KAM-900P

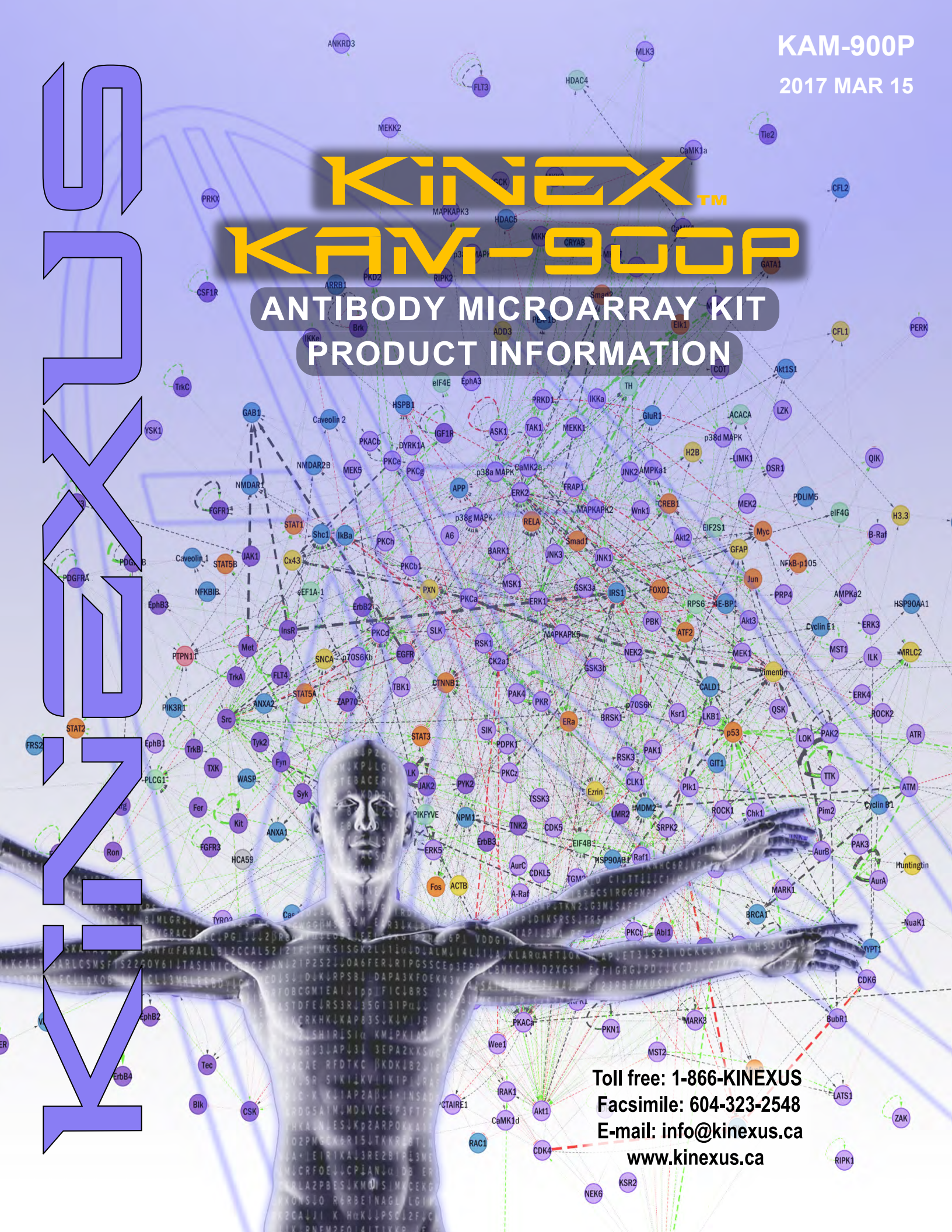
2017 MAR 15

KINEXUS

KINEX™ KAM-900P

ANTIBODY MICROARRAY KIT

PRODUCT INFORMATION



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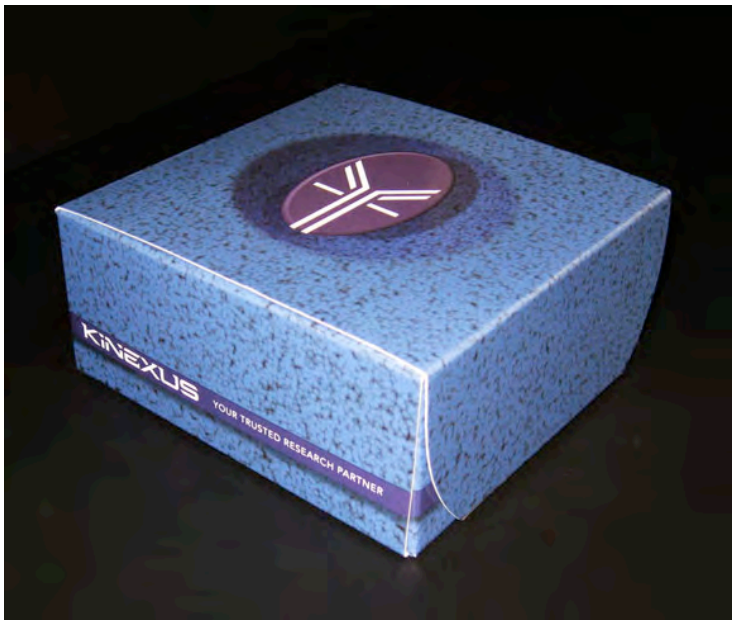


Figure 1. A Kinex™ KAM-900P Antibody Microarray Kit Box

1. INTRODUCTION

Our Kinex™ KAM-900P Antibody Microarray Kits provide alternatives to our Kinex™ KAM Services for clients to perform screening of their cell and tissue lyates in their own laboratories with our high content antibody microarrays that feature 878 pan- and phosphosite-specific antibodies. While our Kinex™ signal transduction protein profiling services are convenient and very cost-effective solutions to assist scientists in the broad discovery of productive research leads such as biomarkers, it can be cost prohibitive to ship frozen samples to Kinexus from overseas. The availability of the KAM-900P Kits allows clients access to our unique antibody microarrays to track the differential binding of tag-labeled proteins in lysates prepared from cells and tissues including cells, fresh or frozen tissues and serum samples. The results can provide novel and useful insights into differences in protein expression, phosphorylation and protein-protein interactions, and define antibody reagents that can be used to follow up on these findings with other immunological-based methods such as Western blotting, immunoprecipitation, ELISA and immunohistochemistry. Our integrated platform of well estabished proteomics and bioinformatics services and proprietary technologies make the Kinex™ KAM antibody microarrays superior to any other commercially available antibody microarrays. Some of the advantages of our antibody microarray kits include highly validated and well characterized antibody probes, wide coverage of cell signalling proteins and pathways, extensive follow-up services for validation, and complementary bioinformatics analyses for comparison purposes. In this instruction manual, we explain how the KAM-900P antibody microarrays perform and how to use them the most effectively to advance your research programs. Kinexus has performed over 3000 antibody microarray analyses for our clients,

and the current KAM-900P antibody microarray is the culmination of continuous product research and development and refinements over the last 8 years.

2. HIGHLY VALIDATED ANTIBODIES

Presently, Kinexus offers two different Kinex™ KAM Antibody Microarray Kits that utilize complementary antibody microarray chips. The KAM-900P antibody microarray features 613 phosphosite-specific antibodies (for phosphorylation) and 265 pan-specific antibodies (for expression levels of these phosphoproteins). The KAM-1100E antibody microarray uses over 1100 pan-specific antibodies. When used together, the KAM-900P and KAM-1100E chips permit screening of cell and tissue lysates with over 1700 non-redundant antibodies.

These antibodies, which have been selected from more than 6000 different commercial antibodies from over 26 companies, have been independently tested in-house by Kinexus to identify many of the best immunological reagents available today to track important signal transduction proteins. The top 15% of these antibodies that performed well in Western blotting applications have been incorporated into our Kinex™ Antibody Microarrays. In addition, Kinexus has produced its own panel of well characterized cell signalling antibodies, many of which are incorporated into the KAM-900P and KAM-1100E series antibody microarrays. Such cherry-picking is apparently not performed by other microarray companies, which rely only on one or two suppliers with dubious information about individual antibody performance. When our clients utlize the KAM-900P antibody microarrays, upon request, we are pleased to disclose the commercial sources and in many cases, these antibodies are available directly from Kinexus at very affordable prices. Immunoblots with the antibodies sold by Kinexus are available for easy viewing on our website. A complete listing of all the antibodies printed on the KAM-900P chip in MS-Excel format is downloadable from the Kinexus website and included at the end of this manual. In particular, at least 246 unique protein kinases are targeted with these antibodies. The classes of targeted proteins and phosphosites on the KAM-900P antibody microarrays are listed in Table 1 below. The antibodies in our microarrays have been optimized to work in human, mouse and rat model systems, but have also been shown commonly to work in chicken, bovine, porcine, canine, rabbit, frog, sea star and many other diverse model systems.

Table 1. Families of protein targets for the KAM-900P antibody microarray slides. These statistics may be slightly altered in future print runs of these microarray chips.

KAM-900P Content	Total %	Total Number
Total number of pan-specific antibodies:	30%	265
Total number of phospho-specific antibodies:	70%	613
Total Number of Antibodies	**100%**	**878**
Total number of protein kinase pan-specific antibodies:	25%	219
Total number of protein kinase phosphosite-specific antibodies:	50%	443
Total number of protein phosphatase pan-specific antibodies:	0.2%	2
Total number of protein phosphatase phosphosite-specific antibodies:	0.7%	6
Total number of transcription factor pan-specific antibodies:	1.7%	15
Total number of transcription factor phosphosite-specific antibodies:	4%	37

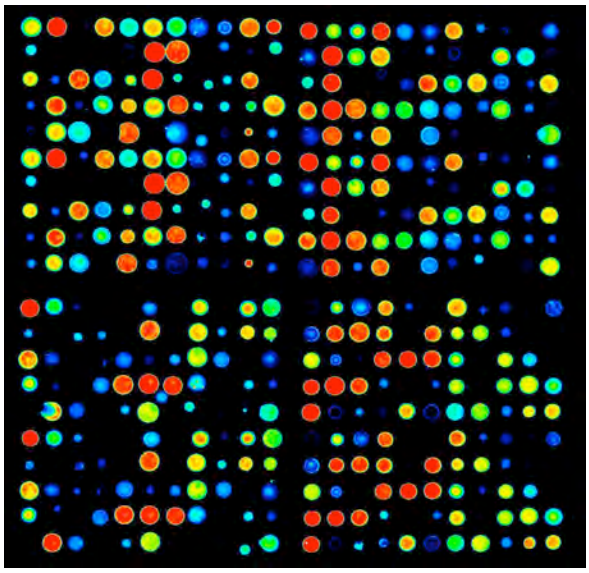
3. QUALITY CONTROL PROCEDURES

Our antibodies are pin-printed and covalently immobilized on a high quality glass surface coated with a proprietary 3-D polymer material to ensure high binding efficiency and specificity. Our microarrays are subjected to stringent quality control measures designed to ensure optimum antibody activity, printing consistency, and consistent intra-slide and inter-slide variability. The printing of individual antibodies on our microarrays is validated by probing with dye-labeled anti-rabbit, anti-mouse and anti-goat secondard antibodies. Each microarray also has loading and antibody controls to ensure the amount of deposited protein is consistent on all fields. The KAM-900P antibody microarrays provide for semi-quantitative analyses of the expression and/or phosphorylation states of cell signalling proteins in two samples. The quantitative analysis of the strength of the fluorescence signals for each captured target protein is based on duplicate measurements. We also employ a normalization step to take into account any minor differences in protein loading on to our microarrays.

If clients wish to take advantage of our KAM Microarray Quantitation and Report Service, we provide a Microsoft Excel spreadsheet and include the (average) percent change from the control sample, the percent range in error measurement, and Z-ratios that can be used to determine which target proteins to follow up with as well as a Kinections Pathway Map analysis feature. In internal studies with our KAM-900P series antibody microarrays without chemical cleavage, we determined that the median spread between duplicate measurements with the same antibody in printed pairs was about 24% (i.e. the median range from the average of the duplicates was ±12% with a standard deviation of 2.0% from testing of 12 fields of 878 antibody pairs per field). With chemical cleavage, we determined that the median spread between duplicate measurements with the same antibody in printed pairs was about 30% (i.e. the median range from the average of the duplicates was ±15% with a standard deviation of 2.0% from testing of 54 fields of 877 antibody pairs per field). The frequency of flagged antibody spots dues to dust or mis-printing is less than 2%. When the average of duplicate measurements of antibody pairs on each chip was determined for the same sample applied to different KAM Antibody Microarrays, we observed that the median value for the differences in the averages was ±8.1% with a standard deviation of 0.6% from testing of 4 pairs of fields. The dynamic range between the highest and lowest reproducible fluorescent dye-signals of captured lsate proteins from these Kinex™ chips can be over 10,000-fold.

We strongly believe that our KAM-900P series antibody microarrays are the best commercial high content antibody array that is available in the market place today for tracking specific protein phosphorylation. The performance of our Kinex™ KAM chips exceeded the other leading antibody microarrays from at least three other companies when tested side-by-side in our hands. In fact, most of our competitors, including Thermo-Fisher, Becton Dickinson, Clontech and Sigma-Aldrich have since discontinued offering their antibody microarray products.

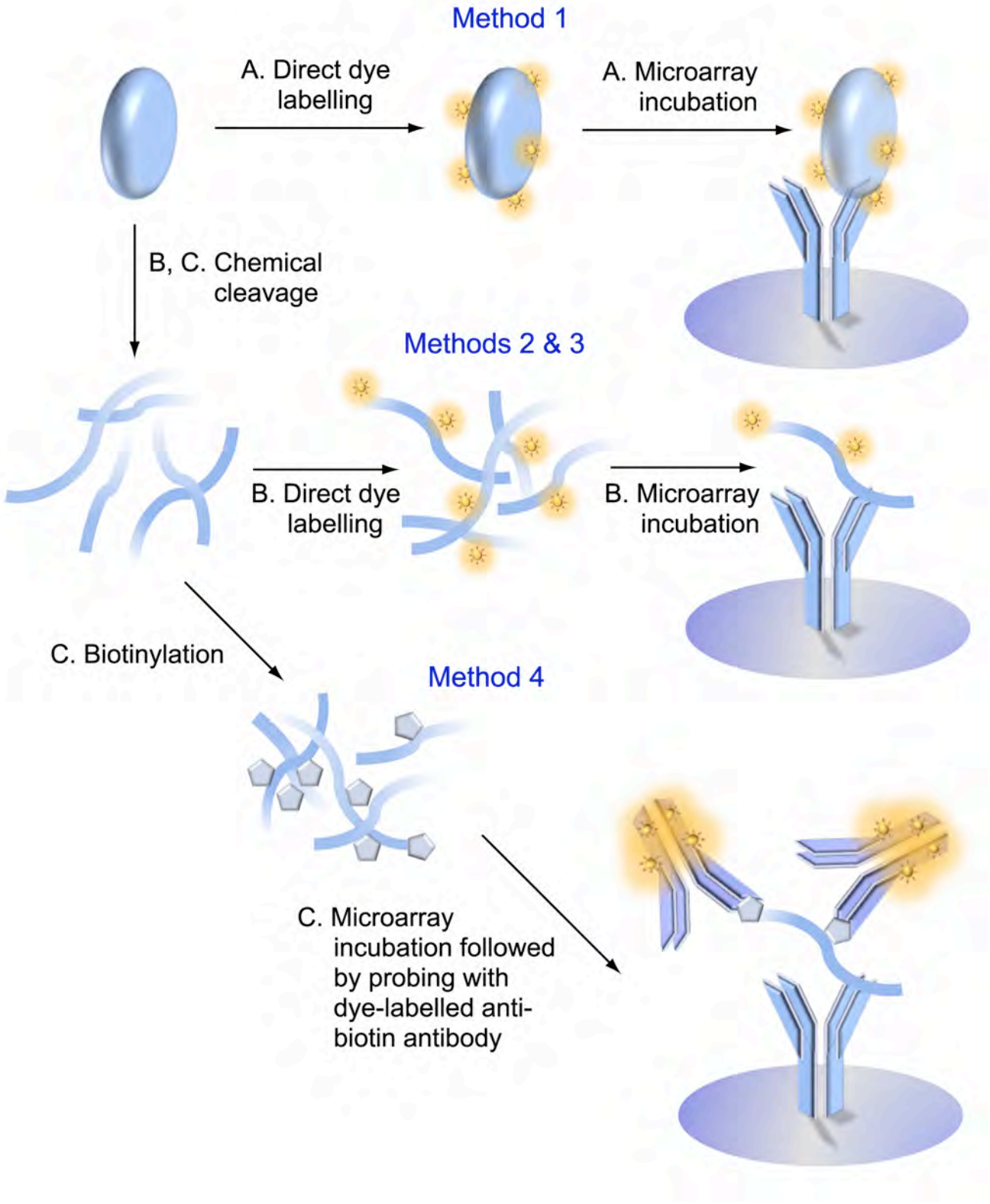
Figure 2. Close up scanned image of 4 of 32 grids that are divided into two fields on a Kinex™ KAM antibody microarray chip incubated with dye-labeled lysate proteins. Decreasing signal intensity corresponds with a red to orange to yellow to green to blue transition.



