

非因生物

Mills 癌症个体化诊疗研究中心

Mills Institute for Personalized Cancer Care

RPPA 信号通路扫描分析服务靶点清单

● 非因生物 专注癌症精准医疗 / 全球领先的蛋白组学·空间多组学技术平台

非因生物科技（山东）有限公司
Fynn Biotechnologies Ltd.

反相蛋白微阵列 (Reverse Phase Protein Array, RPPA) 是一种结合平面高精度大规模样品蛋白抗原微阵列打印和抗体检测的高通量蛋白组学技术，可应用于蛋白功能与调控机理研究、细胞信号通路探查、肿瘤标志物及蛋白分子分型、药物靶标发现与药物机理分析等不同领域。根据研究者的需要，我们既能提供信号通路全景扫描标准化分析服务，也提供不同模块的预设靶点组合 (panel) 分析及客户自选靶点个性化定制分析服务，供用户灵活选择和组合。目前，我们提供的RPPA信号通路全景扫描标准化分析服务，可以对肿瘤研究和药物研发关键信号通路近400种核心靶点蛋白的表达或修饰水平，在大规模样品维度进行全面检测和高通量分析，并提供丰富多样的生物信息学分析与个性化数据挖掘服务。

服务项目	服务细节	靶点数量	代表性通路
信号通路全景扫描标准化分析	涵盖肿瘤研究和药物研发关键信号通路近400种核心靶点，所有服务相关试剂都已经经过前期验证，客户不必提供任何试剂，只需要提供样品。 ※ 信号通路全景扫描标准化分析相关靶点信息见下 表1	近400种，并在不断增加当中	细胞周期、程序性细胞死亡、DNA损伤与修复、p53信号、细胞黏附、细胞增殖、PI3K-Akt、mTOR、AMPK、缺氧信号、氧化应激、VEGF、MAPK、JAK-STAT、PKA、PKC、NF-κB、Wnt、Hippo、Notch、Hedgehog.....
预设靶点组合 (panel) 分析	根据研究需求，在预设的6个靶点组合 (panel) 当中任选1个~5个进行自由组合，相应的每样品服务价格会分别有不同程度降低，所有服务相关试剂都已经经过前期验证，客户不必提供任何试剂，只需要提供样品。 ※ 预设靶点组合 (panel) 分析相关靶点信息见下 表2~表7	41~340	
自选靶点个性化定制分析	根据研究需求，客户任意自选需要的靶点 (含修饰位点或特殊剪切) 进行个性化定制服务，自选靶点相关抗体需要客户提供，并需要承担预实验阶段RPPA系统测试的费用。	用户自选靶点	

表1：信号通路全景扫描标准化分析相关靶点列表

14-3-3 beta	14-3-3 epsilon	14-3-3 zeta
4E-BP1	4E-BP1 (phospho-Ser65)	4E-BP1 (phospho-Thr37/Thr46)
ACC1	ACC1 (phospho-Ser79)	AceCS1
ACSL1	Actin-beta	Akt (pan)
Akt (phospho-Ser473)	Akt (phospho-Thr308)	Akt1
Akt2	Akt3	ALIX
ALK	ALKBH5	alpha-SMA
AMPK alpha	AMPK alpha (phospho-Thr172)	AMPK alpha2 (phospho-Ser345)
AMPK beta1	Androgen Receptor	Annexin A2
Annexin I	Annexin VII	APEX1
A-Raf	ARID1A	ASNS
ATG3	ATG4B	ATG5
ATG7	ATM	ATM (phospho-Ser1981)
ATP5A	ATR	ATR (phospho-Ser428)
AURKA	AURKA (phospho-Thr288)	AURKB
AXL	B7-H4	Bad (phospho-Ser112)
Bak	BAP1	BARD1
Bax	Bcl-2	Bcl-xL
Beclin-1	Beta 2 Microglobulin (B2M)	Bim
B-Raf	B-Raf (phospho-Ser445)	BRCA1
BRCA2	BRD4	BRIP1
c-Abl	Caspase-1	Caspase-3 (cleaved)
Caspase-6	Caspase-7 (cleaved)	Caspase-8
Caveolin-1	CD127/IL7R	CD134/OX40
CD14	CD171	CD20
CD26	CD31	CD3E
CD44	CD49b	CD5
CD55	CD63	CD86
CD9	Cdc42	Cdc6
CDK1	CDK1 (phospho-Tyr15)	CDK2
CDK5	CDK9	CDT1
CENP-A	CHD1L	Chk1
Chk1 (phospho-Ser296)	Chk1 (phospho-Ser345)	Chk2
Chk2 (phospho-Thr68)	c-Jun (phospho-Ser63)	c-Jun (phospho-Ser73)
Claudin-7	c-Met	c-Myc
COG3	Connexin 43	Coup-TFII
COX IV	C-Raf	C-Raf (phospho-Ser338)
CREB1	CtIP	Cyclin A2
Cyclin B1	Cyclin D1	Cyclin D3
Cyclin E1	Cyclin H	Cyclooxygenase-2 (COX-2)

