

Immuno-Oncology master targeted proteomics panel

oM = oxidized Met, p
= phospho,
uK=ubiquitinated Lys
(222 analytes)

Gene Symbol	Target protein name	UniProt ID (& link)	Modification/ Variant*
ADA	Adenosine deaminase	P00813	oM
ADA	Adenosine deaminase	P00813	nonmod
ADAM17	Disintegrin and metalloproteinase domain-containing protein 17	P78536	nonmod
ALCAM	CD166 antigen	Q13740	nonmod
ANXA1	Annexin A1	P04083	nonmod
ANXA1	Annexin A1	P04083	nonmod
ARG1	Arginase-1	P05089	nonmod
ARG2	Arginase-2, mitochondrial	P78540	nonmod
ATM	Serine-protein kinase ATM	Q13315	nonmod
ATM	Serine-protein kinase ATM	Q13315	pS2996
ATM	Serine-protein kinase ATM	Q13315	nonmod
ATM	Serine-protein kinase ATM	Q13315	pS367
B2M	Beta-2-microglobulin [Cleaved into: Beta-2-microglobulin form pI 5.3]	P61769	nonmod
BAD	Bcl2-associated agonist of cell death	Q92934	nonmod
BAX	Apoptosis regulator BAX	Q07812	oM
BAX	Apoptosis regulator BAX	Q07812	nonmod
BCL10	B-cell lymphoma/leukemia 10	Q95999	nonmod
BTK	Tyrosine-protein kinase BTK	Q06187	nonmod
BTLA	B- and T-lymphocyte attenuator	Q7Z6A9	nonmod
CADM1	Cell adhesion molecule 1	Q9BY67	nonmod
CADM1	Cell adhesion molecule 1	Q9BY67	oM
CASP3	Caspase-3	P42574	pS26
CCL5	C-C motif chemokine 5	P13501	nonmod
CD14	Monocyte differentiation antigen CD14	P08571	nonmod
CD163	Scavenger receptor cysteine-rich type 1 protein M130	Q86VB7	nonmod
CD27	CD27 antigen	P26842	nonmod
CD274	Programmed cell death 1 ligand 1	Q9NZQ7	nonmod
CD276	CD276 antigen	Q5ZPR3	nonmod
CD33	Myeloid cell surface antigen CD33	P20138	nonmod
CD38	ADP-ribosyl cyclase/cyclic ADP-ribose hydrolase 1	P28907	nonmod
CD4	T-cell surface glycoprotein CD4	P01730	nonmod
CD4	T-cell surface glycoprotein CD4	P01730	nonmod
CD40	Tumor necrosis factor receptor superfamily member 5	P25942	nonmod
CD40	Tumor necrosis factor receptor superfamily member 5	P25942	nonmod
CD44	CD44 antigen	P16070	nonmod
CD44	CD44 antigen	P16070	HxxxQ
CD44	CD44 antigen	P16070	nonmod
CD46	Membrane cofactor protein	P15529	nonmod
CD47	Leukocyte surface antigen CD47	Q08722	nonmod
CD48	CD48 antigen	P09326	nonmod
CD70	CD70 antigen	P32970	nonmod
CD74	HLA class II histocompatibility antigen gamma chain	P04233	nonmod
CD84	SLAM family member 5	Q9UIB8	nonmod
CD86	T-lymphocyte activation antigen CD86	P42081	nonmod
CD8A	T-cell surface glycoprotein CD8 alpha chain	P01732	nonmod
CDKN1A	Cyclin-dependent kinase inhibitor 1	P38936	nonmod
CEACAM8	Cell adhesion molecule CEACAM8	P31997	nonmod
CGAS	Cyclic GMP-AMP synthase	Q8N884	nonmod
CRP	C-reactive protein [Cleaved into: C-reactive protein	P02741	nonmod
CRP	C-reactive protein [Cleaved into: C-reactive protein	P02741	nonmod
CSF1	Macrophage colony-stimulating factor 1	P09603	nonmod
CSF1R	Macrophage colony-stimulating factor 1 receptor	P07333	nonmod