4. PRINCIPLES OF BINDING AND DETECTION

There are several different methodologies that can be used with Kinex™ KAM antibody microarrays, and these are outlined in Figure 3. **Method 1** involves the direct labelling of lysate proteins with a fluorescent dye and then incubation of the tagged proteins with the microarray for their immunocapture. Unbound lysate proteins are washed away and the microarray slide is scanned for the fluorescent signals associated with each antibody spot. A disadvantage of this approach is that proteins often reside in complexes, and the dye signal associated with an antibody spot may arise from different proteins. **Methods 2** and **3**, both involve fragmentation of the lysate proteins by chemical cleavage at cysteine (CCC) residues using Tris (2-carboxyethyl) phosphine hydrochloride (TCEP) and 2-Nitro-5-thiocyanatobenzoic acid (NTCB). The CCC treatment dissociates protein complexes, and abolishes the activities of kinases, phosphatases, proteases and other enzymes, resulting in more stable peptide samples and preservation of protein phosphorylation. With **Method 2**, CCC treatment is performed at the time of homogenization of cells and tissues, whereas with **Method 3**, CCC is carried out at a later date, but also prior to labelling of the lysate proteins with a fluorescent dye. With **Method 4**, CCC occurs at the time of homogenization, but the lysate proteins are subsequently biotinylated rather than directly dye labeled. After capture of the biotinylated proteins on the microarray, the array is then probed with a dye-labeled anti-biotin antibody. **Method 4** provides the lowest background signals and greatest dynamic range for detection of lysate proteins on the KAM-900P slide, and it is our recommended procedure for the best results with this microarray for tracking changes in protein phosphorylation and expression with higher accuracy.

Figure 3. Methodologies used in Kinex™ KAM Antibody Microarray.



5. PROPRIETARY DYE COMBINATIONS

One key advantage of our antibody microarrays is that lysate samples from control and treated cells are labeled with the same dyes and analyzed together on the same chip at the same time. These dyes are included with the Kinex™ KAM antibody microarray kits. In our experience, the use of a two dye, competitive binding system, in which a control sample is labeled with a different dye from the treatment sample and the two samples are mixed and co-incubated with the same regions of the same chips, generates a higher rate of false leads. Unlike oligonucleotides such as DNA and RNA, proteins display strong individual differences in their relative affinities for dyes. It should be appreciated that this problem also significantly impacts other proteomics approaches such as DIGE 2D gel analysis where two samples that are labeled with different dyes are mixed prior to electrophoresis. Colour changes seen with spots evident on a DIGE 2D gel may not be related to differences in protein expression but rather dye binding to individual protein species. Clients should also be aware that cell signalling proteins are typically present at concentrations that are 100- to 1,000-fold lower than structural proteins and metabolic pathway enzymes. Consequently, these low abundance proteins are usually not evident on 2D gels without some type of special pre-enrichment. This is why we feel that antibody-based detection of proteins with our Kinex™ KAM antibody microarrays and our follow-up Kinetworks™ Custom Screens are superior and complementary methods to undertake broad studies of proteins for signalling network analyses. We use the dye combinations both with direct dye labelling of the lysate proteins as with **Methods 1, 2** and **3**, or for dye labelling of the anti-biotin antibody used in **Method 4**.

6. FALSE POSITIVES & FALSE NEGATIVES

Since non-denatured proteins are commonly analyzed by **Method 1**, as illustrated in Figure 3, there is increased opportunity for false positives and false negatives due to antibody cross-reactivity and blocked epitopes in protein complexes. Many proteins reside in complexes with other proteins and antibodies, and as it is normally necessary to use non-denaturing conditions with antibody microarrays, many apparent changes in protein expressions or phosphorylations may arise from alterations in protein-protein interactions. In our internal studies with cells from different cells, tissues and species, only between 30 to 45% of the protein changes detected on a protein microarray were reproduced by immunoblotting. In addition, about 20 to 30% of the protein changes could not be validated by immunoblotting, because no detectable immunoreactive proteins were evident in these studies as the antibody microarray appears to be about 10-fold or more sensitive than standard Western blotting. It should be appreciated that this high rate of false positives is an inherent problem with all commercial antibody microarrays due to the reliance on non-denaturing conditions for immune capture of target proteins. To help reduce the number of false positives that are typically generated on a protein microarray, we have developed a chemical digestion step in which native proteins are cleaved into larger fragments by chemical cleavage at cysteine residues (CCC) with TCEP and NTBC. This fragmentation leads to dissociation of complexes, but does not destroy most of the epitopes recognized by phosphosite-antibodies. Typical enzymatic cleavage of proteins with proteases such as trypsin causes the loss of most phosphosite epitopes, since basic amino acids commonly surround phosphoserine and phosphothreonine sites. Furthermore, the chemical cleavage step permits more even dye-labelling of the target protein fragments that is much less reflective of the initial size of these proteins, which can vary by more than 10-fold. This chemical digestion step is an option to reduce the number of false positives for clients that are less interested in tracking protein-protein interactions changes in experimental model systems. We recommend that the

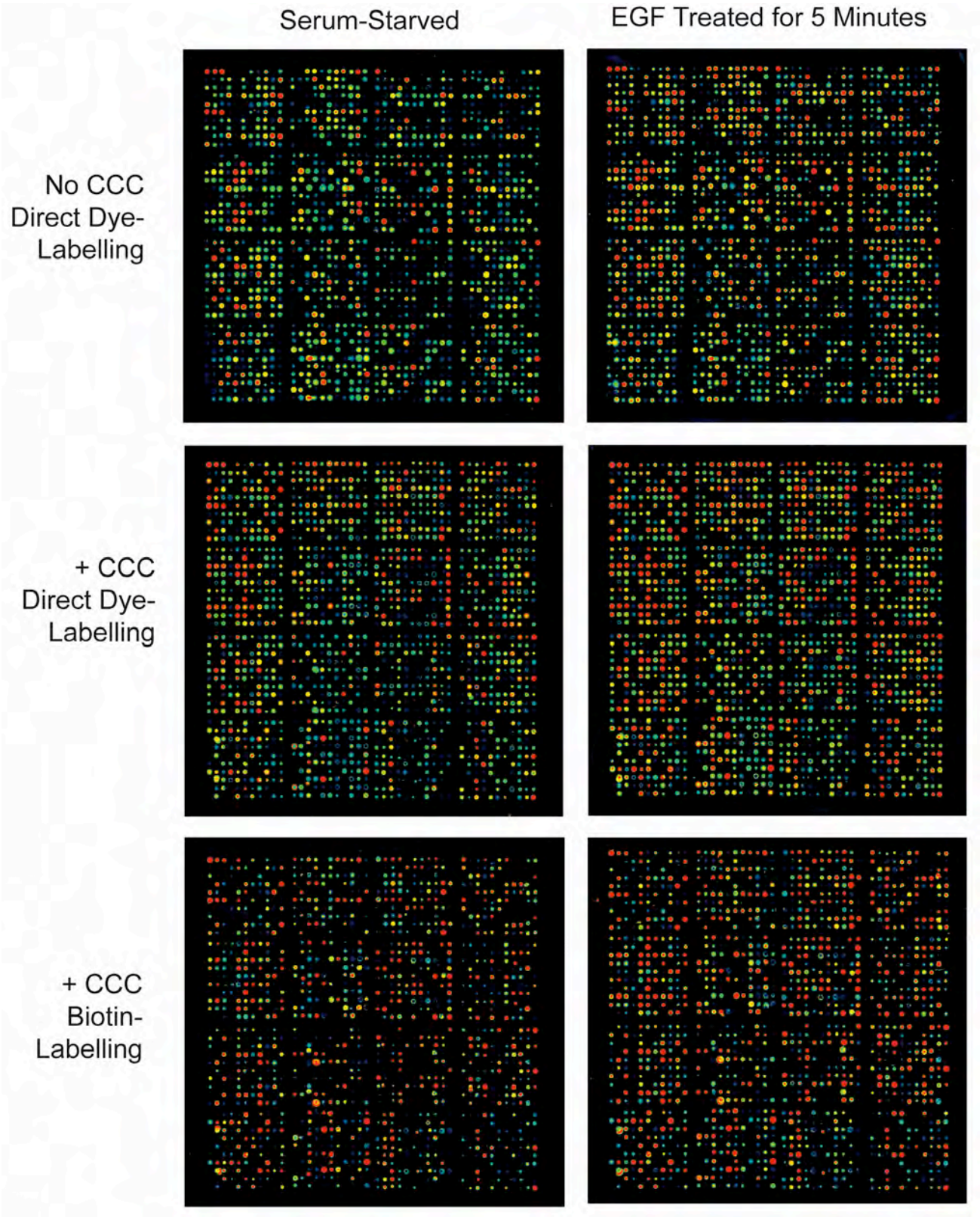
protein-labelling step is carried with fluorescent dye or biotin after the CCC step, which is ideally performed at the time of homogenization. The TCEP and NTBC reagents for this chemical cleavage step are provided with the KAM Kit when they are specifically ordered, as many users may wish to also observe changes in protein-protein interactions in lysate samples from specimens from humans and animals. We have determined that following the CCC step, the fragmented peptides in lysates are very stable at ambient temperate for over 2 weeks, and yield similar results to lysates that are immediately subjected to KAM-900P analyses. Figure 3 shows how the intensity of fluorescently tagged proteins captured on the KAM-900P are affected by the CCC step, and the use of biotin-labelling of lysate proteins instead of direct dye-labelling. Table 2 summarizes the differences in results in the analysis of lysates from growth factor-treated cells analyzed with and without the chemical cleavage step.

To provide a sense of the typical performance of individual antibodies on the Kinex™ KAM-900P antibody microarrays and enable comparison of the specific results obtained with a tested customer cell/tissue lysate, our Analysis Report also includes summary data obtained from the analyses of many other different cell or tissue lysates samples with chemical cleavage. This includes the minimum, maximum, average, median and standard deviation values of the globally normalized signal intensities across these other studies. It also indicates which antibodies printed on the KAM-900P chips can be ordered directly from Kinexus for follow up to experimentally validate key leads from the antibody microarray analyses.

Table 2. Effect of chemical cleavage on the detection of protein changes on the KAM antibody microarray using dye-labelled lysate proteins from epidermal growth factor-treated A431 cells. Overnight, serum-starved A431 cells were treated with and without 100 nM EGF for 5 minutes prior to preparation of cell lysates. The lysates were dye-labeled either without or with prior chemical cleavage at cysteine (CCC). Note that in this study, the dye-labelling step was done first, and the chemical cleavage was subsequently performed afterward. However, we recommend that CCC is carried out first. In the Table 2, the data is restricted to those antibodies that yielded Intensity signals that were greater than 300. With chemical cleavage, the Median Intensity signal for the antibody spots was reduced by 80% to 1149. Without chemical cleavage, the Median Intensity signal was 5843. Based on the data below, which represent the averaged results from three separate experiments, we conclude that chemical cleavage step shows more marked changes with EGF treatment and even improves the detection signals with some antibodies. While chemical cleavage produced a marked decline in the Intensity signals (based on Median values), the signal strength was still very high.

Effect of EGF	# Ab with ≥ 100% increase	# Ab with ≥ 50% increase	# Ab with ≥ 50% decrease	# Ab with ≥ 75% decrease
Without CC	44	92	31	1
With CC	48	142	11	0

Figure 4. Scanned images of Kinex™ KAM-900P antibody microarrays following incubation with dye-labeled (top four panels) or biotin-labelled (bottom two panels) lysate proteins from serum-starved A431 human cervical carcinoma cells treated without (left panels) and with 100 nM epidermal growth factor for 5 minutes (right panels). Top panels – no chemical cleavage; Middle and bottom panels – cysteine chemical cleavage (CCC) was performed at the time of homogenization of of the cells.



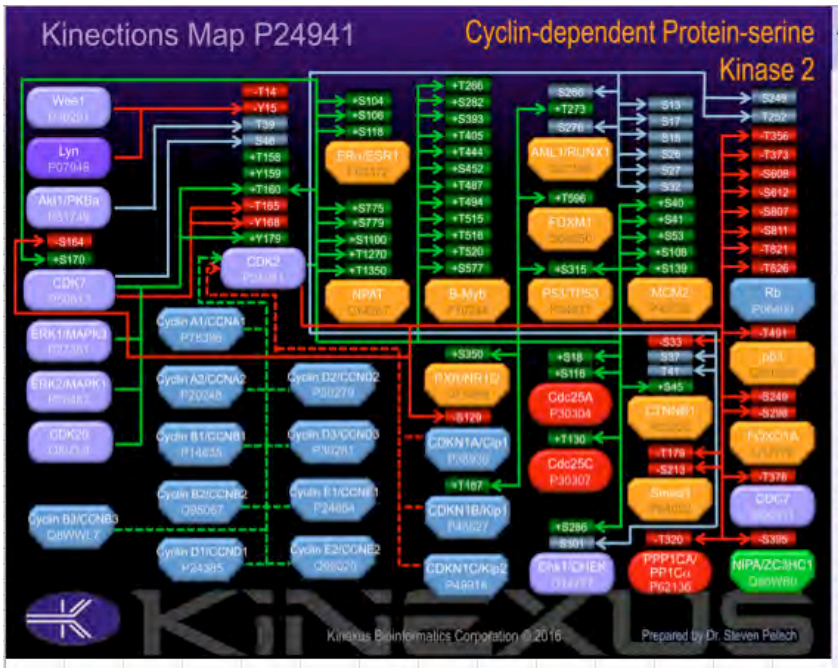
7. COMPLIMENTARY MICROARRAY SCANNING

Clients must be able to scan the KAM Antibody Microarray with captured dye-bound lysate proteins to quantify the levels of these proteins and their phosphorylation status in their cell and tissue samples. If suitable microarray scanners are not available, clients have the option of shipping their chips back to Kinexus for complimentary scanning. The processed KAM Antibody Microarray should be couriered back in the same plastic microarray storage tube in which it was packaged as this provides additional protection to the chip. Refrigeration or freezing of the chip is unnecessary for shipping. Clients must arrange and pay for the courier costs for delivery to Kinexus in Vancouver, B.C., Canada. Tiff or JPEG images of the scanned chip will be returned to the client by email.

8. KAM-900P ANTIBODY MICROARRAY REPORTS

Kinex™ KAM services permit our clients to move from “pixels” to “pathways”. If clients want Kinexus to quantify the intensities of dye-bound proteins captured on the KAM Antibody Microarray, we offer a supporting service in which we use our proprietary software to average the intensities recorded for each pair of antibody spots to calculate the differences between the control and treated lysate samples. This includes calculations of Z scores, percent changes from control (%CFC), and the Kinections Pathway Mapping features. This permits the identification of the most promising biomarkers for further validation by immunoblotting. The Kinections Pathway Maps provides direct linkage of subsets of the KAM microarray results with over 200 local signalling network maps for many of the proteins and phosphosites tracked on the KAM microarray. The Report is in PDF and MS-Excel formats and is returned back to clients within a 10 day turnaround by email. The Kinections Maps may also be freely downloaded in MS PowerPoint format from the www.kinasenet.ca and the www.phosphonet.ca websites. In the MS PowerPoint, these pathways can be custom tailored for the specific needs of the users. The cost of the analysis service to compare one control and one experimental sample is US$329. A copy of the KAM-900P Service Order Form (KAM-900P-AR-SOF) is provided on Page 31. A MS-Word Fillable KAM-900P Service Order Form is downloadable from the Kinexus website at http://www.kinexus.ca/ourServices/microarrays/antibody_microarrays/antibody_microarrays.html . Additional costs may apply if extra comparisons are requested across multiple microarrays. Figure 5 shows an example of one worksheet from a Kinections Map Workbook analysis.

Figure 5. Scanned image of a Kinections Map analysis worksheet from the MS-Excel workbook that is part of the KAM-900P antibody microarray reports that are provided to clients. In this example, the Kinections Map for CDK2 is shown along with the accompanying data from the KAM-900P analysis of EGF treated A431 cells for the proteins featured on this map. Over 200 Kinections Maps are generated with each report.