Cyclophilin F	DDB1	DDB2
DDR1	DNA ligase 4	DNA polymerase gamma
DNMT1	DRP1	DUSP4
DUSP6	Dvl3	E2F1
E-Cadherin	eEF2	eEF2K
EGFR	EGFR (phospho-Tyr1016)	EGFR (phospho-Tyr1068)
EGFR (phospho-Tyr1173)	eIF4A	eIF4E
eIF4E (phospho-Ser209)	eIF4G	Enolase-2
EphA2	ERCC1	ERCC5
ERK1 (phospho-Thr202/Tyr204) / ERK2 (phospho-Thr185/Tyr187)	ERK1/2	ERK5
ERK5 (phospho-Thr218/Tyr220)	ERRFI1	Estrogen Receptor alpha
Estrogen Receptor alpha (phospho-Ser118)	Ets-1	EVI1
FAK	FAK (phospho-Tyr397)	FANCD2
Fas	FASN	FEN1
FGF basic/FGF2	Fibronectin	FOXM1
FOXO3a	FOXO3a (phospho-Ser318/Ser321)	FTO
G6PD	Gab2	GABARAP
GAPDH	GATA3	GCLM
GCN5L2	GLS	GLUD1
Glycogen synthase (phospho-Ser641)	GPX4	GRB2
GSK-3 alpha/beta	GSK-3 alpha/beta (phospho-Ser21/Ser9)	GSK-3 beta
GSK-3 beta (phospho-Ser9)	GSY1	H2AX (phospho-Ser140)
Her2/ErbB2	Her2/ErbB2 (phospho-Tyr1196)	Her2/ErbB2 (phospho-Tyr1222)
Her2/ErbB2 (phospho-Tyr1248)	HES1	Hexokinase-I
Hexokinase-II	Histone H2B-Ubiquitinated	Histone H3
Histone H3-K4-Dimethylated	Histone H3-K9-Dimethylated	HLA-DR/DP/DQ/DX
HMHA1	HNRNPK	HSP27
HSP27 (phospho-Ser82)	HSP70	HSPA8
ICOS/CD278	IGF1R	IGF1R (phospho-Tyr1135/Tyr1136)
IGFBP2	INPP4B	Insulin Receptor
IRS1	JAK2	JAK2 (phospho-Tyr1007)
JNK2	KAP1	KAT2A
Ki67	Ku70	LAG3
Lasu1/Urb1	LC3A/B	Lck
Lck (phospho-Thr505)	LCN2	LDHA
Mcl-1	MCT4	MDM2
MDM2 (phospho-Ser166)	MEK1	MEK1/2 (phospho-Ser217/Ser221)
MEK2	Merlin/NF2	METTL3
MIF	MITF	MLKL
MLST8	MMP14	Mnk1
Mre11	MSH2	MSH6
MSI2	mTOR	mTOR (phospho-Ser2448)