CSF2RA	Granulocyte-macrophage colony-stimulating factor receptor subunit alpha	P15509	nonmod
CTLA4	Cytotoxic T-lymphocyte protein 4	P16410	nonmod
CX3CL1	Fractalkine	P78423	nonmod
CXCL10	C-X-C motif chemokine 10	P02778	nonmod
CXCL10	C-X-C motif chemokine 10	P02778	nonmod
CXCL12	Stromal cell-derived factor 1	P48061	nonmod
CXCL13	C-X-C motif chemokine 13	Q43927	nonmod
CXCL9	C-X-C motif chemokine 9	Q07325	nonmod
EIF2A	Eukaryotic translation initiation factor 2A	Q9BY44	pT518

EIF2A	Eukaryotic translation initiation factor 2A	Q9BY44	pS506
EIF2A	Eukaryotic translation initiation factor 2A	Q9BY44	nonmod
EIF2A	Eukaryotic translation initiation factor 2A	Q9BY44	pT518
EIF2A	Eukaryotic translation initiation factor 2A	Q9BY44	pS506
EIF2A	Eukaryotic translation initiation factor 2A	Q9BY44	nonmod
EIF2A	Eukaryotic translation initiation factor 2A	Q9BY44	pS506/pT518
ENTPD1	Ectonucleoside triphosphate diphosphohydrolase 1	P49961	nonmod
ERCC2	General transcription and DNA repair factor IIH helicase subunit XPD	P18074	nonmod
FAS	Tumor necrosis factor receptor superfamily member 6	P25445	pY291
FAS	Tumor necrosis factor receptor superfamily member 6	P25445	nonmod
FAS	Tumor necrosis factor receptor superfamily member 6	P25445	nonmod
FOXO1	Forkhead box protein O1	Q12778	nonmod
GAPDH	Glyceraldehyde-3-phosphate dehydrogenase	P04406	nonmod
GZMA	Granzyme A	P12544	nonmod
HAVCR2	Hepatitis A virus cellular receptor 2	Q8TDQ0	nonmod
HLA-DRA	HLA class II histocompatibility antigen, DR alpha chain	P01903	nonmod
HLA-E	HLA class I histocompatibility antigen, alpha chain E	P13747	nonmod
HLA-F	HLA class I histocompatibility antigen, alpha chain F	P30511	nonmod
HMGB1	High mobility group protein B1	P09429	nonmod
HMGB1	High mobility group protein B1	P09429	nonmod
ICAM1	Intercellular adhesion molecule 1	P05362	nonmod
ICOSLG	ICOS ligand	Q75144	nonmod
IDO1	Indoleamine 2,3-dioxygenase 1	P14902	nonmod
IFIT1	Antiviral innate immune response effector IFIT1	P09914	nonmod
IFIT2	Interferon-induced protein with tetratricopeptide repeats 2	P09913	nonmod
IFIT3	Interferon-induced protein with tetratricopeptide repeats 3	Q14879	nonmod
IFNGR1	Interferon gamma receptor 1	P15260	nonmod
IKBIP	Inhibitor of nuclear factor kappa-B kinase-interacting protein	Q70UQ0	nonmod
IL16	Pro-interleukin-16 [Cleaved into: Interleukin-16]	Q14005	nonmod
IL18	Interleukin-18	Q14116	nonmod
IL1A	Interleukin-1 alpha	P01583	nonmod
IL1RAP	Interleukin-1 receptor accessory protein	Q9NPH3	nonmod
IL1RN	Interleukin-1 receptor antagonist protein	P18510	nonmod
IL2RG	Cytokine receptor common subunit gamma	P31785	nonmod
IL6R	Interleukin-6 receptor subunit alpha	P08887	nonmod
IL6ST	Interleukin-6 receptor subunit beta	P40189	nonmod
IRF3	Interferon regulatory factor 3	Q14653	nonmod
