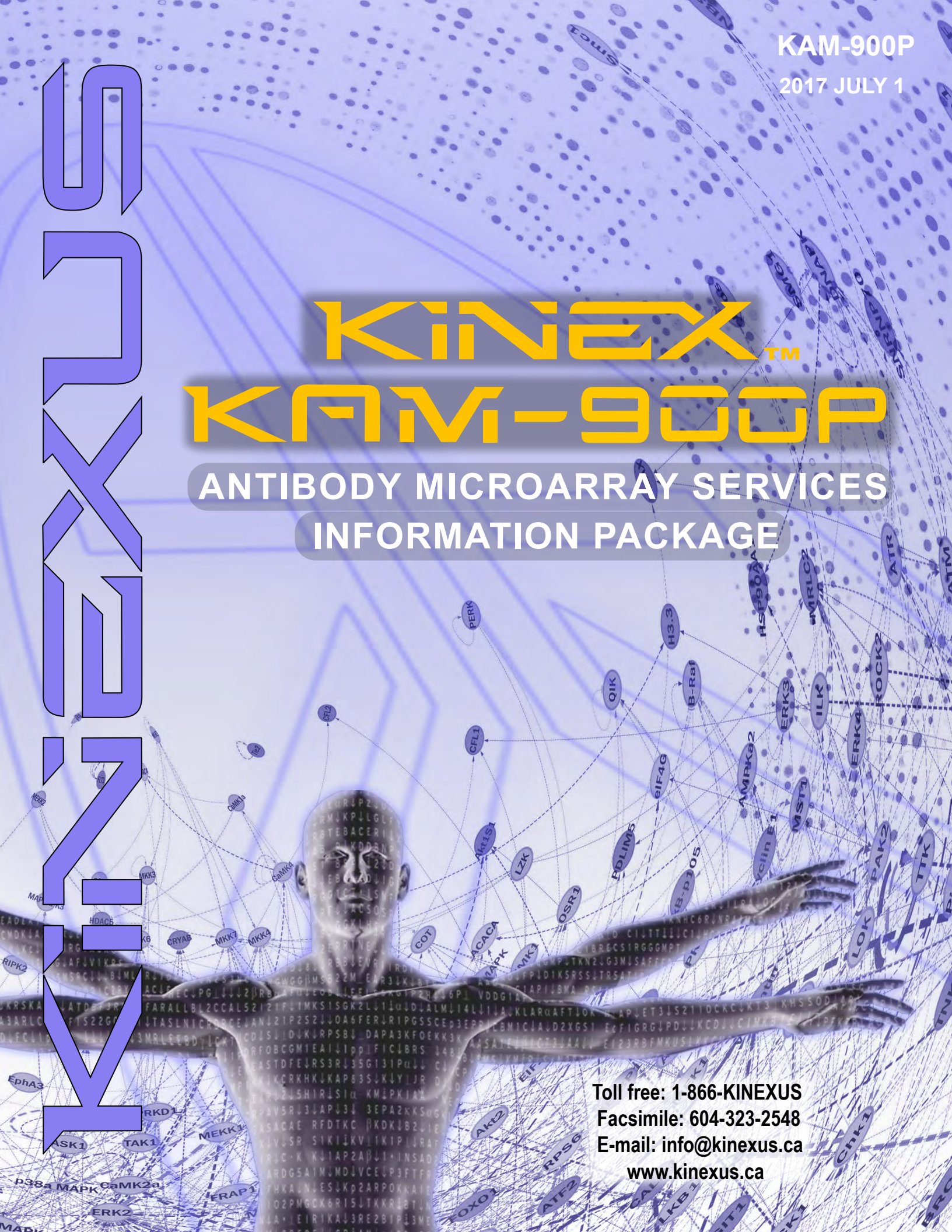
KAM-900P

2017 JULY 1

KINEXUS

KiNEX™ KAM-900P

ANTIBODY MICROARRAY SERVICES INFORMATION PACKAGE



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Overview of Kinex™ KAM-900P Antibody Microarrays

1. INTRODUCTION

Our Kinex™ KAM Services allow our clients to have their cell and tissue lysates from their experimental model systems investigated for discovery of biomarker leads with our high content antibody microarrays. These antibody microarrays are convenient and very cost-effective tools to explore in a directed manner the expression and phosphorylation states of hundreds of key cell signalling proteins simultaneously with minute amounts of specimens. Samples suitable for analyses include cell extracts, fresh or frozen tissues and biofluids such as serum and cerebral spinal fluid. The results can provide novel and useful insights into differences in protein expression, phosphorylation and protein-protein interactions, and define antibody reagents that enable follow up on these findings with other immunological-based methods such as Western blotting, immunoprecipitation, ELISA and immunohistochemistry. Our integrated platform of well-established proteomics and bioinformatics services and proprietary technologies make the Kinex™ KAM antibody microarrays superior to any other commercially available antibody microarrays. Some of the key advantages of our antibody microarray include highly validated antibody probes, wide coverage of cell signalling proteins and pathways, extensive follow-up services for validation, and supporting bioinformatics analyses for comparison purposes. In this information package, we explain how the KAM-900P antibody microarrays work and how best to use them the most effectively to advance your research programs. The KAM-900P antibody microarray features ~613 phosphosite-specific antibodies and ~265 pan-specific antibodies used for capture of cell and tissue lysate proteins. This microarray complements our KAM-1150 antibody microarray, which utlizes 1150 different pan-specific antibodies for over 700 protein targets.

If the shipment of frozen lysate samples to Kinexus in Canada is too cost prohibitive for using of our proteomics services, we also offer an option where we can provide clients with Kinex™ KAM-900P Antibody Microarray Kits so that they can perform the initial stages of the analyses in their own laboratory at reduced costs. Processed microarray chips can then be sent to Kinexus for free scanning and preparation of a KAM-900P Report for a fee. Customers interested in this option should download our Kinex™ KAM-900P Antibody Microarray Kit Information Package from our website.

2. HIGHLY VALIDATED ANTIBODIES

Kinexus offers two different Kinex™ KAM antibody microarray 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-1150 antibody microarray uses approximately 1150 pan-specific antibodies. When used together, the KAM-900P and KAM-1100 chips permit screening of cell and tissue lysates with over 1700 non-redundant antibodies. These microarrays are the culmination of continuous on-going efforts to steadily improve the power and accuracy of our antibody microarrays over the last 8 years. Kinexus has already performed over 3000 antibody microarray analyses for our clients.

The antibodies deployed on the KAM-900P and KAM-1150 chips have been selected from more than 6000 different commercial antibodies sourced from over 26 companies that 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 highly characterized cell signalling antibodies, many of which are incorporated into the KAM-900P and KAM-1150 antibody microarrays. Such cherry-picking is apparently not performed by other microarray companies, which rely only on one or a few suppliers with dubious information about individual antibody performance. When our clients utilize the KAM-1150 and KAM-900P antibody microarrays, upon request, we are pleased to disclose their commercial sources and in many cases, these antibodies are available directly from Kinexus at very affordable prices. Immunoblots images with the antibodies sold by Kinexus are available for easy viewing on our website at www.kinexusproducts.ca. 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 information package. Over 386 distinct proteins are tracked, with most at multiple phosphosites with different antibodies. In particular, at least 259 unique protein kinases are targeted with these antibodies. 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. The classes of targeted proteins and phosphosites on the KAM-900P antibody microarrays are listed in Table 1 below.