MUC1	Myosin IIA	NF-κB p65 (phospho-Ser536)
Notch1	Notch3	NOX2/gp91phox
N-Ras	p16/INK4A/CDKN2A	p18/INK4C/CDKN2C
p21/CIP1/CDKN1A	p27/KIP1/CDKN1B	p27/KIP1/CDKN1B (phospho-Thr198)
p38 MAPK	p38 MAPK (phospho-Thr180/Tyr182)	p53
p70S6K	p70S6K (phospho-Thr389)	PAI-1
PAI-2	PAICS	PAK4/5/6 (phospho-Ser474/602/560)
PALB2	PARP	PARP (cleaved)
Paxillin	PCNA	PD-1
PDGFR alpha	PDGFR alpha (phospho-Tyr849/Tyr857)	PDGFR beta
PDK1	PDK1 (phospho-Ser241)	PD-L1
PEA-15	PEA-15 (phospho-Ser116)	PERK
PHLPP	PI3K p110 alpha	PI3K p110 beta
PKC (pan)/beta II (phospho-Ser660)	PKC alpha	PKC alpha (phospho-Ser657)
PKC alpha/beta II (phospho-Thr638/Thr641)	PKC delta (phospho-Ser664)	PKM2
PLC-gamma1	PLC-gamma2 (phospho-Tyr759)	PLK1
PMS2	POU5F1/OCT4	PTEN
Puma	Rab11	Rab25
Rad17 (phospho-Ser645)	Rad23A	Rad50
Rad51	Rad51C	Rad51D
Rad54L	Raf1 (phospho-Ser296)	Raf1 (phospho-Ser621)
Raptor	Rb	Rb (phospho-Ser807/Ser811)
Rheb	Rictor	Rictor (phospho-Thr1135)
ROS1	RPA32	RPA32 (phospho-Ser4/Ser8)
RPS6	RPS6 (phospho-Ser235/Ser236)	RPS6 (phospho-Ser240/Ser244)
RRM2	RSK1	RSK1/RSK2/RSK3
SDHA	SDHB	SGK1
SGK3	SHP-2	SHP-2 (phospho-Tyr542)
SIRPa	SLC1A5	Smac/Diablo
Smad1	Smad3	Smad3 (phospho-Ser423/Ser425)
Smad4	Snail	SOD1
SOD2	SOX17	SOX2
SQS/FDFT1	SQSTM1/p62	Src
Src (phospho-Tyr416)	Src (phospho-Tyr527)	SRSF1
Stat3	Stat3 (phospho-Tyr705)	Stat5a
Stat5a (phospho-Ser726)	STING	Syk
Tau	TFRC	TGM2
TIGAR	TPX2	TRIM25
TSC1	TSC2	TSC2 (phospho-Thr1462)
TSG101	TTF-1	Tubulin-beta
Tyro3	ULK1 (phospho-Ser757)	VDAC1
VEGFR2	Vimentin	Vinculin
Wee1	WIPI1	WTAP

XIAP	XPA	XPF
XRCC1	YAP	YAP (phospho-Ser127)
β -Catenin	β -Catenin (phospho-Thr41/Ser45)	Zap-70

表2：肿瘤增殖、迁移与侵袭信号转导预设panel相关靶点列表

14-3-3 beta	14-3-3 epsilon	14-3-3 zeta
4E-BP1	4E-BP1 (phospho-Ser65)	4E-BP1 (phospho-Thr37/Thr46)
Akt (pan)	Akt (phospho-Ser473)	Akt (phospho-Thr308)
Akt1	Akt2	Akt3
ALIX	ALK	alpha-SMA
AMPK alpha	AMPK alpha (phospho-Thr172)	AMPK alpha2 (phospho-Ser345)
Annexin A2	Annexin I	Annexin VII
A-Raf	Axl	BAP1
BARD1	B-Raf	B-Raf (phospho-Ser445)
c-Abl	CD44	CD63
CD9	c-Jun (phospho-Ser63)	c-Jun (phospho-Ser73)
Claudin-7	c-Met	Connexin 43
C-Raf	C-Raf (phospho-Ser338)	DDR1
DUSP4	DUSP6	Dvl3
E-Cadherin	eEF2	eEF2K
EGFR	EGFR (phospho-Tyr1016)	EGFR (phospho-Tyr1068)
EGFR (phospho-Tyr1173)	eIF4E	eIF4E (phospho-Ser209)
eIF4G	EphA2	ERK1 (phospho-Thr202/Tyr204) / ERK2 (phospho-Thr185/Tyr187)
ERK1/2	ERK5	ERK5 (phospho-Thr218/Tyr220)
ERRFI1	FAK	FAK (phospho-Tyr397)
FGF basic/FGF2	Fibronectin	Gab2
GRB2	Her2/ErbB2	Her2/ErbB2 (phospho-Tyr1196)
Her2/ErbB2 (phospho-Tyr1222)	Her2/ErbB2 (phospho-Tyr1248)	HMHA1
IGF1R	IGF1R (phospho-Tyr1135/Tyr1136)	IGFBP2
KAP1	Ki67	MEK1
MEK1/2 (phospho-Ser217/Ser221)	MEK2	Merlin/NF2
MLST8	MMP14	Mnk1
MSI2	mTOR	mTOR (phospho-Ser2448)
MUC1	Myosin IIA	N-Ras
p38 MAPK	p38 MAPK (phospho-Thr180/Tyr182)	p70S6K
p70S6K (phospho-Thr389)	PAI-1	PAI-2
PAK4/5/6 (phospho-Ser474/602/560)	Paxillin	PCNA
PDGFR alpha	PDGFR alpha (phospho-Tyr849/Tyr857)	PDGFR beta
PK1	PK1 (phospho-Ser241)	PEA-15
PEA-15 (phospho-Ser116)	PHLPP	PI3K p110 alpha
PI3K p110 beta	PKC (pan)/beta II (phospho-Ser660)	PKC alpha