ITGAE	Integrin alpha-E	P38570	nonmod
ITGAM	Integrin alpha-M	P11215	nonmod
ITGAM	Integrin alpha-M	P11215	AxxxV
ITGAX	Integrin alpha-X	P20702	nonmod
JAK1	Tyrosine-protein kinase JAK1	P23458	nonmod
JAK2	Tyrosine-protein kinase JAK2	Q60674	nonmod
LAG3	Lymphocyte activation gene 3 protein	P18627	nonmod
LGALS1	Galectin-1	P09382	nonmod
LGALS9	Galectin-9	Q00182	nonmod
LIG1	DNA ligase 1	P18858	nonmod
LIME1	Lck-interacting transmembrane adapter 1	Q9H400	pT274
LIME1	Lck-interacting transmembrane adapter 1	Q9H400	nonmod
LY75	Lymphocyte antigen 75	Q60449	nonmod
MAP2K4	Dual specificity mitogen-activated protein kinase kinase 4	P45985	nonmod
MCL1	Induced myeloid leukemia cell differentiation protein Mcl-1	Q07820	nonmod
MGMT	Methylated-DNA--protein-cysteine methyltransferase	P16455	nonmod
MKI67	Proliferation marker protein Ki-67	P46013	pT1801
MKI67	Proliferation marker protein Ki-67	P46013	nonmod
MKI67	Proliferation marker protein Ki-67	P46013	pT2406
MKI67	Proliferation marker protein Ki-67	P46013	nonmod
MKI67	Proliferation marker protein Ki-67	P46013	nonmod
MLH1	DNA mismatch repair protein Mlh1	P40692	nonmod
MMP9	Matrix metalloproteinase-9	P14780	nonmod
MPO	Myeloperoxidase	P05164	oM
MPO	Myeloperoxidase	P05164	nonmod
MS4A1	B-lymphocyte antigen CD20	P11836	nonmod
MSH2	DNA mismatch repair protein Msh2	P43246	nonmod
MSH3	DNA mismatch repair protein Msh3	P20585	nonmod
MSH6	DNA mismatch repair protein Msh6	P52701	nonmod

MSLN	Mesothelin	Q13421	nonmod
MSLN	Mesothelin	Q13421	nonmod
MST1	Hepatocyte growth factor-like protein	P26927	nonmod
MUTYH	Adenine DNA glycosylase	Q9UIF7	oM521
MUTYH	Adenine DNA glycosylase	Q9UIF7	nonmod
NCAM1	Neural cell adhesion molecule 1	P13591	nonmod
NFKB1	Nuclear factor NF-kappa-B p105 subunit	P19838	nonmod
NFKB2	Nuclear factor NF-kappa-B p100 subunit	Q00653	nonmod
NT5E	5'-nucleotidase	P21589	nonmod
PAK4	Serine/threonine-protein kinase PAK 4	O96013	pS181
PAK4	Serine/threonine-protein kinase PAK 4	O96013	nonmod
PARP1	Poly [ADP-ribose] polymerase 1	P09874	pS41
PARP1	Poly [ADP-ribose] polymerase 1	P09874	pS177
PARP1	Poly [ADP-ribose] polymerase 1	P09874	nonmod
PAXIP1	PAX-interacting protein 1	Q6ZW49	nonmod
PCNA	Proliferating cell nuclear antigen	P12004	uK164
PCNA	Proliferating cell nuclear antigen	P12004	nonmod
PCNA	Proliferating cell nuclear antigen	P12004	nonmod
PDCD1	Programmed cell death protein 1	Q15116	nonmod
PDCD1LG2	Programmed cell death 1 ligand 2	Q98Q51	nonmod
PECAM1	Platelet endothelial cell adhesion molecule	P16284	nonmod
PMS1	PMS1 protein homolog 1	P54277	nonmod
PMS2	Mismatch repair endonuclease PMS2	P54278	nonmod
POLD1	DNA polymerase delta catalytic subunit	P28340	nonmod
POLE	DNA polymerase epsilon catalytic subunit A	Q07864	nonmod