Antibody Codes	Protein Target Name	Phospho Site (Human)	Globally Normalized - A431 Ctrl	Globally Normalized - EGF	%CFC (EGF from A431 Ctrl)	Primary Map
NK129	Akt1 (PKBa)	Pan-specific	8001	11464	43	
NK129-3	Akt1 (PKBa)	Pan-specific	5044	7249	44	
PK515	Akt1 (PKBa)	T308	1539	1580	3	
PK516	Akt1 (PKBa)	Y315	192	223	16	
PK517	Akt1 (PKBa)	Y326	216	308	44	
PK148	Akt1 (PKBa)	Y474	3448	6057	76	
PN166	Catenin b	S33	1024	1166	14	
PN167	Catenin b	Y333	1068	910	-14	
NN021	Catenin b1	Pan-specific	4015	4467	11	
NN021-1	Catenin b1	Pan-specific	2303	2872	25	
NK026-5	CDK2	Pan-specific	2822	2078	-26	• •
NK026-6	CDK2	Pan-specific	4877	6044	24	• •
PK568	CDK2	T160	672	1054	57	• •
NK030-1	CDK7	Pan-specific	475	748	58	• •
NK030-2	CDK7	Pan-specific	1774	3018	70	• •
PK573	CDK7	T170	21402	10545	-51	• •
NK034	Chk1 (CHEK1)	Pan-specific	2185	2490	14	• •
NK034-2	Chk1 (CHEK1)	Pan-specific	6863	5879	-14	• •
PK162	Chk1 (CHEK1)	S280	1263	522	-59	• •
PK577	Chk1 (CHEK1)	S280	13701	5819	-58	• •
PK578	Chk1 (CHEK1)	S317	4206	2534	-40	• •
PK579	Chk1 (CHEK1)	S345	1758	1258	-28	• •
NN029	Cyclin B1 (CCNB1)	Pan-specific	1582	1222	-23	
PN190	Cyclin B1 (CCNB1)	S147	1672	2373	42	
NN031	Cyclin E1 (CCNE1)	Pan-specific	4567	4496	-2	
PN191	Cyclin E1 (CCNE1)	T395	1299	1565	20	
PN198	ER-alpha	S104	2787	2470	-11	
NK055-6	ERK1 (MAPK3)	Pan-specific	19	29	50	• •
NK055-3	ERK1 (MAPK3)	Pan-specific	18085	18605	3	• •
NK055-1	ERK1 (MAPK3)	Pan-specific	43056	48706	13	• •
PK170	ERK1 (MAPK3)	T202	1111	965	-13	• •
PK621	ERK1 (MAPK3)	T202+Y204	1038	967	-7	• •
PK865	ERK1 (MAPK3)	T207	1166	1190	2	• •
PK864	ERK1 (MAPK3)	Y204	398	386	-3	• •
PK168	ERK1 (MAPK3)	Y204	853	1033	21	• •
PK866	ERK1 (MAPK3)	Y204+T207	485	480	-1	• •
NK056-2	ERK2 (MAPK1)	Pan-specific	2443	3184	30	• •
NK056-4	ERK2 (MAPK1)	Pan-specific	27007	32634	21	• •
PK622	ERK2 (MAPK1)	T185+Y187	5341	5447	2	• •
PN194	FKHR	S256	1008	1326	31	
PN195	FKHR	S319	826	1252	51	
NK095	Lyn	Pan-specific	1204	1363	13	• •
PK688	Lyn	Y508	3370	3486	3	• •
NN082	p53	Pan-specific	2158	1952	-10	
PN158	p53	S33	759	295	-61	
PN159	p53	S37	2837	1821	-36	
PN057-2	p53	S392	1476	657	-55	
PN160	p53	S6	3203	1455	-55	
NN093	Rb	Pan-specific	925	1062	15	
PN066	Rb	S612	4642	6800	46	
PN067	Rb	S780	481	960	94	
PN131-1	Rb	S795	1145	849	-26	
PN068	Rb	S807	452	418	-8	
PN065	Rb	T356	4999	7237	45	
PN070	Rb	T821	14961	6223	-58	
PN071	Rb	T826	8402	7465	-11	
NK185	Wee1	Pan-specific	4924	6521	32	
PK854	Wee1	S642	351	1357	286	

Kinexus also offers our custom KiNetscape Network Mapping service to connect the leads from our Kinex™ KAM-900P analyses into protein phosphorylation network maps. We have produced a database of over 11,000 experimentally confirmed kinase-substrate relationships (KSR's), for which a specific protein kinase phosphorylates a specific phosphosite in a substrate protein in a KSR. For most of these KSR's, the functional consequence of the phosphorylation is known or highly predictable. These KSR's are available for viewing in the KinaseNET (www.kinasenet.ca) website. For those KSR entries from the KinaseNET database where the effects of a treatment on cells or animals generate significant changes from the antibody microarray analyses, we use the Cytoscape 3.4 program (The Cytoscape Consortium) with our customized settings to rapidly create publishable phosphorylation network maps. Figure 6 shows an example of a portion of a qualitative KiNetscape map. Custom qualitative KiNetscape maps are priced at US$225 each, whereas quantitative maps cost US$275 each. Figure 7 shows the the same portion of the map in Figure 6 in the quantitative KiNetscape map format. A range of colour schemes are available with this graphics service. Clients should complete a KiNetscape Mapping Service Order Form (KNSM-SOF), which is provided on Page 32, if they wish to utilize this service.

Figure 6. KiNetscape qualitative representation of the key EGF-induced changes in protein expression or phosphorylation from a Kinex™ KAM-900P antibody microarray analyses of the lysates from serum-starved A431 cells that were treated without or with 100 ng/ml EGF for 5 minutes. Lysates were prepared by directly homogenizing the cells into CCC buffer and subsequently biotinylated (**Method 4**). Relevant kinase-substrate relationships were imported into the Cytoscape 3.4 program (The Cytoscape Consortium). With this style of protein signalling map, protein kinases are represented with circular icons and other proteins with rounded box icons (nodes). Activating phosphorylation events are shown with green dotted lines and arrows, inhibitory phosphorylations with red dotted lines and phosphorylations with undefined effects with grey dotted lines (edges). Proteins that showed increased expression changes greater than 45% are coloured orange, but appear blue if there was decreased expression greater than 45%. Protein expression changes less than 45% are not identified and these protein icons are coloured purple. If the phosphorylation of a site on a protein was induced more than 45%, then the text for this phosphosite is coloured orange. If its phosphorylation was reduced more than 45% in response to EGF, the text is colored blue. Changes in phosphorylation less than 45% are not indicated and the text for these phosphosites appears grey. The appearance of a positive or negative sign in front of the phosphorylation site text shows if the site is known to be stimulatory or inhibitory, respectively. A portion of the full map is shown.

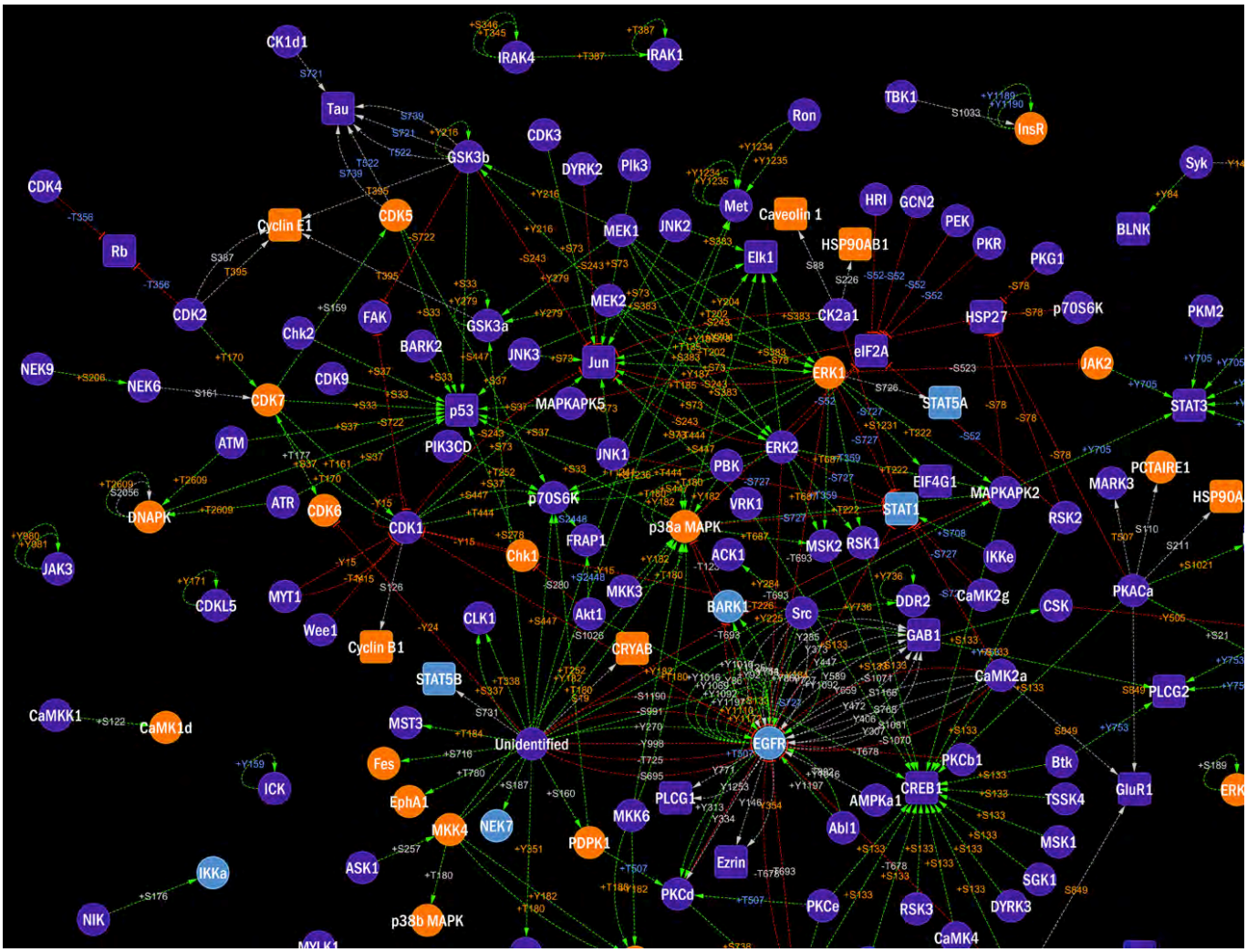
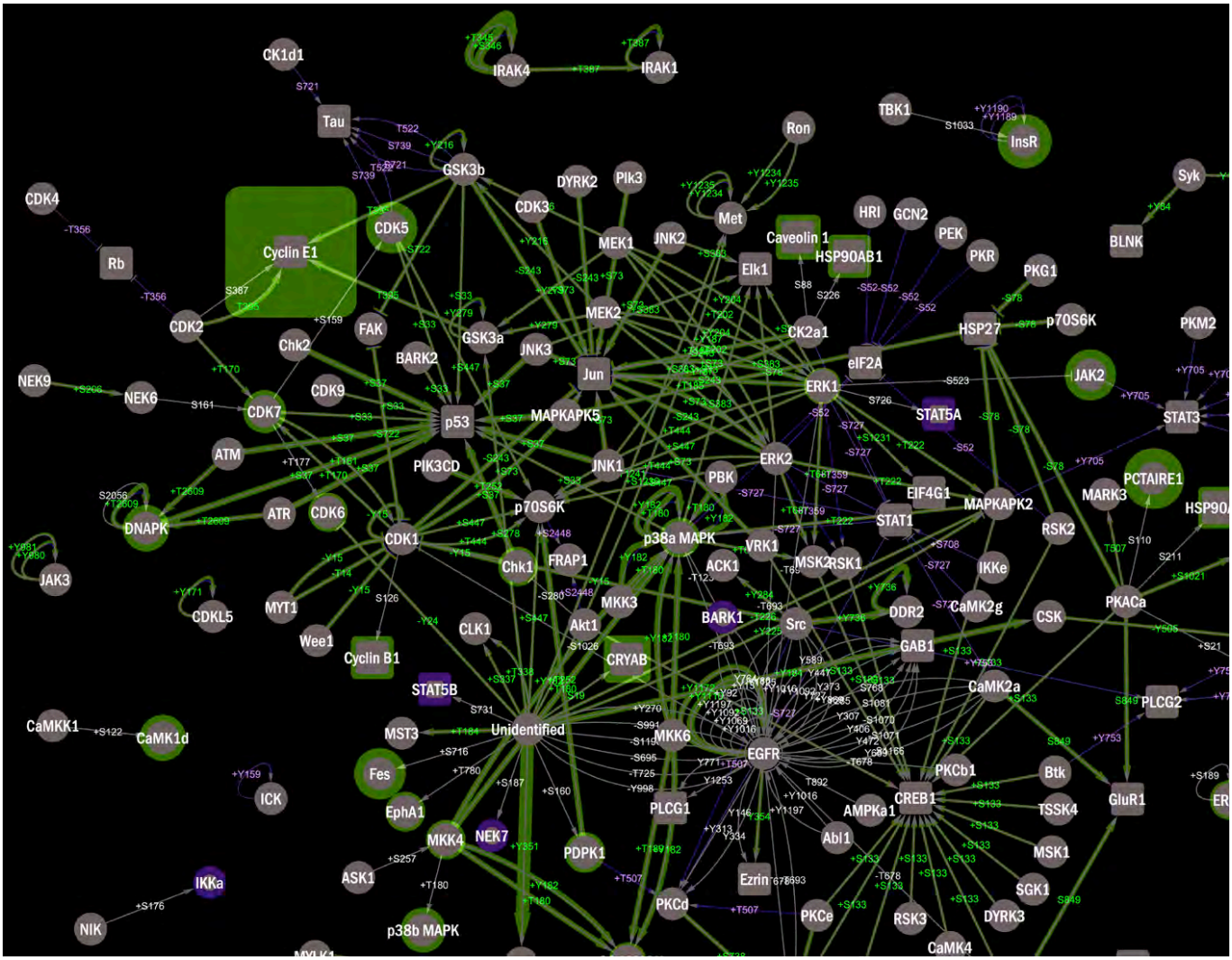


Figure 7. KiNetscape quantitative representation of the key EGF-induced changes in protein expression or phosphorylation from a Kinex™ KAM-900P antibody microarray analyses of the lysates from serum-starved A431 cells that were treated without or with 100 ng/ml EGF for 5 minutes. Lysates were prepared by directly homogenizing the cells into CCC buffer and subsequently biotinylated (Method 4). Relevant kinase-substrate relationships were imported into the Cytoscape 3.4 program (The Cytoscape Consortium). The data from untreated cells and EGF-treated cells are used to generate separate maps that were colored separately and then overlaid. With this representation style, the sizes of the icons (nodes) and the thicknesses of the lines (edges) are proportioned to the EGF-induced changes. The size of the node is increased or decreased by the percentage of the EGF-induced change from the untreated condition provided that it is at least 45% altered. In the case of the edges, the thickness of the lines is related to square of the change induced by EGF, again provided that it was at least 45% altered. With the colour scheme selected in this map, increases in phosphorylation are shown with green lines and arrows and green text for the phosphosites, and reduced phosphorylation are shown with purple lines and purple text, and any phosphorylation changes that do not meet the 45% threshold appear with grey lines and grey text. Proteins that showed increased expression changes greater than 45% have green exterior halos, but have purple interior halos if there was decreased expression greater than 45%. Protein expression changes less than 45% are not identified and these protein icons are colored only grey. The appearance of a positive or negative sign in front of the phosphorylation site text indicates if the site is known to be stimulatory or inhibitory, respectively.



9. FOLLOWUP SERVICES

We highly recommend that all interesting leads generated with the Kinex™ KAM Antibody Microarray should be validated by Western blotting before proceeding to other followup work. Such validation is essential with any commercial or custom produced antibody microarray. To assist in this regard, Kinexus offers two cost-effective custom immunoblotting services.

Clients can use the Kinetworks™ Custom KCPS 1.0 (Multi-Antibody) Protein Screen, where any 18 antibodies used on the KAM-900P chip can be selected, and we can test whether they correctly detect their target proteins and phosphosites in your experimental model system. If there are multiple samples to test, it is often advisable to have a pre-screen performed where equal aliquots of sample lysates are pooled and then tested to confirm the antibodies are detected on a Western blot. Alternatively, with the Kinetworks™ Custom KCSS 1.0 (Multi-Sample) Protein Screen, up to 8 different samples can be probed with up to 3 different antibodies, provided the molecular masses are significantly separated by SDS-PAGE. Lysate samples for Kinetworks™ analyses may be shipped without refrigeration to Kinexus if they are boiled and stored in SDS-PAGE sample buffer. More information about these Kinetworks™ services and the necessary forms can be download from our website.

The availability of these Kinetworks™ Custom screens is an important distinguishing feature of our antibody microarray services as clients can have their research leads conveniently and cost-effectively confirmed. The cost savings arising from the use of the Kinexus discovery platform becomes immediately apparent when one considers the purchase costs of individual antibodies and the labour necessary to confirm key antibody results obtained with other antibody microarrays. In addition, once the results are confirmed by Western blotting, clients can correlate their data with thousands of other data points from hundreds of different model systems using our KiNET databases, which contain the results from thousands of previous Kinetworks™ Immunoblots or Kinex™ Antibody Microarray analyses. Over 500 scientific publications have been published that reference the Kinexus Services, of which more than 150 are directly related to the Kinex™ Antibody Microarray Services.

In addition to the Kinetworks™ Custom Immunoblotting Services to validate leads, Kinexus can assist with many other aspects of your research project from start to finish. Other services that can be used in combination with our Kinex™ Antibody Microarray services include the following:

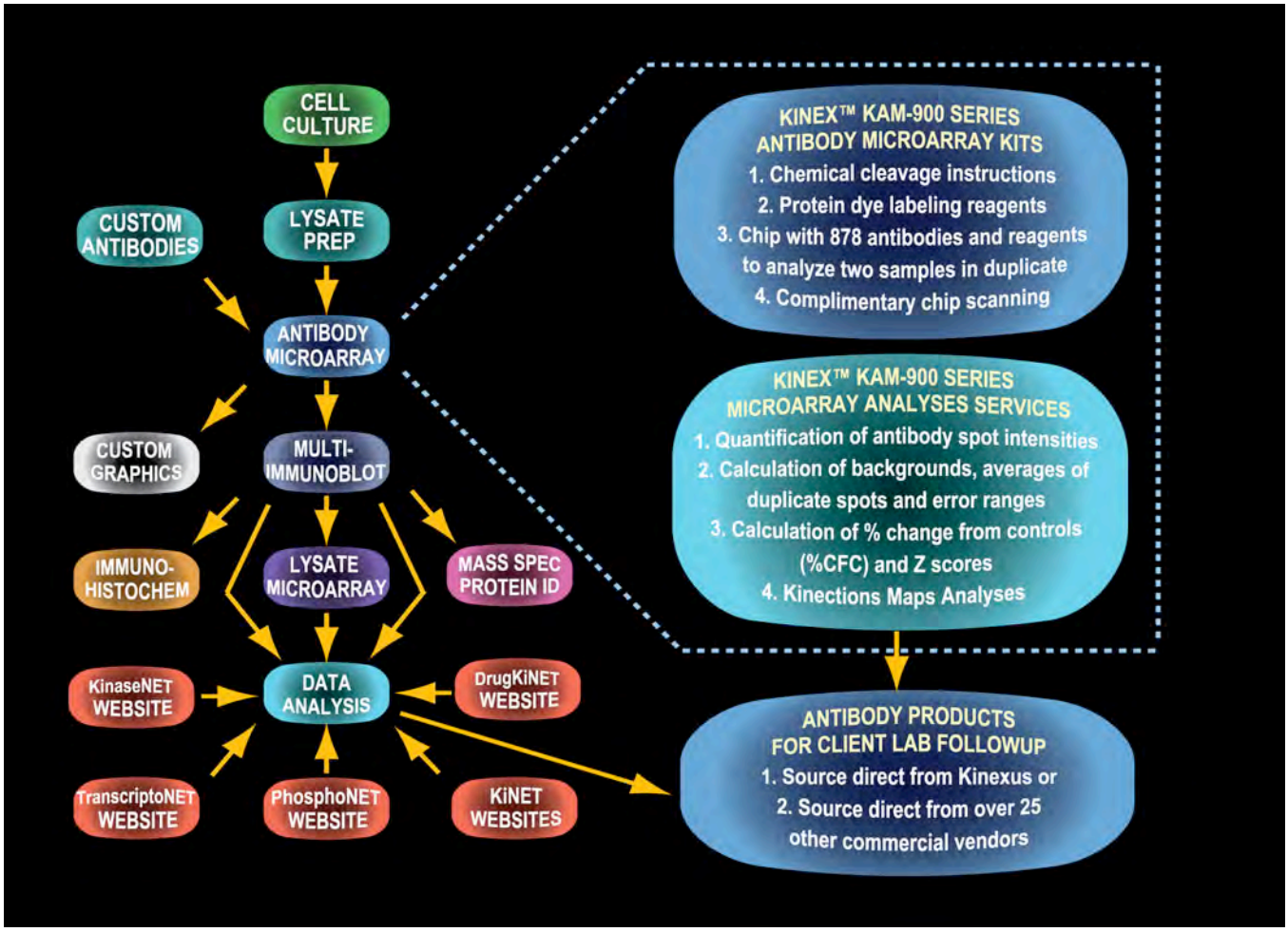
- *In vivo* services – send us your experimental compounds, proteins or oligonucleotides and we will perform the treatment of cells according to your specification and generate lysates for testing with our microarrays;
- Tissue or cell pellet processing – send us your cell pellets or tissues and we will prepare lysates for you;
- Mass spectrometry identification of antibody cross-reactive proteins;
- Custom Graphics – we can prepare pathway charts and bar graphs for your scientific publications;
- Custom Antibody Microarrays – we can print custom microarrays with hundreds of antibodies selected from our antibody library or supplied by you for your own internal research programs;
- Custom Antibody Macroarrays – we can print custom nitrocellulose or glass slide arrays with 10 to 100 or more antibodies from our antibody library or provided by you;

- Custom Reverse Phase Lysate Microarrays – we can print custom microarrays with hundreds of cell or tissue lysates to allow for further evaluation of the biological robustness of biomarkers identified through our Kinex™ Antibody Microarray services. These can be sourced from Kinexus or supplied by you;
- Custom Lysate Macroarrays – we can print custom nitrocellulose or glass slide arrays with 10 to 100 or more cell/tissue lysates slected from our library or supplied by you; and
- Kinase and phosphatase substrate or compound inhibitor profiling services with more than 450 active protein kinases and phosphatases to choose from.