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
Total Number of Distinct Protein Targets	**100%**	**386**
Total number of protein-serine/threonine and dual specificity kinases:	49.5%	191
Total number of protein-tyrosines:	17.6%	68
Total number of protein phosphatases:	1.3%	5
Total number of transcription factors:	6.7%	26

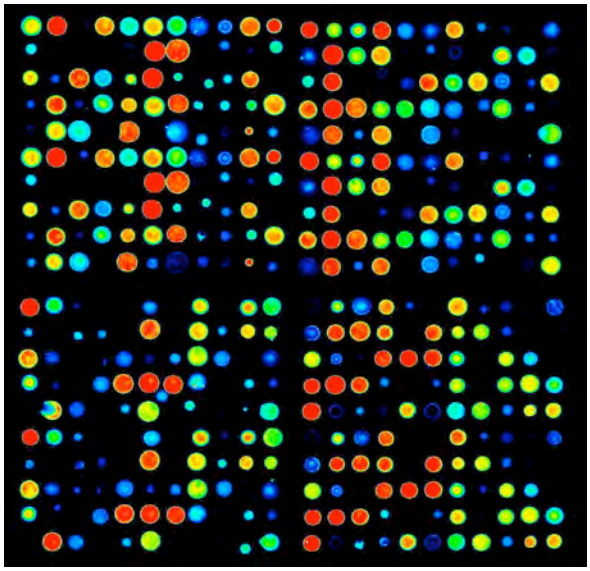
3. QUALITY CONTROL PROCEDURES

In the KAM-900P slide, our antibodies 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.

In our Kinex™ 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 misprinting 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 lysate 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, Sigma-Aldrich and Takeda have since discontinued offering their antibody microarray products.

Figure 1. 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

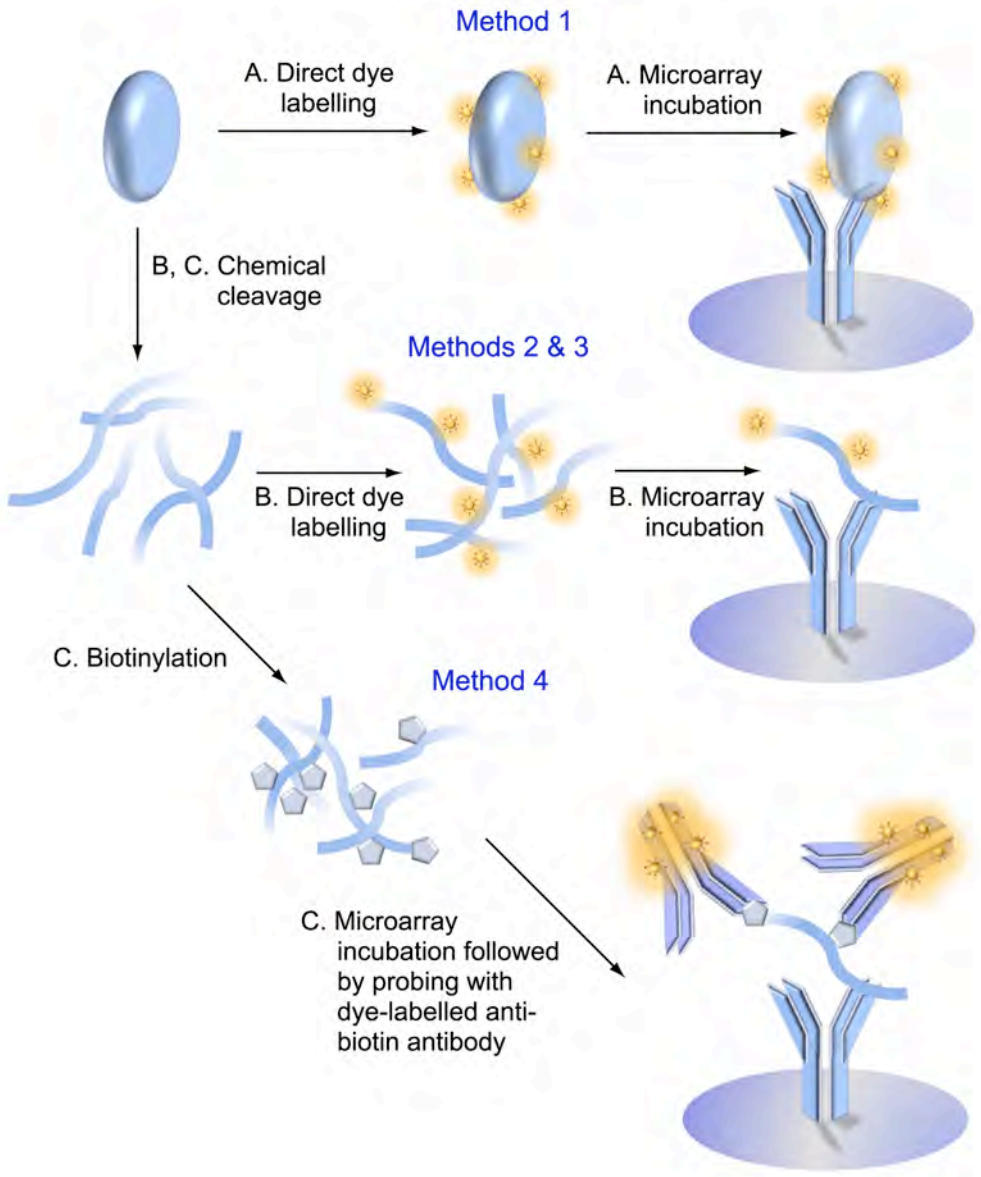
There are several different methodologies that can be used with Kinex™ KAM-900P antibody microarray for expression and phosphorylation profiling, and these are outlined in Figure 2. **Method 1** involves the direct labelling of lysate proteins with a fluorescent dye and then incubation of the tagged 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. One 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. Another problem is that it is critical to remove the free dye after the lysate protein labelling reaction. This usually involves the use of a G25 spin-column and the presence of ethanolamine to quench any free dye that is unresolved from the dye-labelled proteins following the gel filtration step. However, despite these precautions, we find that there is still some direct labelling of the capture antibodies on the microarray, and this can contribute to higher backgrounds for some of the antibodies that are printed in a more concentrated form.

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. We find that this produced less background signals that observed with the direct-

dye labelling approach. 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-1150 slide, and it is our recommended procedure for the best results with this microarray for tracking changes in protein expression and phosphorylation with higher accuracy.

Figure 2. 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 2, 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. It is also feasible that some epitopes may be blocked by internal interactions amongst amino acid residue side chains even within the same chemically cleaved fragment, for example, a phosphorylated residue with an arginine or lysine residue. This appears to be an issue with the detection of changes in certain phosphosites such as the pT185 and pY187 phosphosites in ERK2 and pT202 and pY204 phosphosites in ERK1.