PKC alpha (phospho-Ser657)	PKC alpha/beta II (phospho-Thr638/Thr641)	PKC delta (phospho-Ser664)
PLC-gamma1	PLC-gamma2 (phospho-Tyr759)	PTEN
Rab11	Rab25	Raf1 (phospho-Ser621)
Raptor	Rheb	Rictor
Rictor (phospho-Thr1135)	ROS1	RPS6
RPS6 (phospho-Ser235/Ser236)	RPS6 (phospho-Ser240/Ser244)	RRM2
RSK1	RSK1/RSK2/RSK3	SGK1
SGK3	Src	Src (phospho-Tyr416)
Src (phospho-Tyr527)	TPX2	TSC1
TSC2	TSC2 (phospho-Thr1462)	TSG101
Tyro3	VEGFR2	Vimentin
Vinculin		

表3：表观遗传与转录调控预设panel相关靶点列表

ALKBH5	Androgen Receptor	ARID1A
BRD4	CHD1L	c-Jun (phospho-Ser63)
c-Jun (phospho-Ser73)	c-Myc	Coup-TFII
CREB1	CtIP	DNMT1
E2F1	Estrogen Receptor alpha	Estrogen Receptor alpha (phospho-Ser118)
Ets-1	EVI1	FOXO1
FOXO3a	FOXO3a (phospho-Ser318/Ser321)	FTO
GATA3	GCN5L2	HES1
Histone H2B-Ubiquitinated	Histone H3	Histone H3-K4-Dimethylated
Histone H3-K9-Dimethylated	HNRNPK	KAT2A
METTL3	MITF	NF-κB p65 (phospho-Ser536)
Notch1	Notch3	p53
POU5F1/OCT4	Rb	Rb (phospho-Ser807/Ser811)
Smad1	Smad3	Smad3 (phospho-Ser423/Ser425)
Smad4	Snail	Sox17
Sox2	SRSF1	TTF-1
WTAP	YAP	YAP (phospho-Ser127)
β-Catenin	β-Catenin (phospho-Thr41/Ser45)	

表4：细胞代谢调节预设panel相关靶点列表

4E-BP1	4E-BP1 (phospho-Ser65)	4E-BP1 (phospho-Thr37/Thr46)
ACC1	ACC1 (phospho-Ser79)	AceCS1
ACSL1	Akt (phospho-Ser473)	Akt (phospho-Thr308)
Akt1	Akt2	Akt3
Akt (pan)	AMPK alpha	AMPK alpha (phospho-Thr172)

AMPK alpha2 (phospho-Ser345)	AMPK beta1	ASNS
COX IV	CREB1	DRP1
Enolase-2	FASN	FoxO3a
FoxO3a (phospho-Ser318/Ser321)	G6PD	GAPDH
GCLM	GLUD1	GLS
Glycogen synthase (phospho-Ser641)	GSK-3 alpha/beta	GSK-3 alpha/beta (phospho-Ser21/Ser9)
GSK-3 beta	GSK-3 beta (phospho-Ser9)	GYS1
Hexokinase-II	Hexokinase-I	Insulin Receptor
IRS1	LDHA	MCT4
MLST8	mTOR	mTOR (phospho-Ser2448)
p70S6K	p70S6K (phospho-Thr389)	PAICS
PDK1	PDK1 (phospho-Ser241)	PI3K p110 alpha
PI3K p110 beta	PKM2	PTEN
Raptor	Rheb	Rictor
Rictor (phospho-Thr1135)	SDHA	SDHB
SLC1A5	SQS/FDFT1	TGM2
TIGAR	TSC1	TSC2
TSC2 (phospho-Thr1462)		