Kinexus also offers free services and open access on-line databases to clients which include the following:

- KiNET™ Antibody Microarray (KiNET-AM) DataBase (www.kinet-am.ca) – clients can directly compare their Kinex™ Antibody Microarray results with lysates from thousands of other experimental model systems analysed with the same methodology;
- KiNET™ Immunoblotting (KiNET-IB) DataBase (www.kinet.ca) – clients can compare the results from their validation immunoblotting data with hundreds of other experiments from hundreds of other model systems.
- PhosphoNET KnowledgeBase (www.phosphonet.ca) – clients can compare interesting phosphosites identified by our microarrays with over 180,000 confirmed and 790,000 additional predicted human phosphosites to learn about their evolutionary conservation in up to 20 different species as well as the top 50 kinases predicted to phosphorylate these sites;
- KinaseNET KnowledgeBase (www.kinasenet.ca) – clients can retrieve comprehensive information on over 536 human protein kinase.
- DrugKiNET KnowledgeBase (www.drugkinet.ca) – clients can identify the most potent inhibitors experimentally verified for all of the human protein kinases tracked on our microarrays as well as predicted inhibitors for off target kinases.
- OncoNET KnowledgeBase (www.onconet.ca) – clients can obtain information about the expression and mutation of many of the proteins tracked on our microarrays in diverse types of human cancers.
- TranscriptoNET KnowledgeBase (www.transcriptonet.ca) – clients can compare expression levels identified by our microarrays with the mRNA levels for over 20,000 human genes in 600 different human organs, tissues and cell lines.
- KinATLAS (www.kinatlas.ca) - clients can identify protein-protein interactions in a cell and tissue specific manner with this pathway mapping site that also tracks kinase-drug interactions.

Figure 8. The Kinexus integrated platform of proteomics and bioinformatics services and products is a powerful discovery engine for biomarker discovery and validation, and antibody probe identification. The Kinex™ KAM-900P series antibody microarray kits enable clients to perform initial analyses in their own laboratories, but still gain access to a wide range of follow-up services and products.



Kinex™ KAM-900P Kit Components

10. LIST OF COMPONENTS AND ADDITIONAL ITEMS NEEDED

Each Kinex™ KAM-900P antibody microarray kit is designed for processing and probing two lysate protein samples for comparison. It contains all the necessary components required including a KAM microarray chip, reagents and consumables for protein lysate preparation, protein labelling and purification, array blocking, probing and washing. It can be shipped by courier at room temperature. In addition to detailed user instructions that are provided, a series of demonstration videos are also available to be viewed on our company's You-Tube Channel at https://www.youtube.com/channel/UC_GL-BCsGRrnKiQ_6qV1jeA .

Upon arrival, remove the KAM microarray in the plastic array storage tube from the kit and store it unopened in the vacuum sealed plastic pouch at -20°C or colder until ready to use. The two Kinex™ 543 Dye vials should also be stored at -20°C and kept in the dark. The majority of the other components can be stored at room temperature or 4°C. For optimal results, we recommend that the kit is used within 1 month of receipt.

Other items to consider:

- Review the sample preparation protocols before beginning your experiment.
- Ensure you have all the necessary consumables, reagents, and equipment available.
- Always double check the label and lid on the reagent matches the protocol before proceeding.
- Avoid touching the surface of the microarray slide containing the antibodies.

The KAM-900P kits contain the following components:

ID	Reagent / Item	No.	Quantity	Storage
A	KAM-900P Antibody Microarray in Storage Tube	1	1 slide/1 tube	-20°C
B	10X Incubation Buffer	1	8 ml	4°C
C	Incubation Chamber (2 wells)	1	1 each	RT
D	Lysis Buffer Cocktail (protease inhibitors with DTT)	1	1 vial	4°C
E	Kinexus Lysis Buffer	1	1 ml	4°C
F	Kinex 543 Dye Mix *	2	2 vials	-20°C
G	Protein Labelling Buffer I *(if chemical cleavage is not used)*	1	50 µl	4°C
H	Protein Labelling Buffer II *(if chemical cleavage is not used*	1	100 µl	4°C
I	Microspin G25 Columns & Collection Tubes	2	2 each	RT
J	10X Blocking Buffer I	1	2 ml	RT
K	1X Blocking Buffer II (need to add 600 µl of dH_20)	1	600 µl	RT
L	12X Wash Buffer I	1	1.6 ml	4°C
M	12X Wash Buffer II	1	1.6 ml	4°C
N	12X Wash Buffer III	1	1.6 ml	4°C
O	12X Wash Buffer IV	1	1.6 ml	4°C

The Kinexus 543 Dye Mix should be kept in the dark until ready to use

ID	Chemical Cleavage Reagents	No.	Quantity	Storage
P	CC Reagent #1 Sodium Carbonate + TCEP	1	12 µl	4°C
Q	CC Reagent #2 NTCB	1	15 µl	-20°C
R	CC Reagent #3 HCL	1	10 µl	RT

Do not use Items G and H if the Chemical Cleavage Reagents P, Q and R are used.

Figure 9. Opened Kinex™ KAM Antibody Microarray Kit.

Additional components and access to the following lab equipment is needed:

- Microprobe sonicator or syringes with 26-gauge needles
- Homogenizer or French Press (for tissues)
- Benchtop ultracentrifuge or microcentrifuge
- Benchtop swing bucket centrifuge (optional)
- Spectrophotometer equipped with a visible light source
- pH meter and pH paper test strips
- Benchtop rocking (preferred) or orbital shaker
- Rotator
- Compressed N_2 (preferred)
- Microarray scanner (e.g. ScanArray® Express Microarray Scanner from Perkin-Elmer, or GenePix 4000B Microarray Scanner from Molecular Devices) if quantitation is performed in your lab
- Vortexer
- Pipettes
- Protein Assay reagents
- Milli-Q Grade water
- Phosphate Buffered Saline (PBS), concentrated HCl and NaOH

Antibodies and Their Targets on the Kinex™ KAM-900P Microarray

11. LISTING OF ANTIBODIES ON KAM-900P MICROARRAY

No.	Ab Code	Target Protein	Phospho Site	AbType	Refseq ID	Uniprot ID
1	NN166	4E-BP1	Pan-specific	RpAb	NP_004086	Q13541
2	PN001	4E-BP1	S65	RpAb	NP_004086	Q13541
3	PN114	4E-BP1	T45	RpAb	NP_004086	Q13541
4	PK501	A6	Y309	RpAb	NP_001229326.1	Q12792
5	PK502	A6r	Y309	RpAb	NP_009215.1	Q6IBS0
6	PK503	AAK1	S637	RpAb	NP_055726.3	Q2M2I8
7	NK001	Abl1	Pan-specific	MmAb	NP_005148	P00519
8	PK504	Abl1	Y139	RpAb	NP_005148	P00519
9	PK505	Abl1	Y226	RpAb	NP_005148	P00519
10	PK506	Abl1	Y257	RpAb	NP_005148	P00519
11	PK507	Abl1	Y264	RpAb	NP_005148	P00519
12	PK001	Abl1	Y412	RpAb	NP_005148	P00519
13	PK508	Abl1	Y469	RpAb	NP_005148	P00519
14	NK001-2	Abl1	Pan-specific	RpAb	NP_005148	P00519
15	PK509	Abl2 (Arg)	Y439	RpAb	NP_009298.1	P42684
16	PK510	Abl2 (Arg)	Y439+T440	RpAb	NP_009298.1	P42684
17	PN002	ACACA (ACC1)	S80	RpAb	NP_000655	Q13085
18	NK002	ACK1 (TNK2)	Pan-specific	RpAb	NP_005772	Q07912
19	PK511	ACK1 (TNK2)	Y284	RpAb	NP_005772	Q07912
20	PK512	ACK1 (TNK2)	Y518	RpAb	NP_005772	Q07912
21	PK513	ACK1 (TNK2)	Y859+Y860	RpAb	NP_005772	Q07912
22	CN001	Actin	Pan-specific	GpAb		
23	PN500	ACTB	Y294	RpAb	NP_001092.1	P60709
24	PN501	ACTB	Y53	RpAb	NP_001092.1	P60709
25	PN502	ACTN1	Y246	RpAb	NP_1093.1	P12814
26	PN003-PN004	ADD1/3 (Adducin a/g)	S726	RpAb	NP_058432.1	Q9UEY8
27	PK515	Akt1 (PKBa)	T308	RpAb	NP_001014431.1	P31749
28	PK516	Akt1 (PKBa)	Y315	RpAb	NP_001014431.1	P31749
29	PK517	Akt1 (PKBa)	Y326	RpAb	NP_001014431.1	P31749
30	NK129	Akt1 (PKBa)	Pan-specific	MmAb	NP_001014431.1	P31749
31	NK130-7	Akt2 (PKBb)	Pan-specific	GpAb	NP_001617.1	P31751
32	NK129-3	Akt1 (PKBa)	Pan-specific	RpAb	NP_001014431.1	P31749
33	NK130-8	Akt2 (PKBb)	Pan-specific	RpAb	NP_001617.1	P31751
34	NK130-9	Akt2 (PKBb)	Pan-specific	RpAb	NP_001617.1	P31751
35	NK131-3	Akt3 (PKBg)	Pan-specific	RpAb	NP_005456.1	Q9Y243
36	NK003	ALK	Pan-specific	RpAb	NP_004295.2	Q9UM73
37	PK518	ALK	Y1092	RpAb	NP_004295.2	Q9UM73
38	PK519	ALK	Y1096	RpAb	NP_004295.2	Q9UM73

39	PK520	ALK	Y1507	RpAb	NP_004295.2	Q9UM73
40	PK521	AMPKa1 (PRKAA1)	T183+S184	RpAb	NP_006242.5	Q13131
41	PK522	AMPKa2 (PRKAA2)	S377	RpAb	NP_006243.2	P54646
42	PK523	ANKRD3 (RIPK4)	S438	RpAb		P57078
43	PN503	ANXA1	Y207	RpAb	NP_000691.1	P04083
44	PN504	ANXA2	Y238	RpAb	NP_001002857.1	P07355
45	PN189	APP	T743	RpAb	NP_000475.1	P05067
46	NK205-2	RafA (ARaf)	Pan-specific	RpAb	NP_001645.1	P10398
47	PK500	RafA (A-Raf)	Y302	RpAb	NP_001645.1	P10398
48	NN121	Arrestin b (ARRB1)	Pan-specific	MmAb	NP_004032	P49407
49	PN133	Arrestin b (ARRB1)	S412	RpAb	NP_004032	P49407
50	NK007	ASK1 (MAP3K5)	Pan-specific	RpAb	NP_005914	Q99683
51	NK007-2	ASK1 (MAP3K5)	Pan-specific	RpAb	NP_005914	Q99683
52	PK524	ASK1 (MAP3K5)	S1033	RpAb	NP_005914	Q99683
53	PK525	ASK1 (MAP3K5)	T838	RpAb	NP_005914	Q99683
54	PK143	ASK1 (MAP3K5)	S1046	RpAb	NP_005914	Q59GL6
55	PN115	ATF2	S112	RpAb	NP_001871	P15336
56	PK526	ATM	S1981	RpAb	NP_000042	Q13315
57	PK527	ATM	Y2969	RpAb	NP_000042	Q13315
58	NK230-2	ATM	Pan-specific	RpAb	NP_000042	Q62388
59	NK230-1	ATM	Pan-specific	RpAb	NP_000042	Q62388
60	PK528	ATR	S435+S436	RpAb	NP_001175.2	Q13535
61	NK237-2	ATR	Pan-specific	RpAb	NP_001175.2	Q13535
62	NK237-3	ATR	Pan-specific	RpAb	NP_001175.2	Q13535
63	PK529	AurKA (Aurora A, AIK)	T287+T288	RpAb	NP_940835	O14965
64	NK008-4	AurKA (Aurora A, AIK)	Pan-specific	RpAb	NP_940835	O14965
65	NK008-5	AurKA (Aurora A, AIK)	Pan-specific	RpAb	NP_940835	O14965
66	PK530	AurKB (Aurora B, AIM-1)	S227	RpAb	NP_004208	Q96GD4
67	PK531	AurKB (Aurora B, AIM-1)	T232	RpAb	NP_004208	Q96GD4
68	NK193-2	AurKB (Aurora B, AIM-1)	Pan-specific	RpAb	NP_004208	Q96GD4
69	NK193-3	AurKB (Aurora B, AIM-1)	Pan-specific	RpAb	NP_004208	Q96GD4
70	PK532	AurKC (Aurora C, AIK3)	S193	RpAb	NP_003151	Q9UQB9
71	NK009-2	AurKC (Aurora C, AIK3)	Pan-specific	RpAb	NP_003151	Q9UQB9
72	PK533	Axl	Y702+Y703	RpAb	NP_001690.2	P30530
73	PN008	B23 (NPM1)	T199	RpAb	NP_002511	P06748
74	PN009	B23 (NPM1)	T234+T237	RpAb	NP_002511	P06748
75	NN000	Bak	Pan-specific	RpAb	NP_001179	Q16611
76	PK536	BARK1 (GRK2, ADRBK1)	S670	RpAb	NP_001610	P25098
77	PK537	BARK1 (GRK2, ADRBK1)	Y356	RpAb	NP_001610	P25098
78	PK164	Bcr	Y177	RpAb	NP_004318.3	P11274
79	PK538	Bcr	Y177	RpAb	NP_004318.3	P11274
80	PK539	Bcr	Y591	RpAb	NP_004318.3	P11274
81	PK540	Bcr	Y644	RpAb	NP_004318.3	P11274
82	PK542	BLK	Y188	RpAb	NP_001706.2	P51451
83	PK543	BLK	Y389	RpAb	NP_001706.2	P51451