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 appeared to be at least 10-times 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 pan and phosphosite-antibodies. This is because we avoid the use of cysteine residues in the immunogenic peptides that we use for antibody production. 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 20-fold. This chemical digestion step is an option to reduce the number of false positives for those 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. We have

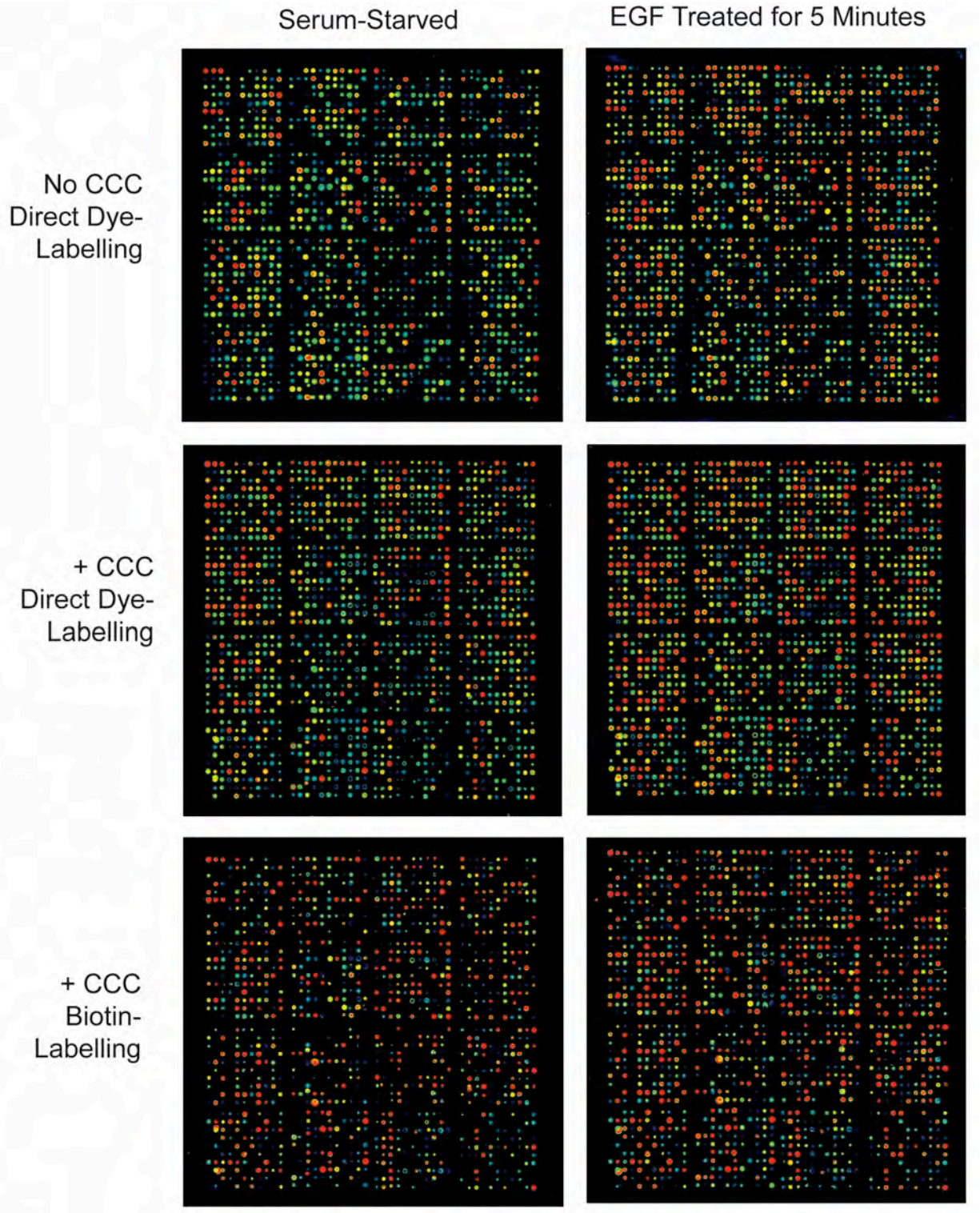
determined that following the CCC step, the fragmented peptides in lysates are very stable at ambient temperature for well over 2 weeks, and yield similar results to lysates that are immediately subjected to antibody microarray analyses. Figure 3 shows how the intensity of fluorescently tagged proteins 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 3. 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. KAM-900P ANTIBODY MICROARRAY REPORTS

The Kinex™ KAM services permit our clients to move from “pixels” to “pathways”. As part of our KAM Antibody Microarray services, Kinexus quantifies the intensities of dye-bound proteins captured on the KAM Antibody Microarray, and 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 feature. 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. 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. Figure 4 shows an example of one worksheet from a Kinections Map Workbook analysis. Clients can also use our open-access KinATLAS website (www.kinatlas.ca) to identify protein-protein interactions between the proteins monitored on our microarrays.

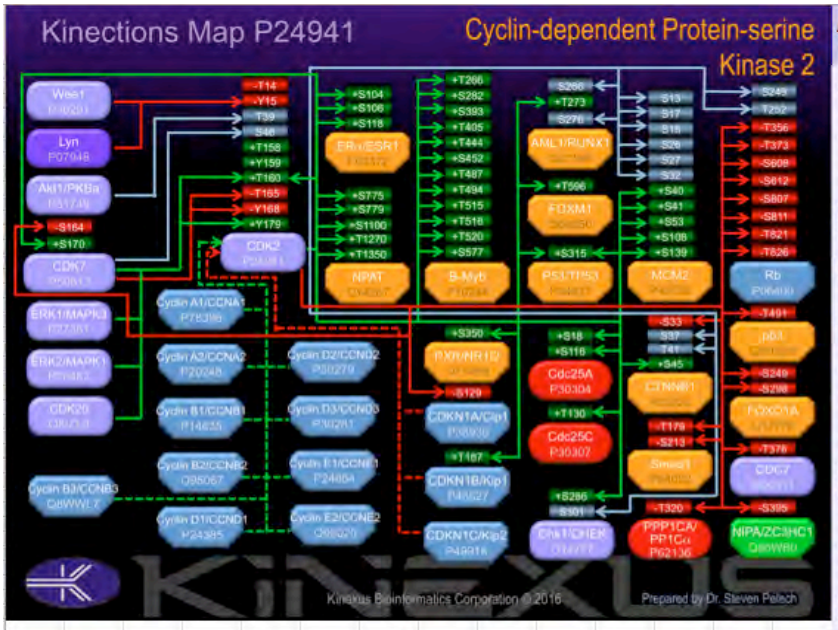
8. PRICING INFORMATION

Kinexus offers the Kinex™ services at different pricing levels depending on the level of confidentiality required for your samples. With the full analysis with 877 pan- and phospho-site-specific antibodies and full confidentiality, our regular price for the Kinex™ KAM-900P Antibody Microarray Services starts at US $2,998 per slide for each pair of samples submitted and analyzed in duplicate. At this pricing level, only the species needs to be disclosed. To receive a further 40% discount off these prices, Kinexus requires the Non-Confidential Sample Description Form (NSDF-LY) to be completed in full including species, organ, tissue, cell, cell state, fractionation, perturbation, and treatment for each sample being analyzed. The philosophy behind the non-confidential data pricing is to accelerate signal transduction research and knowledge within the scientific community. After a one year hold, Kinexus is permitted to post the results of a Non-Confidential analyses on its KiNET-AM website. Please note that at any time, clients can change the status of their order from Non-Confidential to Confidential by paying the difference in price. To receive a quotation or for a volume discount on large orders, please contact the Director of Sales & Marketing at 1-866-KINEXUS or 1-604-323-2547 (Extension 11) or e-mail sales@kinexus.ca .

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 5 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 6 shows the

the same portion of the map in Figure 5 in the quantitative KiNetscape map format. A range of colour schemes are available with this graphics service. Clients should directly contact Kinexus for details if they wish to utilize this service.

Figure 4. 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	276	398	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	43066	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	388	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	32834	21		•
PK622	ERK2 (MAPK1)	T185+Y187	5341	5447	2		•
PN194	FKHR	S256	1068	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	758	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	950	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		
PK864	Wee1	S642	351	1357	286		

Figure 5. 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.