PRF1	Perforin-1	P14222	nonmod
PRKDC	DNA-dependent protein kinase catalytic subunit	P78527	nonmod
PRKDC	DNA-dependent protein kinase catalytic subunit	P78527	nonmod
PRKDC	DNA-dependent protein kinase catalytic subunit	P78527	oxMpT2609
PRKDC	DNA-dependent protein kinase catalytic subunit	P78527	oxM
PSMA1	Proteasome subunit alpha type-1	P25786	nonmod
PSMB10	Proteasome subunit beta type-10	P40306	nonmod
PTGES2	Prostaglandin E synthase 2	Q9H727	nonmod
PTGES2	Prostaglandin E synthase 2	Q9H727	nonmod
PTGS2	Prostaglandin G/H synthase 2	P35354	nonmod
PTPN2	Tyrosine-protein phosphatase non-receptor type 2	P17706	nonmod
PTPRC	Receptor-type tyrosine-protein phosphatase C	P08575	nonmod
PTPRC	Receptor-type tyrosine-protein phosphatase C	P08575	nonmod
PVR	Poliovirus receptor	P15151	oM
PVR	Poliovirus receptor	P15151	nonmod
RB1	Retinoblastoma-associated protein	P06400	nonmod
RB1	Retinoblastoma-associated protein	P06400	pS807
RELA	Transcription factor p65	Q04206	nonmod
RIF1	Telomere-associated protein RIF1	Q5UIP0	pS1542
RIF1	Telomere-associated protein RIF1	Q5UIP0	nonmod
SELE	E-selectin	P16581	nonmod
SERPINA6	Corticosteroid-binding globulin	P08185	nonmod
SIGLEC1	Sialoadhesin	Q9BZZ2	nonmod
SIGLEC7	Sialic acid-binding Ig-like lectin 7	Q9Y286	nonmod
SIGLEC9	Sialic acid-binding Ig-like lectin 9	Q9Y336	nonmod
SIRPA	Tyrosine-protein phosphatase non-receptor type substrate 1	P78324	nonmod
SLAMF1	Signaling lymphocytic activation molecule	Q13291	nonmod
SLAMF7	SLAM family member 7	Q9NQ25	nonmod
SLAMF8	SLAM family member 8	Q9P0V8	nonmod
SMPDL3B	Acid sphingomyelinase-like phosphodiesterase 3b	Q92485	nonmod
SPON2	Spondin-2	Q9BUD6	nonmod
SPP1	Osteopontin	P10451	nonmod
SRC	Proto-oncogene tyrosine-protein kinase Src	P12931	nonmod
SRC	Proto-oncogene tyrosine-protein kinase Src	P12931	nonmod
STAT1	Signal transducer and activator of transcription 1-alpha/beta	P42224	nonmod
STAT2	Signal transducer and activator of transcription 2	P52630	nonmod
STAT3	Signal transducer and activator of transcription 3	P40763	nonmod
STAT3	Signal transducer and activator of transcription 3	P40763	pY705
STAT3	Signal transducer and activator of transcription 3	P40763	pS701
STAT3	Signal transducer and activator of transcription 3	P40763	pY705
STAT3	Signal transducer and activator of transcription 3	P40763	nonmod

STAT3	Signal transducer and activator of transcription 3	P40763	pS
STAT5A	Signal transducer and activator of transcription 5A	P42229	pS
STAT5A	Signal transducer and activator of transcription 5A	P42229	pS
STAT5A	Signal transducer and activator of transcription 5A	P42229	pS
STAT5A	Signal transducer and activator of transcription 5A	P42229	nonmod
STAT5B	Signal transducer and activator of transcription 5B	P51692	pS