84	PN013	BLNK	Y84	RpAb	NP_037446	O75498
85	PK544	BMPR2	S375	RpAb	NP_001195.2	Q13873
86	NK012	Bmx (Etk)	Pan-specific	MmAb	NP_001712	P51813
87	PK545	Bmx (Etk)	Y40	RpAb	NP_001712	P51813
88	PK003	Bmx (Etk)	Y40	RpAb	NP_001712	P51813
89	NK156	RafB (BRaf)	Pan-specific	RpAb	NP_004324	P15056
90	PK534	RafB (BRaf)	S446+S447	RpAb	NP_004324	P15056
91	PK535	RafB (BRaf)	S729	RpAb	NP_004324	P15056
92	NK156-4	RafB (BRaf)	Pan-specific	RpAb	NP_004324	P15056
93	PN116	BRCA1	S1423	RpAb	NP_009225	P38398
94	PN014	BRCA1	S1497	RpAb	NP_009225	P38398
95	PK546	BRD2	S37	RpAb	NP_001106653.1	P25440
96	PK547	Brk (PTK6)	S446+Y447	RpAb	NP_005966.1	Q13882
97	PK548	Brk (PTK6)	Y342	RpAb	NP_005966.1	Q13882
98	PK549	BRSK1	T189	RpAb	NP_115806.1	Q8TDC3
99	NK014	Btk	Pan-specific	RpAb	NP_000052	Q06187
100	PK550	Btk	Y223+Y225	RpAb	NP_000052	Q06187
101	PK551	Btk	Y551	RpAb	NP_000052	Q06187
102	PK552	BUB1B	S670	RpAb	NP_001202.4	O60566
103	PN015	Caldesmon	S789	RpAb	NP_004333	Q05682
104	PK553	CaMK1a	T177	RpAb	NP_003647.1	Q14012
105	NK016-2	CaMK1d	Pan-specific	GpAb	NP_003647	Q8IU85
106	PK554	CaMK1d	T180	RpAb	NP_003647	Q8IU85
107	PK555	CaMK2a	T286	RpAb	NP_741960.1	Q9UQM7
108	PK556	CaMK4	T200	RpAb	NP_001735	Q16566
109	NK021-3	CaMK4	Pan-specific	RpAb	NP_001735	Q16566
110	NK021	CaMK4	Pan-specific	RpAb	NP_001735	Q16566
111	PN505	Cas-L	Y166	RpAb	NP_006394.1	Q14511
112	PN162	Catenin a (CTNNA1)	S641	RpAb	NP_001277236.1	P35221
113	PN166	Catenin b (CTNNB1)	S33	RpAb	NP_001895	P35222
114	PN167	Catenin b (CTNNB1)	Y333	RpAb	NP_001895	P35222
115	NN021	Catenin b (CTNNB1)	Pan-specific	RpAb	NP_001895	P35222
116	NN021-1	Catenin b (CTNNB1)	Pan-specific	RpAb	NP_001895	P35222
117	NN167	Caveolin 1	Pan-specific	RpAb	NP_001744.2	Q03135
118	PN147	Caveolin 1 (CAV1)	Y14	RpAb	NP_001744.2	Q03135
119	NN022-1	Caveolin 2 (CAV2)	Pan-specific	MmAb	NP_001224	P51636
120	PN018	Caveolin 2 (CAV2)	S36	RpAb	NP_001224	P51636
121	PN171	Cbl	Y700	RpAb	NP_005179.2	P22681
122	NK025-6	CDK1 (CDC2)	Pan-specific	RpAb	NP_001777.1	P06493
123	PK558	CDC7	T376	RpAb	NP_001127891.1	O00311
124	NK025-1	CDK1 (CDC2)	Pan-specific	MmAb	NP_001777.1	P06493
125	PK559	CDK1 (CDC2)	T14	RpAb	NP_001777.1	P06493
126	PK560	CDK1 (CDC2)	T14+Y15	RpAb	NP_001777.1	P06493
127	PK008-1	CDK1 (CDC2)	T161	RpAb	NP_001777.1	P06493
128	PK561	CDK1 (CDC2)	T161	RpAb	NP_001777.1	P06493

129	PK563	CDK1 (CDC2)	Y19	RpAb	NP_001777.1	P06493
130	PK006	CDK1 (CDC2)	T14+Y15	RpAb	NP_001777.1	P06493
131	PK007-1	CDK1 (CDC2)	Y15	RpAb	NP_001777.1	P06493
132	PK007-3	CDK1 (CDC2)	Y15	RpAb	NP_001777.1	P06493
133	PK564	CDK10	T196	RpAb	NP_443714.3	Q15131
134	PK565	CDK11A	T583	RpAb	NP_001300825.1	Q9UQ88
135	PK566	CDK12	S383+S385	RpAb	NP_057591.2	Q9NYV4
136	PK567	CDK12	T893	RpAb	NP_057591.2	Q9NYV4
137	NK204	CDK1 (CDC2)	Pan-specific	RpAb	NP_001777.1	P06493
138	NK026-5	CDK2	Pan-specific	RpAb	NP_001789.2	P24941
139	NK026-6	CDK2	Pan-specific	RpAb	NP_001789.2	P24941
140	PK568	CDK2	T160	RpAb	NP_001789.2	P24941
141	NK027-2	CDK4	Pan-specific	RpAb	NP_000066	P11802
142	PK569	CDK4	T172	RpAb	NP_000066	P11802
143	NK028-5	CDK5	Pan-specific	MmAb	NP_004926	Q00535
144	PK570	CDK5	Y15	RpAb	NP_004926	Q00535
145	NK029	CDK6	Pan-specific	MmAb	NP_001250	Q00534
146	NK029-3	CDK6	Pan-specific	RpAb	NP_001250	Q00534
147	PK165	CDK6	Y13	RpAb	NP_001250	Q00534
148	PK571	CDK6	Y13	RpAb	NP_001250	Q00534
149	PK572	CDK6	Y24	RpAb	NP_001250	Q00534
150	NK030-2	CDK7	Pan-specific	MmAb	NP_001790	P50613
151	PK573	CDK7	T170	RpAb	NP_001790	P50613
152	NK030-1	CDK7	Pan-specific	RpAb	NP_001790	P50613
153	NK032	CDK9	Pan-specific	RpAb	NP_001252	P50750
154	PK574	CDK9	S347	RpAb	NP_001252	P50750
155	PK575	CDK9	T186	RpAb	NP_001252	P50750
156	PK576	CDKL5	Y171	RpAb	NP_001032420.1	O76039
157	NK034	Chk1 (CHEK1)	Pan-specific	MmAb	NP_001265	O14757
158	NK034-2	Chk1 (CHEK1)	Pan-specific	RpAb	NP_001265	O14757
159	PK162	Chk1 (CHEK1)	S280	RpAb	NP_001265	O14757
160	PK577	Chk1 (CHEK1)	S280	RpAb	NP_001265	O14757
161	PK578	Chk1 (CHEK1)	S317	RpAb	NP_001265	O14757
162	PK579	Chk1 (CHEK1)	S345	RpAb	NP_001265	O14757
163	NK035	Chk2 (CHEK2)	Pan-specific	RpAb	NP_009125	O96017
164	PK580	Chk2 (CHEK2)	T383	RpAb	NP_009125	O96017
165	PK119	Chk2 (CHEK2)	T68	RpAb	NP_009125	O96017
166	PK581	Chk2 (CHEK2)	T68	RpAb	NP_009125	O96017
167	PK167	CK2a1 (CSNK2A1)	T360+S362	RpAb	NP_001887	P68400
168	PK582	CK2a1 (CSNK2A1)	Y255	RpAb	NP_001887	P68400
169	PK583	CLK1	S337	RpAb	NP_004062.2	P49759
170	PK584	CLK1	S337+T338	RpAb	NP_004062.2	P49759
171	NN026	Cofilin 1 (CFL1)	Pan-specific	MmAb	NP_005498	P23528
172	PN019	Cofilin 1 (CFL1)	S3	RpAb	NP_005498	P23528
173	PN020	Cofilin 2 (CFL2)	S3	RpAb	NP_068733	Q9Y281

174	PN148	Connexin 43 (Cx43, GJA1)	S368	RpAb	NP_000156.1	P17302
175	PK585	COT (MAP3K8, TPL2)	S334	RpAb	NP_005195	P41279
176	NK042-1	COT (MAP3K8, TPL2)	Pan-specific	RpAb	NP_005195	P41279
177	NK042-2	COT (MAP3K8, TPL2)	Pan-specific	RpAb	NP_005195	P41279
178	PN024	CREB1	S133	RpAb	NP_004370	P16220
179	NN149-1	Crystallin aB (CRYAB)	Pan-specific	RpAb	NP_001876	P02511
180	NN149-2	Crystallin aB (CRYAB)	Pan-specific	MmAb	NP_001876.1	P02511
181	PN025	Crystallin aB (CRYAB)	S19	RpAb	NP_001876	P02511
182	PN110	Crystallin aB (CRYAB)	S45	RpAb	NP_001876	P02511
183	PK586	CSF1R	S807+Y809	RpAb	NP_005202.2	P07333
184	PK587	CSF1R	Y699	RpAb	NP_005202.2	P07333
185	PK588	CSF1R	Y809	RpAb	NP_005202.2	P07333
186	NK234-2	CSF1R	Pan-specific	RpAb	NP_005202.2	P07333
187	NK234-4	CSF1R	Pan-specific	RpAb	NP_005202.2	P07333
188	NK044	Csk	Pan-specific	MmAb	NP_004374	P41240
189	NK044-2	Csk	Pan-specific	RpAb	NP_004374	P41240
190	PK589	Csk	Y184	RpAb	NP_004374	P41240
191	NN029	Cyclin B1 (CCNB1)	Pan-specific	MmAb	NP_114172	P14635
192	PN190	Cyclin B1 (CCNB1)	S147	RpAb	NP_114172	P14635
193	PN191	Cyclin E1 (CCNE1)	T395	RpAb	NP_001229	P24864
194	NN031	Cyclin E1 (CCNE1)	Pan-specific	MmAb	NP_001229	P24864
195	PK590	DAPK	S269	RpAb	NP_006292.3	Q12852
196	PK591	DDR1	Y796+Y797	RpAb	NP_001284583.1	Q08345
197	PK592	DDR1	Y797	RpAb	NP_001284583.1	Q08345
198	PK593	DDR2	Y736	RpAb	NP_001014796.1	Q16832
199	PK594	DDR2	Y740	RpAb	NP_001014796.1	Q16832
200	NK048	DNAPK	Pan-specific	RpAb	NP_008835	P78527
201	PK595	DNAPK	T2609	RpAb	NP_008835	P78527
202	PK596	DNAPK	Y883	RpAb	NP_008835	P78527
203	PN508	Dok3	Y398	RpAb	NP_079148.2	Q7L591
204	PK597	DYRK1A	Y321	RpAb	NP_001387.2	Q13627
205	PK598	DYRK2	Y382	RpAb	NP_006473.2	Q92630
206	PN509	eEF1A1	Y141	RpAb	NP_001393.1	P68104
207	PN173	Ephrin-B2 (EFNB2)	Y316	RpAb	NP_004084.1	P52799
208	PK121	EGFR	T693	RpAb	NP_005219	P00533
209	PK599	EGFR	Y1069	RpAb	NP_005219	P00533
210	PK123	EGFR	Y1110	RpAb	NP_005219	P00533
211	PK010	EGFR	Y1172	RpAb	NP_005219	P00533
212	PK010-2	EGFR	Y1172	RpAb	NP_005219	P00533
213	PK601	EGFR	Y1172	RpAb	NP_005219	P00533
214	PK011-1	EGFR	Y1197	RpAb	NP_005219	P00533
215	PK602	EGFR	Y869	RpAb	NP_005219	P00533
216	PK603	EGFR	Y998	RpAb	NP_005219	P00533
217	NK052-5	EGFR	Pan-specific	RpAb	NP_005219	P00533
218	NK052-6	EGFR	Pan-specific	RpAb	NP_005219	P00533

219	NK052-4	EGFR	Pan-specific	RpAb	NP_005219	P00533
220	NN038-1	eIF2a	Pan-specific	RpAb	NP_004085	P05198
221	PN028-1	eIF2a	S52	RpAb	NP_004085	P05198
222	PN028-2	eIF2a	S52	RpAb	NP_004085	P05198
223	PK604	EIF2AK3 (PERK)	T982	RpAb	NP_004827.4	Q9NZJ5
224	PN172	eIF4B	S422	RpAb	NP_001408.2	P23588
225	NN039-1	eIF4E	Pan-specific	MmAb	NP_001959	P06730
226	PN030-1	eIF4E	S209	RpAb	NP_001959	P06730
227	PN030-2	eIF4E	S209	RpAb	NP_001959	P06730
228	PN031	eIF4G (eIF4G1)	S1106	RpAb	NP_004944	Q04637
229	PN193	eIF4G (eIF4G1)	S1231	RpAb	NP_004944	Q04637
230	NN168	Elk1	Pan-specific	RpAb	NP_001107595.1	P19419
231	PN149	Elk1	S383	RpAb	NP_001107595.1	P19419
232	PN170	Elk1	S389	RpAb	NP_001107595.1	P19419
233	PN510	EML4	Y226	RpAb	NP_001107595.1	Q9HC35
234	PN511	ENO1	Y44	RpAb	NP_001419.1	P06733
235	PN512	ENO2	Y25	RpAb	NP_001966.1	P09104
236	NK053	EphA1	Pan-specific	RpAb	NP_005223	P21709
237	PK605	EphA1	Y781	RpAb	NP_005223	P21709
238	PK606	EphA2	Y588	RpAb	NP_004422.2	P29317
239	PK607	EphA2	Y772	RpAb	NP_004422.2	P29317
240	PK608	EphA3	Y779	RpAb	NP_005224.2	P29320
241	PK609	EphB1	Y594	RpAb	NP_004432.1	P54762
242	PK610	EphB2	Y780	RpAb	NP_001296122.1	P29323
243	PK611	EphB3	Y600	RpAb	NP_004434.2	P54753
244	PK612	EphB4	Y596	RpAb	NP_004435.3	P54760
245	PN198	Estrogen Receptor (Era, ESR1)	S104	RpAb	NP_000116.2	P03372
246	PK613	ErbB2 (HER2)	Y1248	RpAb	NP_004439	P04626
247	PK614	ErbB2 (HER2)	Y735	RpAb	NP_004439	P04626
248	PK615	ErbB2 (HER2)	Y877	RpAb	NP_004439	P04626
249	NK054-4	ErbB2 (HER2)	Pan-specific	RpAb	NP_004439	P04626
250	NK054-5	ErbB2 (HER2)	Pan-specific	RpAb	NP_004439	P04626
251	PN513	ERBB2IP (Erbin, LAP2)	Y1104	RpAb	NP_001240626.1	Q96RT1
252	PK616	ErbB3	Y1289	RpAb	NP_001005915.1	P21860
253	PK617	ErbB3	Y1307	RpAb	NP_001005915.1	P21860
254	PK163	ErbB3	Y1328	RpAb	NP_001005915.1	P21860
255	PK618	ErbB3	Y1328	RpAb	NP_001005915.1	P21860
256	NK231-2	ErbB3	Pan-specific	RpAb	NP_001005915.1	P21860
257	NK231-3	ErbB3	Pan-specific	RpAb	NP_001005915.1	P21860
258	PK619	ErbB4	Y733	RpAb	NP_001036064.1	Q15303
259	NK235-1	ErbB4	Pan-specific	RpAb	NP_001036064.1	Q15303
260	NK235-3	ErbB4	Pan-specific	RpAb	NP_001036064.1	Q15303
261	PK170-PK171	ERK1 (MAPK3)	T202	RpAb	NP_002737.2	P27361
262	PK621	ERK1 (MAPK3)	T202+Y204	RpAb	NP_002737.2	P27361
263	PK865 (PK014-7)	ERK1 (MAPK3)	T207	RpAb	NP_002737.2	P27361

264	PK168-PK169	ERK1 (MAPK3)	Y204	RpAb	NP_002737.2	P27361
265	PK864 (PK014-6)	ERK1 (MAPK3)	Y204	RpAb	NP_002737.2	P27361
266	PK866 (PK014-8)	ERK1 (MAPK3)	Y204+T207	RpAb	NP_002737.2	P27361
267	NK055-1	ERK1 (MAPK3)	Pan-specific	RpAb	NP_002737.2	P27361
268	NK055-3	ERK1 (MAPK3)	Pan-specific	RpAb	NP_002737.2	P27361
269	NK055-6	ERK1 (MAPK3)	Pan-specific	RpAb	NP_002737.2	P27361
270	PK622	ERK2 (MAPK1)	T185+Y187	RpAb	NP_002736	P28482
271	NK056-2	ERK2 (MAPK1)	Pan-specific	RpAb	NP_002736	P28482
272	NK056-4	ERK2 (MAPK1)	Pan-specific	RpAb	NP_002736	P28482
273	NK057-2	ERK3 (MAPK6)	Pan-specific	RpAb	NP_002739	Q16659
274	PK623	ERK3 (MAPK6)	S189	RpAb	NP_002739	Q16659
275	NK058	ERK4 (MAPK4)	Pan-specific	RpAb	NP_002738	P31152
276	PK624	ERK4 (MAPK4)	S186	RpAb	NP_002738	P31152
277	PK625	ERK5 (MAPK7, BMK)	T219+Y221	RpAb	NP_620602	Q13164
278	PK626	ERK5 (MAPK7, BMK)	Y221	RpAb	NP_620602	Q13164
279	NK206-4	ERK5 (MAPK7, BMK)	Pan-specific	RpAb	NP_620602	Q13164
280	NK206-5	ERK5 (MAPK7, BMK)	Pan-specific	RpAb	NP_620602	Q13164
281	PN514	ESYT1	Y822	RpAb	NP_056107.1	Q9BSJ8
282	PN174	Ezrin	T567	RpAb	NP_001104547.1	P15311
283	PN175	Ezrin	Y354	RpAb	NP_001104547.1	P15311
284	NK060	FAK	Pan-specific	RpAb	NP_005598	Q05397
285	PK020-3	FAK	S722	RpAb	NP_005598	Q05397
286	PK024	FAK	S910	RpAb	NP_005598	Q05397
287	PK017-1	FAK	Y397	MmAb	NP_005598	Q05397
288	PK627	FAK	Y397	RpAb	NP_005598	Q05397
289	PK151	FAK	Y576+Y577	RpAb	NP_005598	Q05397
290	PK628	FAK	Y576+Y577	RpAb	NP_005598	Q05397
291	PK629	FAK	Y577	RpAb	NP_005598	Q05397
292	PK630	Fer	Y402	RpAb	NP_005237.2	P16591
293	NK061	Fes	Pan-specific	RpAb	NP_001996	P07332
294	PK632	Fes	Y713	RpAb	NP_001996	P07332
295	PK633	Fes	Y713+S716	RpAb	NP_001996	P07332
296	PK634	FGFR1	Y653+Y654	RpAb	NP_075598.2	P11362
297	NK062-3	FGFR1	Pan-specific	RpAb	NP_075598.2	P11362
298	PK635	FGFR2	Y656+Y657	RpAb	NP_000132.3	P21802
299	NK063-4	FGFR2	Pan-specific	RpAb	NP_000132.3	P21802
300	NK063-2	FGFR2	Pan-specific	RpAb	NP_000132.3	P21802
301	PK636	FGFR3	Y647+Y648	RpAb	NP_000133.1	P22607
302	NK236-2	FGFR3	Pan-specific	RpAb	NP_000133.1	P22607
303	NK236-3	FGFR3	Pan-specific	RpAb	NP_000133.1	P22607
304	PK638	FGR	Y208+Y209	RpAb	NP_001036194.1	P09769
305	PK639	FGR	Y412	RpAb	NP_001036194.1	P09769
306	PN194	FKHR (FOXO1A)	S256	RpAb	NP_002006.2	Q12778
307	PN195	FKHR (FOXO1A)	S319	RpAb	NP_002006.2	Q12778
308	PK640	Flt3	Y842	RpAb	NP_004110.2	P36888