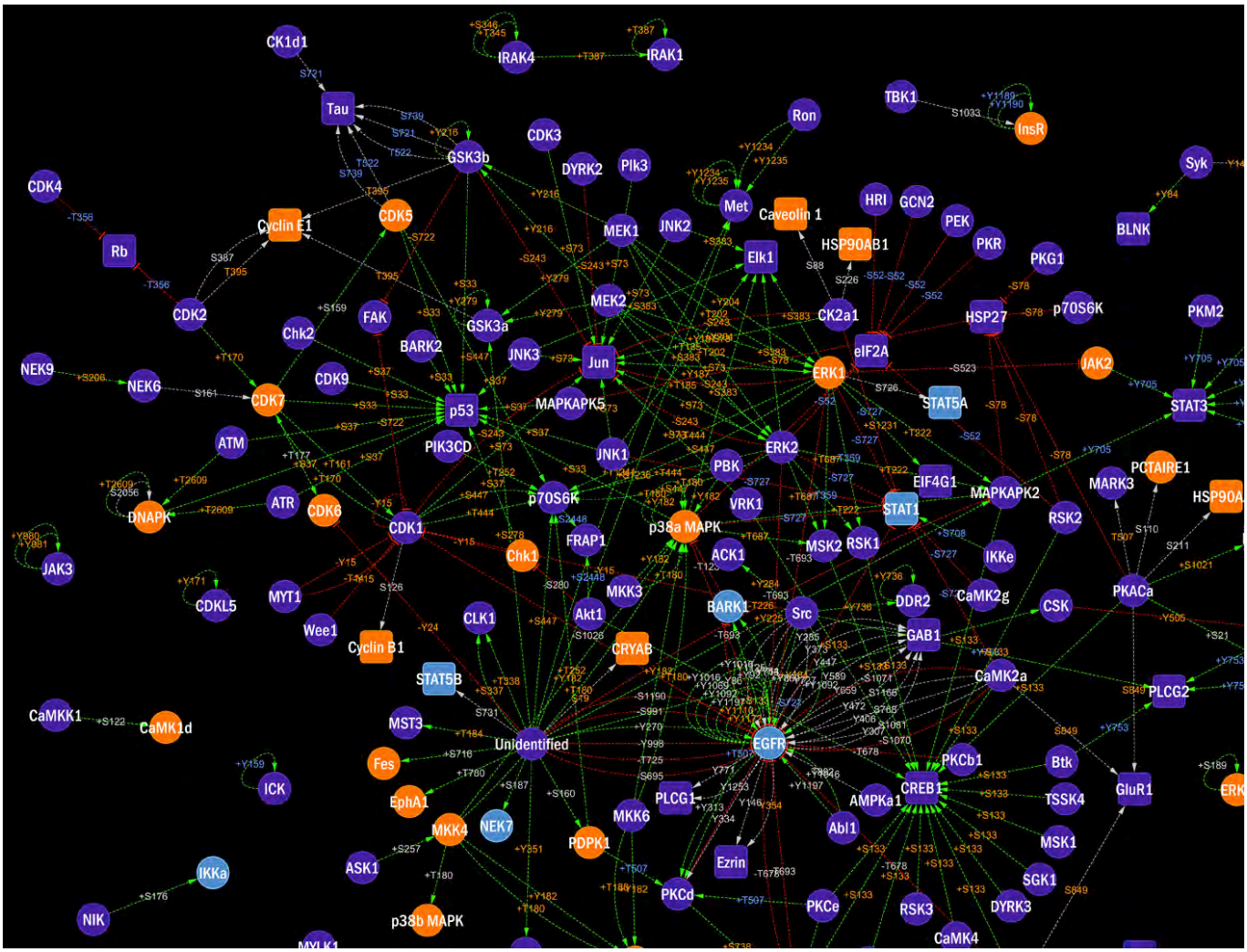
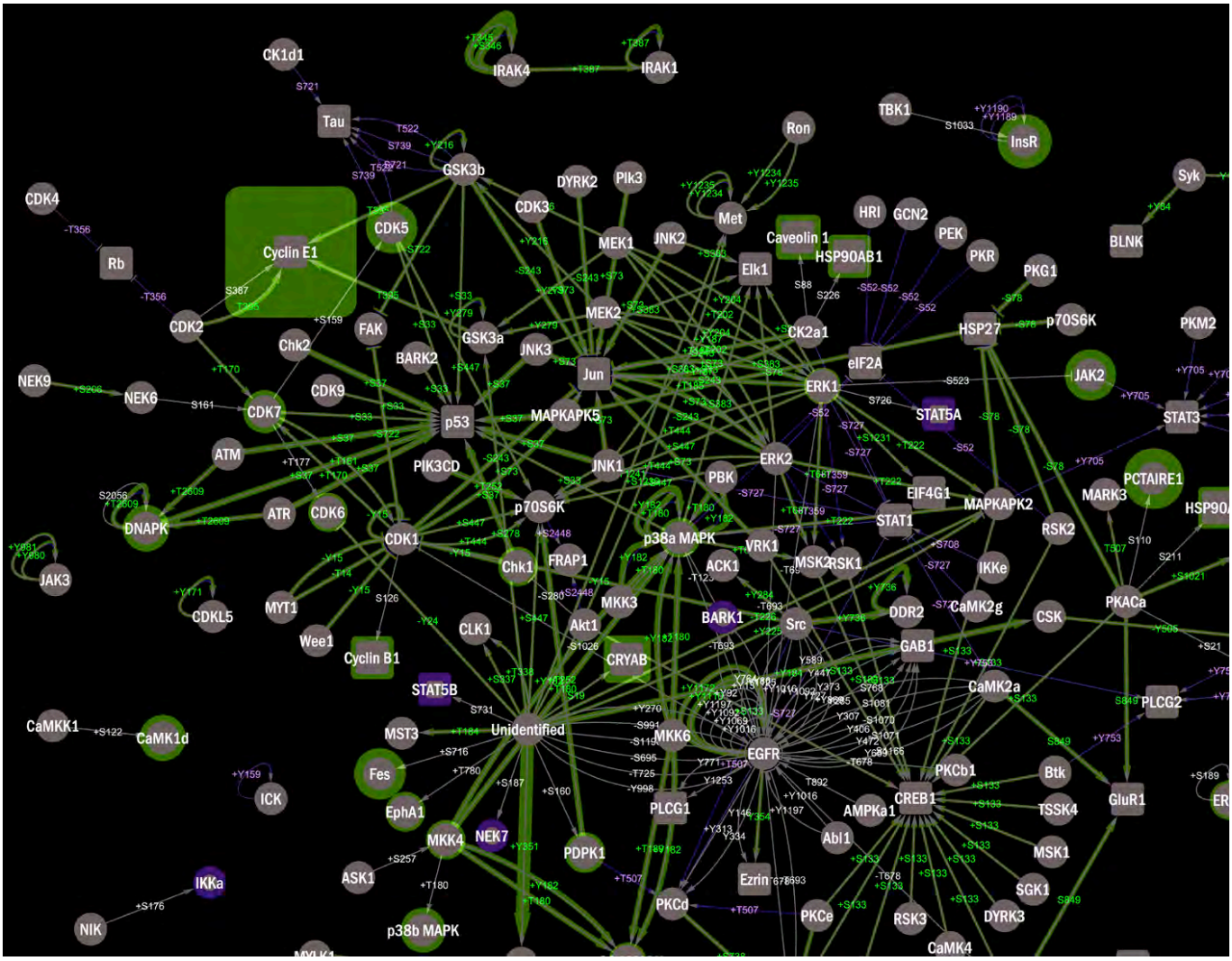


Figure 6. KiNetscape quantitative representation of the key EGF-induced changes in protein expression or phosphorylation from a Kinex™ KAM-900P antibody microarray analyses of the lysates from serum-starved A431 cells that were treated without or with 100 ng/ml EGF for 5 minutes. Lysates were prepared 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. FOLLOW-UP 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 follow-up 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 at http://www.kinexus.ca/ourServices/immunoblotting/custom_profiling/custom_profiling.html.

