alpha-1-acid glycoprotein and haptoglobin, decreased glycosylation of alpha-2-macroglobulin and transferrin	12

- 1 Schwarz, U.R., et al., Flow cytometry analysis of intracellular VASP phosphorylation for the assessment of activating and inhibitory signal transduction pathways in human platelets--definition and detection of ticlopidine/clopidogrel effects.. *Thromb Haemost*, 1999. 82(3): 1145-52.
- 2 Sampathkumar, R., et al., *Increased glutathionylated hemoglobin (HbSSG) in type 2 diabetes subjects with microangiopathy*. *Clin Biochem*, 2005. 38(10): p. 892-9.
- 3 Zhao, J. et al., Comparative Serum Glycoproteomics Using Lectin Selected Sialic Acid Glycoproteins with Mass Spectrometric Analysis: Application to Pancreatic Cancer Serum. *J Proteome Res*, 2006. 5(7): 1792-1802.
- 4 Selvin, E., et al., Glycated Hemoglobin, Diabetes, and Cardiovascular Risk in Nondiabetic Adults. *N Engl J Med*, 2010. 362(9): 800-811.
- 5 de Leoz, M.L., et al., *High-mannose glycans are elevated during breast cancer progression*. *Mol Cell Proteomics*, 2011. 10(1): p. M110 002717.
- 6 Alley, W.R., Jr., et al., *N-linked glycan structures and their expressions change in the blood sera of ovarian cancer patients*. *J Proteome Res*, 2012. 11(4): p. 2282-300.
- 7 Nagumo, K., et al., *Cys34-cysteinylation of human serum albumin is a sensitive plasma marker in oxidative stress-related chronic diseases*. *PLoS One*, 2014. 9(1): p. e85216.
- 8 Sethi, M.K., et al., *In-depth N-glycome profiling of paired colorectal cancer and non-tumorigenic tissues reveals cancer-, stage- and EGFR-specific protein N-glycosylation*. *Glycobiology*, 2015. 25(10): p. 1064-78.
- 9 Dammer, E.B., et al., *Quantitative phosphoproteomics of Alzheimer's disease reveals cross-talk between kinases and small heat shock proteins*. *Proteomics*, 2015. 15(2-3): p. 508-519.
- 10 Russell, C.L., et al., *Comprehensive Quantitative Profiling of Tau and Phosphorylated Tau Peptides in Cerebrospinal Fluid by Mass Spectrometry Provides New Biomarker Candidates*. *J Alzheimers Dis*, 2017. 55(1): p. 303-313.
- 11 Qin, R., et al., *Discovery of Non-invasive Glycan Biomarkers for Detection and Surveillance of Gastric Cancer*. *J Cancer*, 2017. 8(10): p. 1908-1916.
- 12 Miyamoto, S., et al., *Multiple Reaction Monitoring for the Quantitation of Serum Protein Glycosylation Profiles: Application to Ovarian Cancer*. *J Proteome Res*, 2018. 17(1): p. 222-233.