309	NN044	Fos	Pan-specific	RpAb	NP_005243	P01100
310	PN033	Fos	T232	RpAb	NP_005243	P01100
311	PK641	FRK	Y387	RpAb	NP_002022.1	P42685
312	PK642	FRK	Y497	RpAb	NP_002022.1	P42685
313	PN146	FRS2	Y348	RpAb	NP_001036020.1	Q8WU20
314	PK643	Fused	S159	RpAb	NP_056505.2	Q9NRP7
315	NK065	Fyn	Pan-specific	MmAb	NP_002028	P06241
316	PK644	Fyn	Y213+Y214	RpAb	NP_002028	P06241
317	PK645	Fyn	Y531	RpAb	NP_002028	P06241
318	PN515	G6PD	Y401	RpAb	NP_001035810.1	P11413
319	PN192	Gab1	Y627	RpAb	NP_002030.2	Q13480
320	PN196	GATA1	S142	RpAb	NP_002040.1	P15976
321	NK066	GCK	Pan-specific	GpAb	NP_004570	Q12851
322	PK646	GCK	S170	RpAb	NP_004570	Q12851
323	PN034	GFAP	S8	MmAb	NP_002046	P14136
324	PN517	GIT1	Y545	RpAb	NP_054749.2	Q9Y2X7
325	PN178	GluR1	S849	RpAb	NP_000818.2	P42261
326	NK067	GRK2 (BARK1, ADRBK1)	Pan-specific	RpAb	NP_001610	P25098
327	PK025	GRK2 (BARK1, ADRBK1)	S670	RpAb	NP_001610	P25098
328	PK647	GSK3a	S278+Y279	RpAb	NP_002084	P49840
329	PK648	GSK3a	T19+S21	RpAb	NP_002084	P49840
330	PK028-PK029-1	GSK3a	Y279	RpAb	NP_002084	P49840
331	PK650	GSK3a	Y284+Y285	RpAb	NP_002084	P49840
332	NK069-NK070-2	GSK3a	Pan-specific	MmAb	NP_002084	P49840
333	NK070	GSK3b	Pan-specific	RpAb	NP_001139628.1	P49841
334	PK651	GTF2F1	S385+T389	RpAb	NP_002087.2	P35269
335	PK652	GUK1	Y53	RpAb	NP_000849.1	Q16774
336	PN518	HCA59 (HSPC220)	Y147	RpAb	NP_057604.1	Q9NZ63
337	NN169	HDAC4	Pan-specific	RpAb	NP_006028.2	P56524
338	PN179-PN180-PN181	HDAC4/5/9	S246	RpAb	NP_006028.2	P56524
339	PN188	HDAC5	S498	RpAb	NP_005465.2	Q9UQL6
340	PK653	HGK (ZC1, MAP4K4)	T187	RpAb	NP_001229488.1	O95819
341	PK654	HIPK1	Y352	RpAb	NP_938009.1	Q86Z02
342	PN036	Histone H2A.X	S139	MmAb	NP_002096	P16104
343	PN037	Histone H2B	S14	RpAb	NP_778225	P33778
344	PN038	Histone H3 (H3F3A)	S10	RpAb	NP_003521	P84243
345	PN039	Histone H3 (H3F3A)	S28	RpAb	NP_003521	P84243
346	PN101-2	Histone H3 (H3F3A)	T3	RmAb	NP_003521	P84243
347	PN041	Hsp27	S78	RpAb	NP_001531	P04792
348	NN061	Hsp90	Pan-specific	MmAb	NP_005339	P07900
349	NN061-16	Hsp90 alpha	Pan-specific	RpAb	NP_031381.2	P07900
350	NN165-1	Hsp90 beta	Pan-specific	RpAb	NP_031381.2	P08238
351	PN520	HSP90AB1 (HSP90-beta)	Y484	RpAb	NP_031381	P08238
352	PN176	HSP90AB1 (HSP90-beta)	S255	RpAb	NP_031381	P08238
353	PN103	Huntingtin	S421	RpAb	NP_002102	P42858

354	PK655	ICK	Y156+T157	RpAb	NP_055735.1	Q9UPZ9
355	PK656	ICK	Y159	RpAb	NP_055735.1	Q9UPZ9
356	PK657	IGF1R	Y1161+T1163	RpAb	NP_000866	P08069
357	PK153	IGF1R	Y1165/Y1166	RpAb	NP_000866	P08069
358	PK152	IGF1R	Y1280	RpAb	NP_000866	P08069
359	PK658	IGF1R	Y1346	RpAb	NP_000866	P08069
360	NK075-6	IKKb	Pan-specific	MmAb	NP_001269	O15111
361	NN064	IkBa	Pan-specific	RpAb	NP_065390	P25963
362	PN164	IkBa	Y42	RpAb	NP_065390	P25963
363	NN065	IkBb	Pan-specific	RpAb	NP_002494	Q15653
364	PN168	IkBe	S161	RpAb	NP_004547.2	O00221
365	NK075-2	IKKa (CHUK)	Pan-specific	MmAb	NP_001269	O15111
366	NK075-3	IKKa (CHUK)	Pan-specific	RpAb	NP_001269	O15111
367	PK659	IKKa (CHUK)	T179+S180	RpAb	NP_001269	O15111
368	PK154	IKKa (CHUK)	T23	RpAb	NP_001269	O15111
369	PK660	IKKe	S172	RpAb	NP_054721.1	Q14164
370	NK078-2	ILK1	Pan-specific	RpAb	NP_034692	Q13418
371	PK662	ILK1	Y351	RpAb	NP_034692	Q13418
372	PK663	IR (Insulin receptor b)	Y1189	RpAb	NP_000866	P06213
373	NK079	IR (Insulin receptor b)	Pan-specific	MmAb	NP_000199	P06213
374	PN043	Integrin a4 (ITGA4)	S1021	RpAb	NP_000876	P13612
375	PK032-1	IR (Insulin receptor b)	Y999	RpAb	NP_000199	P06213
376	PK033	IR (Insulin receptor b)/IGF1R	Y1189/Y1190	RpAb	NP_000866	P06213
377	NK080-2	IRAK1	Pan-specific	RpAb	NP_001560	P51617
378	PK664	IRAK1	T387	RpAb	NP_001560	P51617
379	PK665	IRAK4	T345+S346	RpAb	NP_001107654.1	Q9NWZ3
380	PN117	IRS1	S312	RpAb	NP_005535	P35568
381	PN118	IRS1	S639	RpAb	NP_005535	P35568
382	PN045	IRS1	Y612	RpAb	NP_005535	P35568
383	PK666	ITK	Y512	RpAb	NP_005537.3	Q08881
384	PN521	ITSN2 (Intersectin-2)	Y968	RpAb	NP_006268.2	Q9NZM3
385	PK126	JAK1	Y1034	RpAb	NP_002218	P23458
386	NK084-5	JAK1	Pan-specific	RpAb	NP_002218	P23458
387	NK085	JAK2	Pan-specific	RpAb	NP_004963	O60674
388	PK034-1	JAK2	Y1007+Y1008	RpAb	NP_004963	O60674
389	PK667	JAK2	Y1007+Y1008	RpAb	NP_004963	O60674
390	PK668	JAK2	Y570	RpAb	NP_004963	O60674
391	NK085-2	JAK2	Pan-specific	RpAb	NP_004963	O60674
392	NK085-3	JAK2	Pan-specific	RpAb	NP_004963	O60674
393	NK086	JAK3	Pan-specific	MmAb	NP_000206	P52333
394	PK669	JAK3	Y980+Y981	RpAb	NP_000206	P52333
395	NK086-3	JAK3	Pan-specific	RpAb	NP_000206	P52333
396	NK086-4	JAK3	Pan-specific	RpAb	NP_000206	P52333
397	PK670	JNK1 (MAPK8, SAPKg)	Y185	RpAb	NP_002741	P45983
398	PK035-2	JNK1 (MAPK8, SAPKg)	T183+Y185	RpAb	NP_002741	P45983

399	NK217-2	JNK1 (MAPK8, SAPKg)	Pan-specific	RpAb	NP_002741	P45983
400	NK196	JNK2 (MAPK9, SAPKa)	Pan-specific	RpAb	NP_002743.3	P45984
401	NK197-2	JNK3 (MAPK10, SAPKb)	Pan-specific	RpAb	NP_002744.1	P53779
402	NK197	JNK3 (MAPK10, SAPKb)	Pan-specific	RpAb	NP_002744.1	P53779
403	NN162	Jun (c-Jun)	Pan-specific	MmAb	NP_002219	P05412
404	PN154	Jun (c-Jun)	S243	RpAb	NP_002219	P05412
405	PN048-1	Jun (c-Jun)	S73	RpAb	NP_002219	P05412
406	PN048-2	Jun (c-Jun)	S73	RpAb	NP_002219	P05412
407	PN163	Jun (c-Jun)	T91	RpAb	NP_002219	P05412
408	PN155	Jun (c-Jun)	Y170	RpAb	NP_002219	P05412
409	PK671	KHS1	S174	RpAb	NP_006566.2	Q9Y4K4
410	PK672	KHS1	Y31	RpAb	NP_006566.2	Q9Y4K4
411	PK674	Kit	S821+Y823	RpAb	NP_000213.1	P10721
412	PK036	Kit	Y703	RpAb	NP_000213.1	P10721
413	PK150	Kit	Y721	RpAb	NP_000213.1	P10721
414	PK037	Kit	Y730	RpAb	NP_000213.1	P10721
415	PK038	Kit	Y936	RpAb	NP_000213.1	P10721
416	PK673	Kit	Y936	RpAb	NP_000213.1	P10721
417	NK241-1	Kit	Pan-specific	RpAb	NP_000213.1	P10721
418	NK241-2	Kit	Pan-specific	RpAb	NP_000213.1	P10721
419	NK090-2	Krs-1	Pan-specific	GpAb	XP_011523731.1	Q8IVT5
420	NK113-3	Krs-2	Pan-specific	GpAb	NP_006273	Q13043
421	PK675	Ksr1	S404	RpAb	XP_011523731.1	Q8IVT5
422	NK090-1	Ksr1	Pan-specific	RpAb	XP_011523731.1	Q8IVT5
423	PK676	Ksr2	S490	RpAb	NP_006273	Q6VAB6
424	PK677	LATS1	S464	RpAb	NP_004681.1	O95835
425	PK678	LATS1	S909	RpAb	NP_004681.1	O95835
426	NK092-2	Lck	Pan-specific	MmAb	NP_055387.2	Q9NRM7
427	PK039	Lck	S158	RpAb	NP_005347	P06239
428	PK040	Lck	Y192	RpAb	NP_005347	P06239
429	PK679	Lck	Y192	RpAb	NP_005347	P06239
430	PK680	Lck	Y263+Y264	RpAb	NP_005347	P06239
431	PK149	Lck	Y394	MmAb	NP_005347	P06239
432	PK041	Lck	Y505	RpAb	NP_005347	P06239
433	NK093	LIMK1	Pan-specific	MmAb	NP_002305	P53667
434	PK681	LIMK1	T508	RpAb	NP_002305	P53667
435	PK682	LKB1 (STK11)	S31	RpAb	NP_000446.1	Q15831
436	PK683	LKB1 (STK11)	S428	RpAb	NP_000446.1	Q15831
437	NK227-2	LKB1 (STK11)	Pan-specific	RpAb	NP_000446.1	Q15831
438	NK227-4	LKB1 (STK11)	Pan-specific	RpAb	NP_000446.1	Q15831
439	PK684	LMR2	S1450	RpAb	NP_055731.2	Q8IWU2
440	PK685	LOK (STK10)	S191	RpAb	NP_005981.3	O94804
441	PK686	LOK (STK10)	T952	RpAb	NP_005981.3	O94804
442	PK687	LTK	Y672	RpAb	NP_002335.2	P29376
443	NK095	Lyn	Pan-specific	MmAb	NP_002341	P07948

444	PK688	Lyn	Y508	RpAb	NP_002341	P07948
445	PK689	MAK	T157	RpAb	NP_005897.1	P20794
446	NK097	MAPKAPK2 (RPS6KC1)	Pan-specific	GpAb	NP_116584	P49137
447	PK690	MAPKAPK2 (RPS6KC1)	T222	RpAb	NP_116584	P49137
448	PK691	MAPKAPK2 (RPS6KC1)	Y225+T226	RpAb	NP_116584	P49137
449	PK049-PK112-2	MAPKAPK2 (RPS6KC1)	T334	RpAb	NP_109587.1	P36507
450	PK692	MAPKAPK3	Y76	RpAb	NP_001230854.1	Q16644
451	PK693	MAPKAPK5	T186	RpAb	NP_620777.1	Q8IW41
452	PK694	MARK1	T215	RpAb	NP_061120.3	Q9P0L2
453	PK697	MARK3	T507	RpAb	NP_001122390.2	P27448
454	PN169	MDM2	S166	RpAb	XP_005268929.1	Q00987
455	PK698	MEK1 (MAP2K1)	S222	RpAb	NP_002746	Q02750
456	PK047-2	MEK1 (MAP2K1)	S298	RpAb	NP_002746	Q02750
457	PK046-1	MEK1 (MAP2K1)	T292	RpAb	NP_002746	Q02750
458	PK046-2	MEK1 (MAP2K1)	T292	RpAb	NP_002746	Q02750
459	PK048-1	MEK1 (MAP2K1)	T386	RpAb	NP_002746	Q02750
460	PK048-2	MEK1 (MAP2K1)	T386	RpAb	NP_002746	Q02750
461	PK045-PN007	MEK1 (MAP2K1) + B23 (NPM)	S218+S222	RpAb	NP_002746	Q02750
462	NK099-9	MEK1 (MAP2K1)	Pan-specific	RpAb	NP_002746	Q02750
463	NK099-7	MEK1 (MAP2K1)	Pan-specific	RpAb	NP_002746	Q02750
464	NK099-3	MEK1 (MAP2K1)	Pan-specific	RpAb	NP_002746	Q02750
465	PK049-2	MEK2 (MAP2K2)	T394	RpAb	NP_109587.1	P36507
466	PK050	MEK2 (MAP2K2) mouse	T394	RpAb	NP_109587.1	P36507
467	NK100-5	MEK2 (MAP2K2)	Pan-specific	RpAb	NP_109587.1	P36507
468	NK100-4	MEK2 (MAP2K2)	Pan-specific	RpAb	NP_109587.1	P36507
469	NK101	MKK3 (MAP2K3, MEK3)	Pan-specific	RpAb	NP_659732	P46734
470	PK051-4	MKK3 (MAP2K3, MEK3)	S218/S207	RpAb	NP_002747	P46734
471	NK103	MKK4 (MAP2K4, MEK4)	Pan-specific	RpAb	NP_003001.1	P45985
472	NK104	MEK5 (MAP2K5, MKK5)	Pan-specific	GpAb	NP_660143	Q13163
473	PK699	MEK5 (MAP2K5, MKK5)	S311	RpAb	NP_660143	Q13163
474	NK104-3	MEK5 (MAP2K5, MKK5)	Pan-specific	RpAb	NP_660143	Q13163
475	NK107-4	MEKK1 (MAP3K1)	Pan-specific	RpAb	XP_042066	Q13233
476	NK108-2	MEKK2 (MAP3K2)	Pan-specific	RpAb	NP_006600.3	Q9Y2U5
477	PK700	MEKK2 (MAP3K2)	S239	RpAb	NP_006600.3	Q9Y2U5
478	NK108-3	MEKK2 (MAP3K2)	Pan-specific	RpAb	NP_006600.3	Q9Y2U5
479	NK107-3	MEKK1 (MAP3K1)	Pan-specific	RpAb	XP_042066	Q13233
480	PK702	MERTK	Y749	RpAb	NP_006334.2	Q12866
481	PK703	MERTK	Y749+Y753	RpAb	NP_006334.2	Q12866
482	PK704	MERTK	Y753	RpAb	NP_006334.2	Q12866
483	PK705	Met	S1236	RpAb	NP_006334.2	P08581
484	PK706	Met	T1241	RpAb	NP_006334.2	P08581
485	PK707	Met	T1355+Y1356	RpAb	NP_006334.2	P08581
486	PK708	Met	Y1003	RpAb	NP_006334.2	P08581
487	PK709	Met	Y1230 (listed as Y1234)	RpAb	NP_006334.2	P08581
488	PK055-1	Met	Y1230+Y1234+Y1235	RpAb	NP_006334.2	P08581