The availability of these Kinetworks™ Custom screens is another 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:

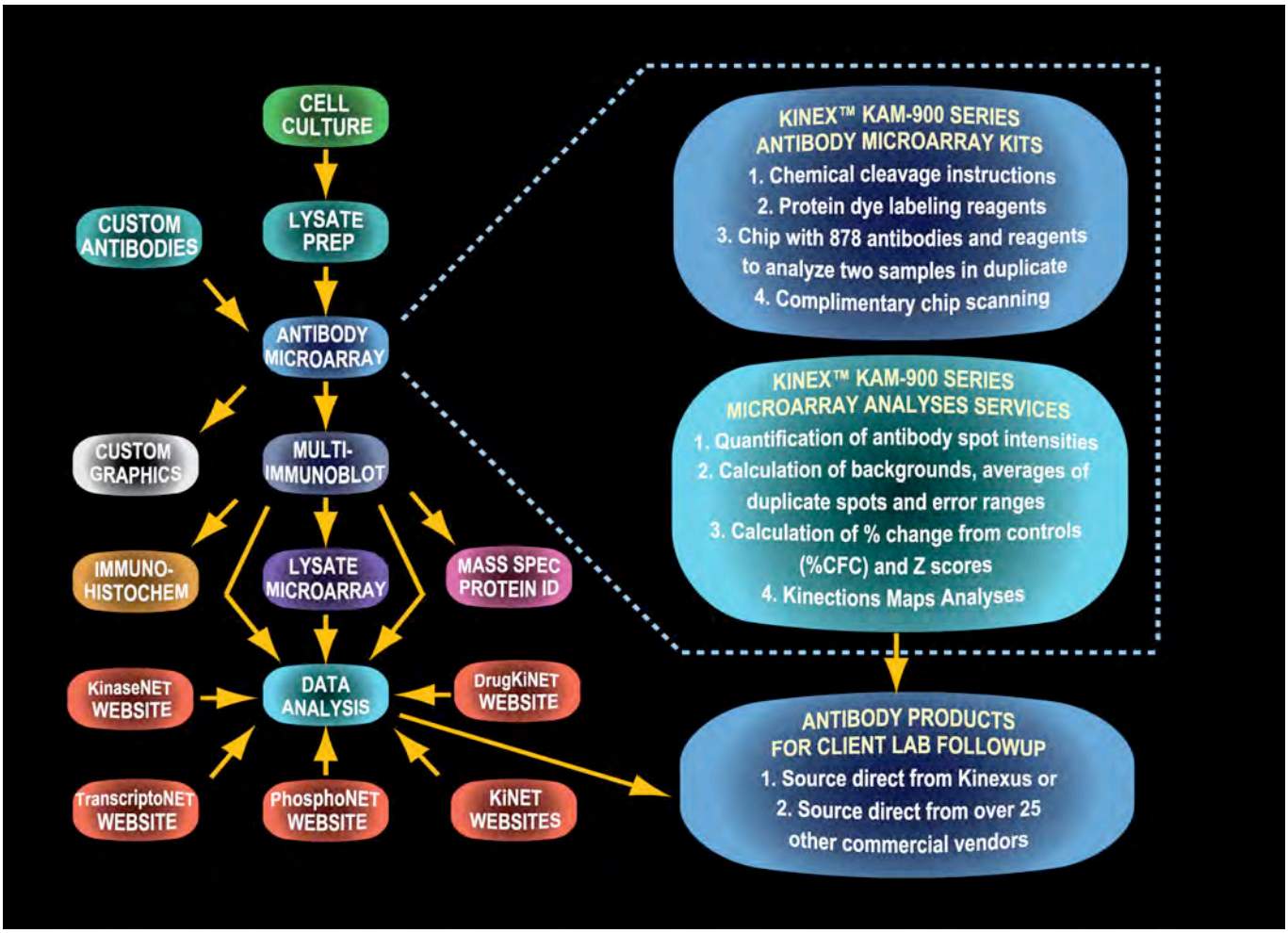
- *In vivo* services – send us your experimental compounds, proteins or oligonucleotides and we will perform the treatment of cells according to your specification and generate lysates for testing with our microarrays;
- Tissue or cell pellet processing – send us your cell pellets or tissues and we will 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 7. 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.



Sample Preparation

10. QUANTITY OF LYSATE

The amount of protein required for the Kinex™ KAM-900P Antibody Microarray service is 100 μg per sample at an approximate concentration of 3 mg/ml. If your samples have a higher concentration, we recommend sending it without further dilution and Kinexus will adjust the concentration as required during processing. In this case, we prefer a minimum volume of approximately 50 μl. If your samples have a lower concentrations, there are alternate steps that can be undertaken for ensuring optimum results. This includes concentrating your samples or providing additional dye-labeling reactions to your samples. We have been able to successfully use 25 μg or less with our microarrays where the amount of sample has been limiting. Please contact a Kinexus Technical Service Representative for more information on how to proceed and the additional costs involved if your sample concentrations are low.

11. LYSIS BUFFER

The standard ingredients for our lysis buffer are listed below, however other lysis buffers commonly used for protein lysate preparation with non-ionic detergents should be compatible with the service. **However any lysis buffers containing Tris or reagents carrying reactive amine groups are not acceptable alternatives**. These will interfere with lysate protein labelling. Please contact Kinexus for more information on the appropriate types of lysis buffers to use or email info@kinexus.ca to request an aliquot of our lysis buffer to be sent at no cost. We only require a courier account number to cover the shipping expenses. Your cell pellets or tissues should be homogenized in ice-cold lysis buffer.

The reagents in the Kinexus Lysis Buffer (pH 7.2) include:

1. 20 mM MOPS (pH 7.0)
2. 2 mM EGTA (to bind calcium);
3. 5 mM EDTA (to bind magnesium and manganese);
4. 50 mM sodium fluoride (to inhibit protein-serine phosphatases);
5. 60 mM β-glycerophosphate, pH 7.2 (to inhibit protein-serine phosphatases);
6. 25 mM sodium pyrophosphate (to inhibit protein-serine phosphatases);
7. 2.5 mM sodium orthovanadate (to inhibit protein-tyrosine phosphatases);
8. 50 nM phenylarsine oxide
9. 1% Triton X-100 * (can be substituted with 1% Nonidet P-40)
10. 0.05% sodium dodecylsulphate (SDS)

NOTE: *Detergents (Triton X-100 and SDS) are required for preparing total detergent-solubilized lysates. The detergents should be omitted from the lysis buffer if a subcellular fractionation is to be performed.*

For chemical cleavage harvesting only:

10. 10 mM TCEP (Tris(2-carboxyethyl)phosphine hydrochloride)
11. 100 mM NTCB (2-nitro-5-thiocyanatobenzoic acid) (added after sonication)

Protease Inhibitors and Dithiothreitol

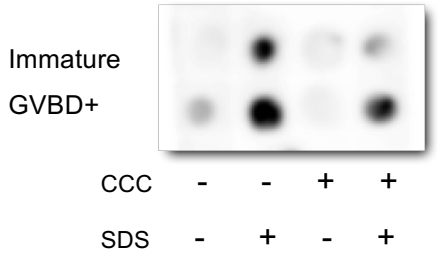
12. 0.5 μM aprotinin (to inhibit proteases);
13. 3 mM benzamidine (to inhibit proteases);
14. 1 mM Petabloc (to inhibit proteases);

15. 10 µM leupeptin (to inhibit proteases); and
16. 1 mM dithiothreitol (to disrupt disulphate bonds).