STAT5B	Signal transducer and activator of transcription 5B	P51692	nonmod
STAT6	Signal transducer and activator of transcription 6	P42226	nonmod
STING1	Stimulator of interferon genes protein	Q86WV6	nonmod
STK11	Serine/threonine-protein kinase STK11	Q15831	nonmod
TAP1	Antigen peptide transporter 1	Q03518	nonmod
TAP2	Antigen peptide transporter 2	Q03519	nonmod
TAPBP	Tapasin	Q15533	nonmod
TBK1	Serine/threonine-protein kinase TBK1	Q9UHD2	nonmod
TGFB1	Transforming growth factor beta-1 proprotein [Cleaved into: Latency-associated peptide	P01137	nonmod
TNFAIP2	Tumor necrosis factor alpha-induced protein 2	Q03169	nonmod
TNFRSF14	Tumor necrosis factor receptor superfamily member 14	Q92956	nonmod
TNFRSF17	Tumor necrosis factor receptor superfamily member 17	Q02223	pS173
TNFRSF17	Tumor necrosis factor receptor superfamily member 17	Q02223	nonmod
TNFRSF9	Tumor necrosis factor receptor superfamily member 9	Q07011	nonmod
TNFSF9	Tumor necrosis factor ligand superfamily member 9	P41273	nonmod
TREX1	Three-prime repair exonuclease 1	Q9NSU2	nonmod
VCAM1	Vascular cell adhesion protein 1	P19320	nonmod
VEGFA	Vascular endothelial growth factor A, long form	P15692	nonmod
VSIR / C10orf54	V-type immunoglobulin domain-containing suppressor of T-cell activation	Q9H7M9	nonmod
VSIR / C10orf54	V-type immunoglobulin domain-containing suppressor of T-cell activation	Q9H7M9	nonmod
VTGN1	V-set domain-containing T-cell activation inhibitor 1	Q7Z7D3	nonmod
XRCC5	X-ray repair cross-complementing protein 5	P13010	nonmod
ZAP70	Tyrosine-protein kinase ZAP-70	P43403	nonmod

References:

- 1) Whiteaker JR, Lundeen RA, Zhao L, Schoenherr RM, Burian A, Huang D, Voytovich U, Wang T, Kennedy JJ, Ivey RG, Lin C, Murillo OD, Lorentzen TD, Thiagarajan M, Colantonio S, Caceres TW, Roberts RR, Knotts JG, Reading JJ, Kaczmarczyk JA, Richardson CW, Garcia-Buntley SS, Bocik W, Hewitt SM, Murray KE, Do N, Brophy M, Wilz SW, Yu H, Ajjarapu S, Boja E, Hiltke T, Rodriguez H, Paulovich AG. Targeted mass spectrometry enables multiplexed quantification of immunomodulatory proteins in clinical biospecimens. *Frontiers in Immunology* (2021) 12:765898. doi: 10.3389/fimmu.2021.765898. PMID:34858420
- 2) Whiteaker JR, Zhao L, Schoenherr RM, Huang D, Lundeen RA, Voytovich U, Kennedy JJ, Ivey RG, Lin C, Murillo OD, Lorentzen TD, Colantonio S, Caceres TW, Roberts RR, Knotts JG, Reading JJ, Perry CD, Richardson CW, Garcia-Buntley SS, Bocik W, Hewitt SM, Chowdhury S, Vandermeer J, Smith SD, Gopal AK, Ramchurren N, Fling SP, Wang P, Paulovich AG. A multiplexed assay for quantifying immunomodulatory proteins supports correlative studies in immunotherapy clinical trials. *Frontiers in Oncology* (2023) 13:1168710. doi: 10.3389/fonc.2023.1168710. eCollection 2023. PMID: 37205196