489	PK710	Met	Y1234	RpAb	NP_006334.2	P08581
490	PK711	Met	Y1234+Y1235	RpAb	NP_006334.2	P08581
491	PK712	Met	Y1234+Y1235+S1236	RpAb	NP_006334.2	P08581
492	NK110-2	Met	Pan-specific	RpAb	NP_006334.2	P08581
493	NK110-3	Met	Pan-specific	RpAb	NP_006334.2	P08581
494	PK713	MKK3 (MAP2K3, MEK3)	S218	RpAb	NP_002747	P46734
495	PK714	MKK3 (MAP2K3, MEK3)	Y230	RpAb	NP_002747	P46734
496	NK101-5	MKK3 (MAP2K3, MEK3)	Pan-specific	RpAb	NP_002747	P46734
497	NK101-6	MKK3 (MAP2K3, MEK3)	Pan-specific	RpAb	NP_002747	P46734
498	PK715	MKK4 (MAP2K4, MEK4)	S257	RpAb	NP_003001.1	P45985
499	PK716	MKK4 (MAP2K4, MEK4)	S80	RpAb	NP_003001.1	P45985
500	NK103-4	MKK4 (MAP2K4, MEK4)	Pan-specific	RpAb	NP_003001.1	P45985
501	NK103-5	MKK4 (MAP2K4, MEK4)	Pan-specific	RpAb	NP_003001.1	P45985
502	NK103-7 (was NK101-2)	MKK4 (MAP2K4, MEK4)	Pan-specific	RpAb	NP_003001.1	P46734
503	NK105-3	MKK6 (MAP2K6, MEK6)	Pan-specific	RpAb	NP_002749.2	P52564
504	NK105-4	MKK6 (MAP2K6, MEK6)	Pan-specific	RpAb	NP_002749.2	P52564
505	PK717	MKK7 (MAP2K7, MEK7)	T275	RpAb	NP_005034	O14733
506	NK106-3	MKK7 (MAP2K7, MEK7)	Pan-specific	RpAb	NP_005034	O14733
507	NK106-4	MKK7 (MAP2K7, MEK7)	Pan-specific	RpAb	NP_005034	O14733
508	PN051-1	MLC (MRLC2, MYL12B)	S19	RpAb	NP_291024	P19105
509	NK208	MLK3 (MAP3K11)	Pan-specific	RpAb	NP_002410	Q16584
510	PK718	MLK3 (MAP3K11)	S281	RpAb	NP_002410	Q16584
511	PK056	MLK3 (MAP3K11)	T277+S281	RpAb	NP_002410	Q16584
512	PK719	MLTK	T161+T162	RpAb	NP_057737.2	Q9NYL2
513	PK720	MOK (RAGE)	T159+Y161	RpAb	NP_055041.1	Q9UQ07
514	PK721	MOK (RAGE)	Y167	RpAb	NP_055041.1	Q9UQ07
515	PK722	Mos	Y263	RpAb	NP_005363	P00540
516	NK112	Mos	Pan-specific	RpAb	NP_005363	P00540
517	PK723	MSK1 (RPS6KA5)	S212	RpAb	NP_004746	O75582
518	PK058	MSK1 (RPS6KA5)	S376	RpAb	NP_004746	O75582
519	PK725	MSK2 (RPS6KA4)	T687	RpAb	NP_003933.1	O75676
520	NK113-1	MST1	Pan-specific	RpAb	NP_006273	Q13043
521	NK113-2	MST1	Pan-specific	MmAb	NP_006273	Q13043
522	NK114	MST2	Pan-specific	RpAb	NP_006272	Q13188
523	NK115	MST3 (STK24)	Pan-specific	MmAb	NP_003567	Q9Y6E0
524	PK727	MST3 (STK24)	T184	RpAb	NP_003567	Q9Y6E0
525	PK728	MST3 (STK24)	T190	RpAb	NP_003567	Q9Y6E0
526	PK729	mTOR (FRAP)	S2448	RpAb	NP_004949	P42345
527	PK730	mTOR (FRAP)	S2478+S2481	RpAb	NP_004949	P42345
528	PK116	mTOR (FRAP)	S2448	RmAb	NP_004949	P42345
529	NK116-4	mTOR (FRAP)	Pan-specific	RpAb	NP_004949	P42345
530	NK116-3	mTOR (FRAP)	Pan-specific	RpAb	NP_004949	P42345
531	PN186	Myc	S373	RpAb	NP_002458.2	P01106
532	PN199	Myc	T58	RpAb	NP_002458.2	P01106
533	PN182	MyoD	S200	RpAb	NP_002469.2	P15172

534	PN052	MYPT1 (PPP1R12A)	T696	RpAb	NP_446342	O14974
535	PN187	NBS1 (NBN, Nibrin)	S343	RpAb	NP_001019859.1	O60934
536	PK731	NDR1 (NDR, STK38)	S281+T282	RpAb	NP_001292031.1	Q15208
537	NK117-3	Nek2	Pan-specific	GpAb	NP_002488	P51955
538	NK117-4	Nek2	Pan-specific	GpAb	NP_002488	P51955
539	PK732	Nek2	S171	RpAb	NP_002488	P51955
540	PK733	Nek2	T170+S171	RpAb	NP_002488	P51955
541	PK734	Nek6	S206	RpAb	NP_001159640.1	Q9HC98
542	NK119	Nek7	Pan-specific	RpAb	NP_598001	Q8TDX7
543	PK735	Nek7	T191+S195	RpAb	NP_598001	Q8TDX7
544	NN070	NFKB p65 p50	Pan-specific	RpAb	NP_003989	P19838
545	NN071	NFKB p65 (Rel A)	Pan-specific	RpAb	NP_003989	Q04206
546	PN053-1	NFKB p65 (Rel A)	S276	RpAb	NP_003989	Q04206
547	PN156	NFKB p65 (Rel A)	S529	RpAb	NP_003989	Q04206
548	PN157	NFKB p65 (Rel A)	S536	RpAb	NP_003989	Q04206
549	PN054	NMDAR2B (GRIN2B)	Y1474	RpAb	NP_000825	Q13224
550	PN055-1	NMDAR1 (Glutamate)	S896	RpAb	NP_000823	Q05586
551	PK737	NuaK1	T211	RpAb	NP_055655.1	O60285
552	PK738	OSR1	T185	RpAb	NP_005100.1	O95747
553	PK739	p38a MAPK (MAPK14)	T180+Y182	RpAb	NP_001306	Q16539
554	PK740	p38a MAPK (MAPK14)	T180+Y182	RpAb	NP_001306	Q16539
555	PK060-1	p38a MAPK (MAPK14)	T180+Y182	RpAb	NP_001306	Q16539
556	PK060-3	p38a MAPK (MAPK14)	T180+Y182	RpAb	NP_001306	Q16539
557	NK120-7	p38a MAPK (MAPK14)	Pan-specific	RpAb	NP_001306	Q16539
558	NK120-10	p38a MAPK (MAPK14)	Pan-specific	RpAb	NP_001306	Q16539
559	PK741	p38b MAPK (MAPK11)	T180+Y182	RpAb	NP_002742.3	Q15759
560	NK248-1	p38b MAPK (MAPK11)	Pan-specific	RpAb	NP_002742.3	Q15759
561	NK248-2	p38b MAPK (MAPK11)	Pan-specific	RpAb	NP_002742.3	Q15759
562	PK742	p38d MAPK (MAPK13)	T180+Y182	RpAb	NP_002745	O15264
563	PK743	p38d MAPK (MAPK13)	Y182	RpAb	NP_002745	O15264
564	NK121-2	p38d MAPK (MAPK13)	Pan-specific	RpAb	NP_002745	O15264
565	NK121-3	p38d MAPK (MAPK13)	Pan-specific	RpAb	NP_002745	O15264
566	NK059-3	p38g MAPK (MAPK12, ERK6, SAPK3)	Pan-specific	RpAb	NP_002960.2	P53778
567	NK059-4	p38g MAPK (MAPK12, ERK6, SAPK3)	Pan-specific	RpAb	NP_002960.2	P53778
568	NK059-5	p38g MAPK (MAPK12, ERK6, SAPK3)	Pan-specific	RpAb	NP_002960.2	P53778
569	NN082	p53 (TP53)	Pan-specific	MmAb	NP_000537	P04637
570	PN158	p53 (TP53)	S33	RpAb	NP_000537	P04637
571	PN159	p53 (TP53)	S37	RpAb	NP_000537	P04637
572	PN057-2	p53 (TP53)	S392	RpAb	NP_000537	P04637
573	PN160	p53 (TP53)	S6	RpAb	NP_000537	P04637
574	NK223	p70 S6K (RPS6KB1, p70S6Ka)	Pan-specific	MmAb	NP_003152	P23443
575	PK744	p70 S6K (RPS6KB1, p70S6Ka)	T252	RpAb	NP_003152	P23443
576	PK147	p70 S6K (RPS6KB1, p70S6Ka)	T389	RpAb	NP_003152	P23443
577	PK745	p70 S6K (RPS6KB1, p70S6Ka)	T412	RpAb	NP_003152	P23443

578	PK746	p70 S6K (RPS6KB1, p70S6Ka)	T444+S447	RpAb	NP_003152	P23443
579	NK223-2	p70 S6K (RPS6KB1, p70S6Ka)	Pan-specific	RpAb	NP_003152	P23443
580	PK747	p70 S6K (RPS6KB1, p70S6Ka)	S423	RpAb	NP_003943.2	Q9UBS0
581	NK122	PAK1 (PAKa)	Pan-specific	RpAb	NP_002567	Q13153
582	PK748	PAK1 (PAKa)	S144	RpAb	NP_002567	Q13153
583	PK130	PAK1 (PAKa)	T212	RpAb	NP_002567	Q13153
584	PK749	PAK1 (PAKa)	T423	RpAb	NP_002567	Q13153
585	PK061	PAK1 (PAKa)	S144/S141/S154	RpAb	NP_002567	Q13153
586	NK122-2	PAK1 (PAKa)	Pan-specific	RpAb	NP_002567	Q13153
587	NK200-2	PAK2 (PAKg)	Pan-specific	GpAb	NP_002568.2	Q13177
588	PK750	PAK2 (PAKg)	S141	RpAb	NP_002568.2	Q13177
589	PK751	PAK2 (PAKg)	Y130	RpAb	NP_002568.2	Q13177
590	NK200	PAK2 (PAKg)	Pan-specific	RpAb	NP_002568.2	Q13177
591	NK123	PAK3 (PAKb)	Pan-specific	GpAb	NP_002569	O75914
592	PK752	PAK4	S474	RpAb	NP_001014831.1	O96013
593	PK753	PAK5	S602	RpAb	NP_065074.1	Q9P286
594	NN086	Paxillin 1 (PXN)	Pan-specific	MmAb	NP_002850	P49023
595	PN060-1	Paxillin 1 (PXN)	Y118	RpAb	NP_002850	P49023
596	PN059	Paxillin 1 (PXN)	Y31	RpAb	NP_002850	P49023
597	PK754	PBK	Y74	RpAb	NP_060962.2	Q96KB5
598	NK125	PCTAIRE1 (CDK16, PCTK1)	Pan-specific	RbAb	NP_148978	Q00536
599	PK755	PCTAIRE1 (CDK16, PCTK1)	Y176	RpAb	NP_148978	Q00536
600	PK756	PCTAIRE2 (CDK17, PCTK2)	S180	RpAb	NP_002586.2	Q00537
601	PK757	PDGFRA	S847+Y849	RpAb	NP_006197	P16234
602	PK063	PDGFRA	Y754	RpAb	NP_006197	P16234
603	PK758	PDGFRA	Y762	RpAb	NP_006197	P16234
604	PK759	PDGFRA	Y768	RpAb	NP_006197	P16234
605	NK242-1	PDGFRA	Pan-specific	RpAb	NP_006197	P16234
606	NK242-2	PDGFRA	Pan-specific	RpAb	NP_006197	P16234
607	PK065	PDGFRB	Y716	RpAb	NP_032835	P09619
608	NK243-1	PDGFRB	Pan-specific	RpAb	NP_032835	P09619
609	NK243-3	PDGFRB	Pan-specific	RpAb	NP_032835	P09619
610	NK126-2	PRDK1	Pan-specific	GpAb	NP_002604	O15530
611	PK760	PDK1	S241	RpAb	NP_002604.1	O15530
612	PN522	PDLIM5 (LIM)	Y251	RpAb	NP_001011515.1	Q96HC4
613	PN523	PECAM-1	Y713	RpAb	NP_000433.4	P16284
614	PN061	PED15 (PEA15)	S116	RpAb	NP_003759	Q15121
615	PN525	PGK1	Y196	RpAb	NP_000282.1	P00558
616	NN089	PIK3R1	Pan-specific	MmAb	NP_852664	P27986
617	PN526	PIK3R1	Y467	RpAb	NP_852664	P27986
618	PN527	PIK3R1	Y580	RpAb	NP_852664	P27986
619	PN528	PIK3R2	Y464	RpAb	NP_005018.1	O00459
620	PK761	Pim2	T195	RpAb	NP_006866.2	Q9P1W9
621	PK762	PIP5K (PIKFYVE)	S307	RpAb	NP_055855.2	Q9Y2I7
622	NK127-1	PRKACA/B (PKACA/B)	Pan-specific	MmAb	NP_002721	P17612

623	PK067	PRKCA/B (PKACA/B)	T198	RpAb	NP_002721	P17612
624	PK068	PRKACB (PKACB)	S339	RpAb	NP_002722	P22694
625	PK148	Akt1 (PKBa)	Y474	RpAb	NP_001014431.1	P31749
626	NK132	PKCa (PRKCA)	Pan-specific	MmAb	NP_002728	P17252
627	PK763	PKCa (PRKCA)	T497	RpAb	NP_002728	P17252
628	PK764	PKCa (PRKCA)	Y195	RpAb	NP_002728	P17252
629	NK201	PKCa (PRKCA)	Pan-specific	RpAb	NP_002728	P17252
630	PK765	PKCb (PRKCB)	S661	RpAb	NP_002729	P05771
631	PK766	PKCb (PRKCB)	T500	RpAb	NP_002729	P05771
632	NK133	PKCb (PRKCB)	Pan-specific	RpAb	NP_002729	P05771
633	NK133-2	PKCb (PRKCB)	Pan-specific	MmAb	NP_002729	P05771
634	PK076-2	PKCb (PRKCB2)	T642	RpAb	NP_002729	P05771
635	NK135	PKCd (PRKCD)	Pan-specific	RpAb	NP_006245	Q05655
636	PK079-1	PKCd (PRKCD)	S645	RpAb	NP_006245	Q05655
637	PK080	PKCd (PRKCD)	S664	RpAb	NP_006245	Q05655
638	PK767	PKCd (PRKCD)	T507	RpAb	NP_006245	Q05655
639	PK077-1	PKCd (PRKCD)	Y313	RpAb	NP_006245	Q05655
640	PK077-2	PKCd (PRKCD)	Y313	RpAb	NP_006245	Q05655
641	PK768	PKCd (PRKCD)	Y313	RpAb	NP_006245	Q05655
642	PK769	PKCd (PRKCD)	Y334	RpAb	NP_006245	Q05655
643	NK136	PKCe (PRKCE)	Pan-specific	RpAb	NP_005391	Q02156
644	NK136-2	PKCe (PRKCE)	Pan-specific	GpAb	NP_005391	Q02156
645	PK081-1	PKCe (PRKCE)	S729	RpAb	NP_005391	Q02156
646	NK137	PKCg (PRKCG)	Pan-specific	RpAb	NP_002730	P05129
647	PK082-1	PKCg (PRKCG)	T514	RpAb	NP_002730	P05129
648	PK082-2	PKCg (PRKCG)	T514	RpAb	NP_002730	P05129
649	PK083	PKCg (PRKCG)	T655	RpAb	NP_002730	P05129
650	PK084	PKCg (PRKCG)	T674	RpAb	NP_002730.1	P05129
651	NK218	PKCh (PRKCH)	Pan-specific	RpAb	NP_006246.2	P24723
652	PK085	PKCh (PRKCH)	T656	RpAb	NP_006246	P24723
653	NK138-1	PKCi (PRKCI)	Pan-specific	GpAb	NP_002731	P41743
654	PK087	PKCi (PRKCI)	T564	RpAb	NP_002731	P41743
655	PK770	PKCm (PRKCM, PKD1)	S205	RpAb	NP_002733	Q15139
656	PK092	PKCm (PRKCM, PKD1)	S738+S742	RpAb	NP_002733	Q15139
657	PK093-1	PKCm (PRKCM, PKD1)	S910	RpAb	NP_002733	Q15139
658	PK089-1	PKCq (PRKCQ, PKC-theta)	S676	RpAb	NP_006248	Q04759
659	PK090-1	PKCq (PRKCQ, PKC-theta)	S695	RpAb	NP_006248	Q04759
660	PK772	PKCq (PRKCQ, PKC-theta)	S695	RpAb	NP_006248	Q04759
661	PK773	PKCq (PRKCQ, PKC-theta)	Y545	RpAb	NP_006248	Q04759
662	NK140	PKCq (PRKCQ, PKC-theta)	Pan-specific	MmAb	NP_006248	Q04759
663	NK141	PKCz (PRKCZ)	Pan-specific	RpAb	NP_002735	Q05513
664	PK774	PKCz (PRKCZ)	S262+Y263	RpAb	NP_002735	Q05513
665	PK775	PKCz (PRKCZ)	T410	RpAb	NP_002735	Q05513
666	NK142	PKCm (PRKCM, PKD1)	Pan-specific	RpAb	NP_002733	Q15139
667	PN529	PKM2	Y390	RpAb	NP_002645.3	P14618