The protease inhibitors and dithiothreitol (DTT) must be added to lysis buffer immediately before use and samples should be processed as quickly as possible. Not all protease inhibitors are required, but it is optimal to use as many as possible. For convenience, the Roche Complete Mini Inhibitor Cocktail tablet can be used to replace the individual protease inhibitors. If the lysate proteins are to remain in their native structure and not denatured, the chemical cleavage step should not be used, and the samples must be frozen and shipped to Kinexus on dry ice. Samples that have been subjected to chemical cleavage or homogenized directly into 1X SDS-PAGE sample buffer can be sent to Kinexus without the need for refrigeration or freeze during shipping.

Note that if the samples are only subjected to chemical cleavage at the time of lysate preparation, it is still feasible for us to perform dot blotting with the chemical cleaved lysates to evaluate whether a treatment was effective in producing a change in the expression or phosphorylation of a marker protein such as ERK2 MAP kinase. Chemically-cleaved lysate samples are unsuitable for SDS-PAGE and Western blotting. However, they can be used for Bradford Protein assays, provided that the carry over of detergent is compensated for in derivation of the protein standard curve for bovine serum albumin, since these components can interfer with this protein assay. Figure 8 below shows the stimulation of ERK1 phosphorylation during meiotic maturation of sea star oocytes on a dot blot.

Figure 8. ERK2 pT185+pY187 phosphosite-specific antibody dot blot of lysates from sea star oocytes that have been induced to undergo meiotic maturation. Lysates from immature oocytes (blocked at prophase) and maturing oocytes (treated with 10 µM 1-methyladenine for 60 minutes) were spotted onto a nitrocellulose membrane following incubations with and without cysteine chemical cleavage (CCC) for 30 min at 45°C, and with and without the addition of 1% sodium dodecylsulphate (SDS) prior to deposition. This antibody (Cat. No. PK621) cross-reacts with ERK1, which undergoes increased phosphorylation during oocyte maturation at the time of germinal vesicle breakdown (GVBD).



Important points to remember include:

1. The cells or tissues should be processed quickly at 4°C or less if the samples are not subjected to chemical cleavage at the time of homogenization;
2. Add the protease inhibitors and DTT to the lysis buffer just before processing samples;
3. Ensure the contents are completely dissolved and store on ice;
4. Homogenization should be performed in small volumes of lysis buffer to obtain protein lysates at high concentrations, ideally at 3-4 mg/ml or higher. The concentrations can be diluted later if required;

5. The detergent-soluble fraction should be obtained as quickly as possible after the cells or tissues are homogenized;
6. Sonication is required for optimal results (do not over sonicate);
7. The highest centrifugal forces available should be used to generate the detergent-soluble fraction;
8. The supernatants should be frozen as quickly as possible if a protein assay cannot be performed immediately. Lysates should be stored at -70°C, unless these have been subjected to chemical cleavage or processed in SDS-PAGE sample buffer.
9. We recommend harvesting cells and tissues with the chemical cleavage reagents (TCEP and NTCB) to help reduce the number of false positives that can arise from the use of non-denatured proteins on the antibody microarray. If you choose to prepare samples without the chemical cleavage method, then omit the sections below outlined in red. However, you should let us know and we can include the chemical cleavage step for you prior to probing your lysates on the microarray. Note that the best results are obtained if the chemical cleavage is performed during initial lysate preparation.

12. FRACTIONATIONS

There are many different types of fractionations that can be performed, and the choice of lysis buffer used will vary depending on the type of fractionation you are considering to prepare. The simplest type of lysate preparation is the total cellular extract obtained as a total detergent-solubilized fraction. To obtain just the soluble cytoplasmic proteins, detergent should not be included in the homogenizing buffer. The remaining microsomal pellet obtained following ultracentrifugation after removal of the cytoplasmic supernatant fraction can be re-sonicated in homogenizing buffer with detergent and re-ultracentrifuged to obtain the detergent-soluble membrane fraction.

Total Cellular Extract:

For quantitation of total cellular levels of cell signalling proteins, lysis and homogenization should be performed in the presence of a non-ionic detergent. We recommend the use of 1% Triton X-100 or 1% Nonidet P40, but comparable detergents are acceptable. This is the most common type of fractionation prepared by clients and is optimal for monitoring changes in total protein expression. However, if proteins are re-distributed between cellular compartments as a consequence of a perturbation of an experimental model system, this will not be evident.

Subcellular Fractionation:

Detergents should be omitted from the homogenization buffer if the subcellular distribution of cell signalling proteins is to be examined. If a particulate-solubilized fraction is to be analyzed, a microsomal pellet should be obtained following the initial homogenization and ultracentrifugation in the absence of detergent and subsequent removal of the cytosolic supernatant. In this instance, the cytosolic extract should be removed and the microsomal pellet should then be resuspended in the homogenization buffer containing 1% Triton X-100 or 1% Nonidet P-40 and subjected to homogenization and ultracentrifugation once again. The resulting detergent-solubilized microsomal fraction should be removed and immediately assayed for its protein concentration.

Other Fractionations:

At this time, we do not recommend you send samples from immunoprecipitation or antibody affinity pull-down experiments for the Kinex™ KAM Antibody Microarray Services unless you consult with us first.

13. PROTEIN LYSATE PREPARATION WITH AND WITHOUT CHEMICAL CLEAVAGE

The optimum amount of protein recommended for the Kinex™ KAM-900P Antibody Microarray is 100 μg per sample at a concentration of 3.0 mg/ml or higher. We recommend preparing extra lysate, if possible, for follow-up studies. If the concentration of the lysate is below 2.0 mg/ml concentration, the sample can be concentrated using an Amicon Ultra-0.5 Ultracel-3 Membrane Centrifugal Filter with a M.W. cut-off of 3,000 (Catalog Number: UFC500308, Millipore, Billerica, MA). For more information about how to concentrate samples, please contact a Kinexus Technical Services representative at info@kinexus.ca or call 1-866-546-3987.

It is highly recommended to use the Kinexus Lysis Buffer included with this kit for protein lysate preparation, as it has been optimized for the use with KAM Antibody Microarray as well as any follow-up services. Other lysis buffers commonly used for protein lysate preparation containing non-ionic detergents may be compatible with the KAM-Antibody Microarray. **However, no lysis buffer containing Tris or reagents carrying reactive amine groups such as glycine and ammonia should be used to prepare lysates for the KAM Antibody Microarray as these may interfere with the protein labelling.** The Kinexus Lysis Buffer contains phosphatase inhibitors and the Lysis Buffer Cocktail contains protease inhibitors and DTT. Immediately prior to use, transfer the content of the Kinexus Lysis Buffer into the Lysis Buffer Cocktail. Invert the tube several times to make sure the contents are completely dissolved and store on ice. Prepare the cell or tissue lysates according to protocols listed below. The resulting protein lysate samples prepared must be frozen at -70°C or below after protein quantification unless they are to be immediately subjected to protein labelling and purification.

It is also highly recommended to harvest cells and tissues at the time of homogenization with the chemical cleavage reagents (TCEP and NTCB) to help reduce the number of false positives that can arise from the use of non-denatured proteins on the antibody microarray. Samples prepared with the cysteine chemical cleavage (CCC) method are stable at room temperature for at least 2 weeks. Use the appropriate set of instructions that follow depending on the type of cells or tissues to be analyzed and whether the CCC method is desired or not.