表5：细胞应激与细胞死亡预设panel相关靶点列表

AMPK alpha	AMPK alpha (phospho-Thr172)	AMPK alpha2 (phospho-Ser345)
ATG3	ATG4B	ATG5
ATG7	Bad (phospho-S112)	Bak
Bax	Bcl-2	Bcl-xL
Beclin-1	Bid	Bim
Caspase-1	Caspase-3 (cleaved)	Caspase-6
Caspase-7 (cleaved)	Caspase-8	Cyclooxygenase-2 (COX-2)
Cyclophilin F	FANCD2	Fas
GABARAP	GPX4	HSP27
HSP27 (phospho-Ser82)	HSP70	HSPA8
JNK2	LC3A/B	Mcl-1
MLKL	NOX2/gp91phox	p38 MAPK
p38 MAPK (phospho-Thr180/Tyr182)	p53	PARP (cleaved)
PERK	Puma	Smac/Diablo
SOD1	SOD2	SQSTM1/p62
TFRC	ULK1 (phospho-S757)	VDAC1
WIPI1	XIAP	

表6: DNA损伤与细胞周期预设panel相关靶点列表

APEX1	ATM	ATM (phospho-Ser1981)
ATR	ATR (phospho-Ser428)	AURKA
AURKA (phospho-Thr288)	AURKB	BAP1
BARD1	BRCA1	BRCA2
BRIP1	Cdc42	Cdc6
CDK1	CDK1 (phospho-Tyr15)	CDK2
CDK5	CDK9	CDT1
CENP-A	Chk1	Chk1 (phospho-Ser296)
Chk1 (phospho-Ser345)	Chk2	Chk2 (phospho-Thr68)
Cyclin A2	Cyclin B1	Cyclin D1
Cyclin D3	Cyclin E1	Cyclin H
DDB1	DDB2	DNA ligase 4
DNA polymerase gamma	E2F1	ERCC1
ERCC5	FANCD2	FEN1
H2AX (phospho-Ser140)	Ku70	KAP1
Lasu1/Urb1	MDM2	MDM2 (phospho-Ser166)
Mre11	MSH2	MSH6
p16/INK4A/CDKN2A	p18/INK4C/CDKN2C	p21/CIP1/CDKN1A
p27/KIP1/CDKN1B	p27/KIP1/CDKN1B (phospho-Thr198)	p53
PALB2	PARP	PLK1
PMS2	Rad17 (phospho-Ser645)	Rad23A
Rad50	Rad51	Rad51C
Rad51D	Rad54L	Rb
Rb (phospho-Ser807/Ser811)	RPA32	RPA32 (phospho-Ser4/Ser8)
RRM2	TPX2	Wee1
XPA	XPF	XRCC1

表7: 免疫调节预设panel相关靶点列表

B7-H4	CD127/IL7R	CD134/OX40
CD14	CD20	CD26
CD3E	CD49b	CD5
CD55	CD63	CD86
c-Jun (phospho-Ser63)	c-Jun (phospho-Ser73)	HLA-DR/DP/DQ/DX
ICOS/CD278	JAK2	JAK2 (phospho-Tyr1007)
JNK2	LAG3	Lck
Lck (phospho-Thr505)	LCN2	MIF
MLKL	NF-κB p65 (phospho-Ser536)	p38 MAPK
p38 MAPK (phospho-Thr180/Tyr182)	PD-1	PD-L1
SHP-2	SHP-2 (phospho-Tyr542)	SIRPa
Stat3	Stat3 (phospho-Tyr705)	Stat5a
Stat5a (phospho-Ser726)	STING	Syk
TRIM25	Zap-70	

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关于非因

非因生物是以新型癌症蛋白组学和空间多组学为核心技术的、以癌症精准医学研究，转化医学与临床服务为核心业务的创新型生物技术公司。

非因生物传承 MD 安德森癌症中心的价值和理念，建设了以癌症精准医疗领域国际先驱 Gordon B. Mills 博士命名的 Mills 癌症个体化诊疗研究中心 (Mills Institute for Personalized Cancer Care, MIPCC)，以多种新型蛋白组学和空间多组学技术为核心，在癌症的基础研究、转化医学、临床研究、药物开发、临床诊疗等各方面开展自主及合作研究，并提供全方位高水准的科研及临床服务。

非因生物拥有多项全国唯一、全球领先的核心技术平台，包括 RPPA (Reverse Phase Protein Array) 反相蛋白微阵列技术，DSP (Digital Spatial Profiler) 数字空间多组学分析技术，单细胞空间组学技术，以及超灵敏度 PWG (Planar Wave Guide) 微阵列检测技术。

非因生物以技术为本，致力于打造中国最前沿的新型蛋白组学和空间多组学高端技术平台，为广大科研工作者提供最优质的新型多组学技术服务，推动癌症转化医学研究和癌症个体化诊疗。

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