668	NK148	PRK1 (PKN1, PRKCL1)	Pan-specific	GpAb	NP_002732	Q16512
669	NK144-1	PKR1 (PRKR, EIF2AK2)	Pan-specific	MmAb	NP_002750	P19525
670	PK132	PKR1 (PRKR, EIF2AK2)	T446	RpAb	NP_002750	P19525
671	PK777	PKR1 (PRKR, EIF2AK2)	T446	RpAb	NP_002750	P19525
672	NN156	PLC R (PLCg2)	Pan-specific	RpAb	NP_002652.2	P16885
673	PN165	PLCg1	Y771	RpAb	NP_877963.1	P19174
674	PN144	PLCg1	Y783	RpAb	NP_877963.1	P19174
675	PN530	PLCg1	Y783	RpAb	NP_877963.1	P19174
676	PN143	PLCg2	Y753	RpAb	NP_002652.2	P16885
677	PN531	PLCg2	Y759	RpAb	NP_002652.2	P16885
678	PK778	Plk1 (PLK)	T210	RpAb	NP_002652.2	P53350
679	PK779	Plk1 (PLK)	Y217	RpAb	NP_002652.2	P53350
680	PK780	Plk4	T170	RpAb	NP_001177728.1	O00444
681	PN532	PPP1R11	Y64	RpAb	NP_068778.1	O60927
682	PN062	PRAS40 (Akt1S1)	T246	RpAb	NP_115751	Q96B36
683	PK781	PRK1 (PKN1, PRKCL1)	T774	RpAb	NP_002732	Q16512
684	PK782	PRKACA (PKACA)	T196+T198	RpAb	NP_002721	P17612
685	PK784	PRKD2 (PKD2)	S197+S198	RpAb	NP_001073349.1	Q9BZL6
686	PK785	PRKX	T201+T203	RpAb	NP_005035.1	P51817
687	PK786	PRP4K (PRP4, PRPF4B)	Y849	RpAb	NP_003904.3	Q13523
688	NP023	PTEN	Pan-specific	MmAb	NP_000305	P60484
689	PP003	PTEN	S380+T382+S385	RpAb	NP_000305	P60484
690	PP006	PTEN	S380+T382+T383	RpAb	NP_000305	P60484
691	PP006-1	PTEN	S380+T382+T383	RpAb	NP_000305	P60484
692	NP023-5	PTEN	Pan-specific	RpAb	NP_000305	P60484
693	PP004	SHP2 (PTP1D)	S580	RpAb	NP_002825	Q06124
694	PN533	PTRF	Y308	RpAb	NP_036364.2	Q6NZI2
695	PG001	p-Tyr phosphorylated proteins	Phospho	RpAb		
696	NK154	PYK2 (PTK2B, FAK2)	Pan-specific	GpAb	NP_004094	Q14289
697	PK787	PYK2 (PTK2B, FAK2)	Y402	RpAb	NP_004094	Q14289
698	PK097-3	PYK2 (PTK2B, FAK2)	Y579	RpAb	NP_004094	Q14289
699	PK789	PYK2 (PTK2B, FAK2)	Y579+Y580	RpAb	NP_004094	Q14289
700	PG005	PYKSD8	Phospho	RpAb		
701	NN092-1	Rac1/cdc42	Pan-specific	MmAb	NP_001782	P63000
702	PN063	Rac1/cdc42	S71	RpAb	NP_008839	P63000
703	PK790	Raf1 (c-Raf, RafC))	S259	RpAb	NP_002871	P04049
704	PK791	Raf1 (c-Raf, RafC))	S296	RpAb	NP_002871	P04049
705	PK792	Raf1 (c-Raf, RafC))	S301+T303	RpAb	NP_002871	P04049
706	NK155-5	Raf1 (c-Raf, RafC))	Pan-specific	RpAb	NP_002871	P04049
707	NK155-8	Raf1 (c-Raf, RafC))	Pan-specific	RpAb	NP_002871	P04049
708	NN093	Rb	Pan-specific	MmAb	NP_000312	P06400
709	PN066	Rb	S612	RpAb	NP_000312	P06400
710	PN067	Rb	S780	RpAb	NP_000312	P06400
711	PN131-1	Rb	S795	RpAb	NP_000312	P06400
712	PN068	Rb	S807	RpAb	NP_000312	P06400

713	PN065	Rb	T356	RpAb	NP_000312	P06400
714	PN070	Rb	T821	RpAb	NP_000312	P06400
715	PN071	Rb	T826	RpAb	NP_000312	P06400
716	NN170	RelB	Pan-specific	RpAb	NP_006500.2	Q01201
717	PN151	RelB	S573	RpAb	NP_006500.2	Q01201
718	PK793	Ret	Y905	RpAb	NP_065681	P07949
719	NK244-1	Ret	Pan-specific	RpAb	NP_065681	P07949
720	NK244-2	Ret	Pan-specific	RpAb	NP_065681	P07949
721	PK794	RIOK1	Y466	RpAb	NP_113668.2	Q9BRS2
722	NK158	RIPK1	Pan-specific	MmAb	NP_003795	Q13546
723	PK795	RIPK1	Y384	RpAb	NP_003795	Q13546
724	PK796	RIPK2	S176	RpAb	NP_003812.1	O43353
725	PK797	RIPK2	Y381	RpAb	NP_003812.1	O43353
726	PK798	ROCK1 (ROKb)	Y913	RpAb	NP_005397	Q13464
727	PK799	ROCK2 (ROKa)	Y722	RpAb	NP_004841	O75116
728	NK160	ROCK1 (ROKb)	Pan-specific	MmAb	NP_005397	Q13464
729	NK159-1	ROCK2 (ROKa)	Pan-specific	MmAb	NP_004841	O75116
730	NK159-2	ROCK2 (ROKa)	Pan-specific	RpAb	NP_004841	O75116
731	PK800	Ron (MST1R)	Y1238	RpAb	NP_002438	Q04912
732	PK801	Ron (MST1R)	Y1238 +Y1239	RpAb	NP_002438	Q04912
733	NK161-2	Ron (MST1R)	Pan-specific	RpAb	NP_002438	Q04912
734	NK161	Ron (MST1R)	Pan-specific	MmAb	NP_002438	Q04912
735	PK802	ROR2	Y645+Y646	RpAb	NP_004551.2	Q01974
736	PK803	Ros (ROS1)	Y2114+Y2115	RpAb	NP_002935	P08922
737	NK163-3	Ros (ROS1)	Pan-specific	RpAb	NP_002935	P08922
738	NK163-4	Ros (ROS1)	Pan-specific	RpAb	NP_002935	P08922
739	NK164	RSK1 (RPS6KA1, p90 RSK)	Pan-specific	RpAb	NP_002944	Q15418
740	PK804	RSK1 (RPS6KA1, p90 RSK)	S221	RpAb	NP_002944	Q15418
741	PK157	RSK1 (RPS6KA1, p90 RSK)	S363	RpAb	NP_002944	Q15418
742	PK805	RSK1 (RPS6KA1, p90 RSK)	S380	RpAb	NP_002944	Q15418
743	PK158	RSK1 (RPS6KA1, p90 RSK)	T359	RpAb	NP_002944	Q15418
744	PK806	RSK1 (RPS6KA1, p90 RSK)	T573	RpAb	NP_002944	Q15418
745	PK807	RSK1 (RPS6KA1, p90 RSK)	Y220+S221	RpAb	NP_002944	Q15418
746	PK099	RSK2 (RPS6KA3, p90 RSK2)	S221/S227	RpAb	NP_002944	Q15418
747	PK100	RSK2 (RPS6KA3, p90 RSK2)	S363/S369	RpAb	NP_002944	Q15418
748	PK100-2	RSK2 (RPS6KA3, p90 RSK2)	S363/S369	RpAb	NP_002944	Q15418
749	PK101-2	RSK2 (RPS6KA3, p90 RSK2)	S380/S386	RpAb	NP_002944	Q15418
750	PK102	RSK3 (RPS6KA2, p90 RSK3)	T573/T577/T570	RpAb	NP_002944	Q15418
751	PK808	RSK3 (RPS6KA2, p90 RSK3)	Y217+S218	RpAb	NP_066958.2	Q15349
752	PN073	RPS6	S235	RpAb	NP_001001	P62753
753	PK166	p70 S6K (RPS6KB1, p70S6Ka)	S434	RpAb	NP_003152	P23443
754	PK156	p70 S6K (RPS6KB1, p70S6Ka)	S447	RpAb	NP_003152	P23443
755	PK145	p70 S6K (RPS6KB1, p70S6Ka)	T252	RpAb	NP_003152	P23443
756	PK146	p70 S6K (RPS6KB1, p70S6Ka)	T444+S447	RpAb	NP_003152	P23443
757	PK809	SCYL1	S754	RpAb	NP_065731.3	Q96KG9

758	PK810	Sgk223	Y413	RpAb	NP_001074295.2	Q86YV5
759	PK811	SgK269	Y635	RpAb	NP_079052.2	Q9H792
760	PN161	Shc1	Y349	RpAb	NP_003020	P29353
761	PN074	Shc1	Y349+Y350	RpAb	NP_003020	P29353
762	PN534	SHIP2 (INPPL1)	Y886	RpAb	NP_001558.3	O15357
763	NP045-2	SHIP2 (INPPL1)	Pan-specific	RpAb	NP_001558.3	O15357
764	NP045-3	SHIP2 (INPPL1)	Pan-specific	RpAb	NP_001558.3	O15357
765	NP026-2	SHP2 (PTP1D)	Pan-specific	RpAb	NP_002825	Q06124
766	PK812	SIK (SIK1)	T182	RpAb	NP_775490.2	P57059
767	PK813	SIK2 (QIK)	S358	RpAb	NP_056006.1	Q9H0K1
768	NK249-2	SIK2 (QIK)	Pan-specific	RpAb	NP_056006.1	Q9H0K1
769	NK249-3	SIK2 (QIK)	Pan-specific	RpAb	NP_056006.1	Q9H0K1
770	PK814	SIK3 (QSK)	T163	RpAb	NP_001268678.1	Q9Y2K2
771	PK815	SIK3 (QSK)	T411	RpAb	NP_001268678.1	Q9Y2K2
772	NK250-1	SIK3 (QSK)	Pan-specific	RpAb	NP_001268678.1	Q9Y2K2
773	NK250-2	SIK3 (QSK)	Pan-specific	RpAb	NP_001268678.1	Q9Y2K2
774	PN535	SIT	Y90	RpAb	NP_055265.1	Q9Y3P8
775	PN536	SIT	Y95	RpAb	NP_055265.1	Q9Y3P8
776	PK816	SLK (STK2)	S189	RpAb	NP_055535.2	Q9H2G2
777	PN183	Smad1	S465	RpAb	NP_001003688.1	Q15797
778	PN184	Smad2	S467	RpAb	NP_001003652	Q15796
779	PN185	Smad2	T220	RpAb	NP_001003652	Q15796
780	NN096	Smad2/3	Pan-specific	MmAb	NP_005892	Q15796
781	PN125	SMC1	S957	RpAb	NP_006297.2	Q14683
782	PK817	SMG1	T3550	RpAb	NP_055907.3	Q96Q15
783	PN197	SNCA (a-Synuclein)	S129	RpAb	NP_000336.1	P37840
784	PN537	snRNP70	Y126	RpAb	NP_003080.2	P08621
785	PN077	SOX9	S181	RpAb	NP_000337	P48436
786	NK172-3	Src	Pan-specific	RpAb	NP_005408	P12931
787	NK172-4	Src	Pan-specific	MmAb	NP_005408	P12931
788	PK107	Src	Y419	RpAb	NP_005408	P12931
789	PK818	Src	Y419	RpAb	NP_005408	P12931
790	PK108	Src	Y530	RpAb	NP_005408	P12931
791	PK819	SRPK1	S222	RpAb	NP_003128.3	Q96SB4
792	PK820	SRPK2	Y319	RpAb	NP_001265202.1	P78362
793	NN102-NN124	STAT1a	Pan-specific	RpAb	NP_009330	P42224
794	PN078-PN135	STAT1	S727	RpAb	NP_009330	P42224
795	PN079-PN136	STAT1	Y701	RpAb	NP_009330	P42224
796	NN103	STAT2	Pan-specific	RpAb	NP_005410	P52630
797	PN080	STAT2	Y690	RpAb	NP_005410	P52630
798	NN104	STAT3	Pan-specific	RpAb	NP_003141	P40763
799	PN082-1	STAT3	Y705	RpAb	NP_003141	P40763
800	PN539	STAT3	Y705+T708	RpAb	NP_003141	P40763
801	NN105	STAT5A	Pan-specific	RpAb	NP_003143	P42229
802	PN119	STAT5A	S780	RpAb	NP_003143	P42229

803	PN083-1	STAT5A	Y694	RpAb	NP_003143	P42229
804	NN106	STAT5B	Pan-specific	RpAb	NP_036580	P51692
805	NK174	Syk	Pan-specific	MmAb	NP_003168	P43405
806	PK159	Syk	Y323	RpAb	NP_003168	P43405
807	PK821	Syk	Y323	RpAb	NP_003168	P43405
808	PK822	Syk	Y352	RpAb	NP_003168	P43405
809	PK823	Syk	Y525+Y526	RpAb	NP_003168	P43405
810	PK824	TAK1 (MAP3K7)	S439	RpAb	NP_663304.1	O43318
811	PK825	TAK1 (MAP3K7)	T184+T187	RpAb	NP_663304.1	O43318
812	PK826	TAO1 (TAOK1)	S181	RpAb	NP_065842.1	Q7L7X3
813	PK827	TAO1 (TAOK1)	Y309	RpAb	NP_065842.1	Q7L7X3
814	PN085	Tau	S516	RpAb	NP_005901	P10636
815	PN090	Tau	S713	RpAb	NP_005901	P10636
816	PN090-2	Tau	S713	RpAb	NP_005901	P10636
817	PN092	Tau	S721	RpAb	NP_005901	P10636
818	PN107	Tau	S739	RpAb	NP_005901	P10636
819	PN121	Tau	T522	RpAb	NP_005901	P10636
820	PN540	TBC1D7	Y14	RpAb	NP_001137436.1	Q9P0N9
821	NK220-2	TBK1	Pan-specific	RpAb	NP_037386	Q9UHD2
822	PK828	TBK1	S172	RpAb	NP_037386	Q9UHD2
823	PK829	TEC	Y519	RpAb	NP_003206.2	P42680
824	PN541	TGM2	Y369	RpAb	NP_004604.2	P21980
825	PK830	Tie2 (TEK)	Y897	RpAb	NP_000450.2	Q02763
826	PK831	Tie2 (TEK)	Y992	RpAb	NP_000450.2	Q02763
827	PN542	TLN1 (Talin-1)	Y70	RpAb	NP_006280.3	Q9Y490
828	PK832	TNK1	Y277	RpAb	NP_001238831.1	Q13470
829	PK836	TRIM33	S1119	RpAb	NP_056990.3	Q9UPN9
830	NK178	TrkA (NTRK1)	Pan-specific	RpAb	NP_002520	P04629
831	PK837	TrkA (NTRK1)	Y680+Y681	RpAb	NP_002520	P04629
832	PK838	TrkB (NTRK2)	Y516	RpAb	NP_006171	Q16620
833	PK839	TrkB (NTRK2)	Y702	RpAb	NP_006171	Q16620
834	PK160	TrkB (NTRK2)	Y706	RpAb	NP_006171	Q16620
835	PK840	TrkC (NTRK3)	Y709+Y710	RpAb	NP_001012338.1	Q16288
836	PK841	TSSK3	T168	RpAb	NP_443073.1	Q96PN8
837	NK180	TTK	Pan-specific	RpAb	NP_003309.2	P33981
838	PK842	TTK	S677	RpAb	NP_003309.2	P33981
839	PK843	TTK	Y833+Y836	RpAb	NP_003309.2	P33981
840	PK844	TXK	Y420	RpAb	NP_003309.2	P42681
841	NK181	TYK2	Pan-specific	RpAb	NP_003322	P29597
842	PK845	TYK2	Y1054+Y1055	RpAb	NP_003322	P29597
843	PK846	TYK2	Y292	RpAb	NP_003322	P29597
844	NK181-3	TYK2	Pan-specific	RpAb	NP_003322	P29597
845	PK847	Tyro3	Y681	RpAb	NP_006284.2	Q06418
846	PK848	Tyro3	Y685+Y686	RpAb	NP_006284.2	Q06418
847	PN093-1	TH (Tyrosine hydroxylase)	S71	RpAb	NP_954986	P07101

848	PN543	VAV1	Y826	RpAb	NP_005419.2	P15498
849	PK850	VEGFR1 (FLT1)	Y1048	RpAb	NP_001153392.1	P17948
850	PK851	VEGFR1 (FLT1)	Y1053	RpAb	NP_001153392.1	P17948
851	PK852	VEGFR2 (KDR)	Y1054	RpAb	NP_002244	P35968
852	PK161	VEGFR2 (KDR)	Y1059	RpAb	NP_002244	P35968
853	PK133	VEGFR2 (KDR)	Y1214	RpAb	NP_002244	P35968
854	PK853	VEGFR3 (FLT4)	Y1068	RpAb	NP_002011	P35916
855	NK226-2	VEGFR1 (FLT1)	Pan-specific	RpAb	NP_001153392.1	P17948
856	NK245-2	VEGFR2 (KDR)	Pan-specific	RpAb	NP_002244	P35968
857	NK245-3	VEGFR2 (KDR)	Pan-specific	RpAb	NP_002244	P35968
858	NK064-2	VEGFR3 (FLT4)	Pan-specific	RpAb	NP_002011	P35916
859	NK064-3	VEGFR3 (FLT4)	Pan-specific	RpAb	NP_002011	P35916
860	PN544	VIM (Vimentin)	Y117	RpAb	NP_003371	P08670
861	PN094	VIM (Vimentin)	S34	MmAb	NP_003371	P08670
862	PN545	WASP	Y291	RpAb	NP_000368.1	P42768
863	NK185	Wee1	Pan-specific	RpAb	NP_003381	P30291
864	PK854	Wee1	S642	RpAb	NP_003381	P30291
865	PK855	Wnk1 (PRKWNK1)	S382	RpAb	NP_061852.3	Q9H4A3
866	PK857	Wnk1 (PRKWNK1)	T2245	RpAb	NP_061852.3	Q9H4A3
867	PK856	Wnk1 (PRKWNK1)	T60	RpAb	NP_061852.3	Q9H4A3
868	NK252-2	Wnk1 (PRKWNK1)	Pan-specific	RpAb	NP_061852.3	Q9H4A3
869	NK186	Yes	Pan-specific	MmAb	NP_005424	P07947
870	NK186-2	Yes	Pan-specific	MmAb	NP_005424	P07947
871	PK858	Yes	Y222+Y223	RpAb	NP_005424	P07947
872	NK214	YSK1 (STK25)	Pan-specific	GpAb	NP_006365.2	O00506
873	PK859	YSK1 (STK25)	T174	RpAb	NP_006365.2	O00506
874	NK187	ZAP70	Pan-specific	MmAb	NP_003168	P43403
875	NK187-2	ZAP70	Pan-specific	RpAb	NP_003168	P43403
876	PK861	ZAP70	Y292	RpAb	NP_003168	P43403
877	PK862	ZAP70	Y319	RpAb	NP_003168	P43403
878	PK863	ZAP70	Y492+Y493	RpAb	NP_003168	P43403