A) Preparation of Lysates from Cells with Chemical Cleavage

i) Adherent Cells:

1. Remove medium from culture dishes containing approximately 1×10^6 to 2×10^6 cells for each sample to be analyzed using the KAM-900P microarray.
2. Rinse the cells in the dishes twice with ice-cold Phosphate Buffered Saline (PBS) to remove medium residue (serum must be completely removed) and aspirate as much PBS as possible after the last rinse.
3. Mix the components in the **Kinexus Lysis Buffer** as listed in Section 11. Invert the tube several times to ensure the contents are completely dissolved and store on ice. Add 200 μl of the ice-cold Kinexus Lysis Buffer to a 150-mm culture dish, or add 100 μl ice-cold Kinexus Lysis Buffer to a 100-mm culture dish. Also, add 25 μl of 10 mM TCEP to 500 μl of lysis buffer for a final concentration of 0.5 mM TCEP. Adjust the pH of the lysis buffer containing 0.5 mM TCEP to pH 9 (approximately 2 μL of 10 N NaOH per 1 mL buffer).

4. Scrape the cells in Kinexus Lysis Buffer, collect the resulting cell suspension from dishes and transfer it into a 1.5-ml microcentrifuge tube. Check to make sure that the pH is 9.0.
5. Sonicate using a microprobe sonicator 4 times for 10 seconds each with 10-second intervals on ice to rupture the cells and to shear nuclear DNA. Alternatively, passing the cell suspension through a 26-gauge needle until the sample is no longer viscous is also acceptable if a sonicator is not accessible. This step is crucial and cannot be omitted. Add 6 μL of 100 mM NTCB per 100 μL cell homogenate for a final concentration of 6 mM NTCB, and make sure that the pH is 9.0 and adjust with 10 N NaOH if necessary). Incubate the homogenate at 45°C in a water bath for 30 minutes.
6. Centrifuge the resulting lysate homogenate at 90,000 x g or above for 30 minutes at room temperature in a Beckman Table Top TL-100 ultracentrifuge, Beckman Airfuge or equivalent. Alternatively, clearing homogenates at maximum speed (15,000-17,000 rpm) on a benchtop microcentrifuge for 30 minutes at room temperature is also acceptable.
7. Transfer the resulting supernatant to a new 1.5-ml microcentrifuge tube.
8. Remove a small aliquot and determine its protein concentration using a commercial Bradford assay reagent (available from Bio-Rad, catalogue number 500-0201) or following the standard protocol of Bradford (Bradford, M.M. (1976) A rapid and sensitive method for quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. Anal. Biochem. 72:248-254). Bovine serum albumin (BSA) is used as the protein standard. The protein concentration obtained should be approximately 3.0 mg/ml or higher. If the concentration obtained is less than 1.0 mg/ml, samples should be concentrated using an Amicon Ultra-0.5 Centrifugal Filter (Millipore).
9. Check the pH of the lysates and adjust to pH 7.0-7.4 with 1 M HCl if necessary. Aliquot and set aside 100 μg for each lysate to be analyzed with the KAM-900P chip.
10. If you wish to have Kinexus perform the custom immunoblotting follow-up analysis, aliquot 350-500 μg for each 18 antibodies to be tested, and boil in SDS-Sample Buffer following the protocols specified on our website. Chemically cleaved lysates are stable at ambient temperature for at least 2 weeks. Store any remaining lysates at -70°C for subsequent validation studies.

ii) Suspension Cells:

1. Transfer cells with medium from cell culture flasks into appropriate sized tubes and centrifuge at 500 x g for 2 minutes at 4°C in a swinging bucket benchtop centrifuge. Remove as much medium from the cell pellet as possible without disrupting cells.
2. Wash the pellet by gently resuspending the cells in ice-cold PBS, followed by centrifugation as above. Repeat this step once to ensure complete removal of serum. Remove as much PBS as possible after the final wash.
3. Mix the components in the **Kinexus Lysis Buffer** as listed in Section 11**.** Invert the tube several times until dissolved and store on ice. Add 25 μl of 10 mM TCEP to 500 μl of lysis buffer for a final concentration of 0.5 mM TCEP, and adjust the pH to 9 (which is approximately 2 μL of 10 N NaOH per 1 mL buffer). Add an adequate amount of the ice-cold Kinexus Lysis Buffer to the sample based on the number and type of cells to achieve a final total protein concentration of approximately 3.0 mg/ml.
4. Follow Steps # 5 through 10 as described in the Adherent Cells Section above.

B) Preparation of Lysates from Cells without Chemical Cleavage

i) Adherent Cells:

1. Remove medium from culture dishes containing approximately 1×10^6 to 2×10^6 cells for each sample to be analyzed using the KAM-900P microarray.
2. Rinse the cells in the dishes twice with ice-cold Phosphate Buffered Saline (PBS) to remove medium residue (serum must be completely removed) and aspirate as much PBS as possible after the last rinse.
3. Mix the components in the **Kinexus Lysis Buffer** as listed in Section 11. Invert the tube several times to ensure the contents are completely dissolved and store on ice. Add 200 µl of the ice-cold Kinexus Lysis Buffer to a 150-mm culture dish, or add 100 µl ice-cold Kinexus Lysis Buffer to a 100-mm culture dish.
4. Scrape the cells in Kinexus Lysis Buffer, collect the resulting cell suspension from dishes and transfer it into a 1.5-ml microcentrifuge tube.
5. Sonicate using a microprobe sonicator 4 times for 10 seconds each with 10-second intervals on ice to rupture the cells and to shear nuclear DNA. Alternatively, passing the cell suspension through a 26-gauge needle until the sample is no longer viscous is also acceptable if a sonicator is not accessible. This step is crucial and cannot be omitted.
6. Centrifuge the resulting lysate homogenate at 90,000 x g or above for 30 minutes at 4°C in a Beckman Table Top TL-100 ultracentrifuge, Beckman Airfuge or equivalent. Alternatively, clearing homogenates at maximum speed (15,000-17,000 rpm) on a benchtop microcentrifuge for 30 minutes at 4°C is also acceptable.
7. Transfer the resulting supernatant to a new 1.5-ml microcentrifuge tube. The following steps should be performed as quickly as possible with the supernatant fraction kept in an ice bath.
8. Remove a small aliquot and determine its protein concentration using a commercial Bradford assay reagent (available from Bio-Rad, catalogue number 500-0201) or following the standard protocol of Bradford (Bradford, M.M. (1976) A rapid and sensitive method for quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. Anal. Biochem. 72:248-254). Bovine serum albumin (BSA) is used as the protein standard. The protein concentration obtained should be approximately 3.0 mg/ml or higher. If the concentration obtained is less than 1.0 mg/ml, samples should be concentrated using an Amicon Ultra-0.5 Centrifugal Filter (Millipore).
9. Aliquot and set aside 100 µg for each lysate to be analyzed with the KAM-900P chip.
10. Store any remaining lysates at -70°C for subsequent validation studies. If you wish to have Kinexus perform the custom immunoblotting follow-up analysis, aliquot 350-500 µg for each 18 antibodies to be tested, and boil in SDS-Sample Buffer following the protocols specified on our website. Label and freeze remaining lysates.

ii) Suspension Cells:

1. Transfer cells with medium from cell culture flasks into appropriate sized tubes and centrifuge at 500 x g for 2 minutes at 4°C in a swinging bucket benchtop centrifuge. Remove as much medium from the cell pellet as possible without disrupting cells.
2. Wash the pellet by gently resuspending the cells in ice-cold PBS, followed by centrifugation as above. Repeat this step once to ensure complete removal of serum. Remove as much PBS as possible after the final wash.

3. Mix the components in the **Kinexus Lysis Buffer** as listed in Section 11**.** Invert the tube several times until dissolved and store on ice. Add an adequate amount of the ice-cold Kinexus Lysis Buffer to the sample based on the number and type of cells to achieve a final total protein concentration of approximately 3.0 mg/ml.
4. Follow Steps # 5 through 10 as described in the Adherent Cells Section above.

C) Preparation of Lysates from Tissues with Chemical Cleavage

1. Mix the components in the **Kinexus Lysis Buffer** as listed in Section 11**.** Add 25 μl of 10 mM TCEP to 500 μl of lysis buffer for a final concentration of 0.5 mM TCEP. Invert the tube several times until dissolved and adjust the pH of the lysis buffer containing 0.5 mM to pH 9 (which is approximately 2 μL of 10 N NaOH per 1 mL buffer) and store on ice. Use approximately 1 ml of the Kinexus Lysis Buffer per 250 mg wet tissue.
2. Cut the tissue into smaller pieces and rinse them in ice-cold PBS three times to remove any blood contaminants.
3. Homogenize the tissue on ice with 15 strokes of a glass douncer (or 3 times for 15 seconds each time with a Brinkman Polytron Homogenizer or with a French Press as alternative).
4. Sonicate the homogenate 4 times for 10 seconds on ice each time to shear nuclear DNA.
5. Add 6 μL of 100 mM NTCB per 100 μL cell homogenate for a final concentration of 6 mM NTCB, and adjust the pH to 9.0 with 10 N NaOH if necessary. Incubate the homogenate at 45°C water bath for 30 minutes.
6. Centrifuge the homogenate at 90,000 x g or higher for 30 minutes at room temperature in a Beckman Table Top TL-100 ultracentrifuge, Beckman Airfuge or equivalent. Alternatively, clients can also centrifuge at maximum speed (15,000 – 17,000 rpm) on a benchtop microcentrifuge for 30 minutes at room temperature.
7. The following steps should be performed as quickly as possible once the supernatant fraction is obtained. Check that the pH of the lysates, which should be close to neutral (pH 7.0-7.4) and adjust with 1 M HCl if necessary.
8. Transfer the resulting supernatant fraction to a new tube and subject it to a protein assay using a commercial Bradford assay reagent or using the standard protocol of Bradford. BSA should be used as the protein standard. The protein concentration obtained should be approximately 15-20 mg/ml or higher, but a final concentration of only 3 mg/ml for the antibody microarray is needed. If the concentration obtained is less than 1.0 mg/ml, samples should be concentrated using an Amicon Ultra-0.5 Centrifugal Filter (Millipore).
8. Aliquot 100 μg for each lysate to be analyzed with the KAM-900P antibody microarray.
9. Chemically cleaved lysates are stable at ambient temperature for at least 2 weeks. Store any remaining lysates at -70°C for subsequent validation studies.

D) Preparation of Lysates from Tissues without Chemical Cleavage

1. Mix the components in the **Kinexus Lysis Buffer** as listed in Section 11**.** Invert the tube several times until dissolved and store on ice. Use approximately 1 ml of the Kinexus Lysis Buffer per 250 mg wet tissue.
2. Cut the tissue into smaller pieces and rinse them in ice-cold PBS three times to remove any blood contaminants.
3. Homogenize the tissue on ice with 15 strokes of a glass douncer (or 3 times for 15 seconds each time with a Brinkman Polytron Homogenizer or with a French Press as alternative).

4. Sonicate the homogenate 4 times for 10 seconds on ice each time to shear nuclear DNA.
5. Centrifuge the homogenate at 90,000 x g or higher for 30 minutes at 4°C in a Beckman Table Top TL-100 ultracentrifuge, Beckman Airfuge or equivalent. Alternatively, clients can also centrifuge at maximum speed (15,000 – 17,000 rpm) on a benchtop microcentrifuge for 30 minutes at 4°C. The following steps should be performed as quickly as possible once the supernatant fraction is obtained.
6. Transfer the resulting supernatant fraction to a new tube, which is kept in an ice bath, and subject it to a protein assay using a commercial Bradford assay reagent or using the standard protocol of Bradford. BSA should be used as the protein standard. The protein concentration obtained should be approximately 15-20 mg/ml or higher. If the concentration obtained is less than 1.0 mg/ml, samples should be concentrated using an Amicon Ultra-0.5 Centrifugal Filter (Millipore).
7. Aliquot 100 μg for each lysate to be analyzed with KAM-900P and keep it on ice if it is to be used immediately.
8. Store any remaining lysates at -70°C for subsequent validation studies. Label the microcentrifuge tubes and freeze them immediately.

E) Additional Notes for KAM-900P Lysate Preparation

1. Note all cell lines are different so the suggested number of 1×10^6 to 2×10^6 cells for each sample is an estimate based on commonly used cell lines. For the validation immunoblotting service, you will need to prepare about 10 times more cells (1×10^7 to 2×10^7 cells).
2. Cells or tissues should be processed in a timely fashion at 4°C or below if the chemical cleavage step is not used.
3. The Kinexus Lysis Buffer with its phosphatase and protease inhibitors should be completely dissolved and kept over ice just prior to use.
4. Protein concentration of each sample should preferably be at or above 3.0 mg/ml.
5. 100 μg of lysate is recommended to be used, especially with the KAM-900P chip, since the phosphorylation of target proteins at specific sites is often found with very low stoichiometry. However, if sample material is difficult to obtain, as little as 25 μg of lysate has been successfully used. (Note: The same amount of protein from each sample to be analyzed together must be applied to the microarray for optimal comparison purposes).
6. To minimize the volume and maximize the protein concentration of lysates, the lysis buffer used to recover the scraped cells from a culture dish can be transferred to the next dish if multiple dishes of cells for the same sample are to be used for lysate preparation. It is advised to use the *minimal amount* of lysis buffer for lysate preparation to achieve the protein concentration required for the KAM-900P antibody microarray analysis.
7. Nuclear DNA shearing by sonication or needle passing is necessary and cannot be omitted.
8. The highest centrifugal forces achievable on a microcentrifuge should be used to prepare the detergent-soluble fraction.
9. Detergents should be omitted from the lysis buffer if a particulate-solubilized fraction is to be prepared and analyzed.

10. Supernatants should be separated from pelleted precipitates and frozen as quickly as possible if the chemical cleavage is not performed. Removal of an aliquot for the protein assay is suggested so that the bulk of the lysate sample can be frozen quickly to preserve the phosphorylation state of the proteins in the extract.

    Once we have received your lysate samples at Kinexus, they will undergo extensive processing according to your specifications. To get a sense of how they might be handled, demonstration videos are also available for viewing on our company's You-Tube Channel at https://www.youtube.com/channel/UC_GL-BCsGRrnKiQ_6qV1jeA .

14. PREPARATION OF CELL AND TISSUE PELLETS

An additional charge of $200 per sample will apply for submission of cell pellets to be processed at Kinexus. A sufficient number of cells (>2 x 10^6 cells) should be provided for each sample to be subjected to KAM-900P analysis. If Kinetworks™ multi-immunoblotting is desired for validation of the KAM-900P results, the number of cells required is ten-fold higher (>2 x 10^7 cells).

A) Adherent Cells

1. Remove the medium and rinse the cells in dish with ice-cold PBS once;
2. Detach cells with trypsin as one does in passaging cells or scrape the cells with a rubber policeman, followed by the addition of equal volume of medium;
3. Collect cells in a 15-ml conical tube and centrifuge at 500 x g for 2 minutes at 4°C in a swinging bucket benchtop centrifuge;
4. Wash the pellet twice with ice-cold PBS thoroughly, (the presence of serum from medium could skew the protein assay) and remove as much PBS as possible (the presence of liquid residue dilutes the sample and may also result in the damage of cells during freezing process); and
5. Freeze the pellets for shipping. Pellets must be shipped on dry ice.

B) Suspended Cells

Simply follow Steps 3-5 above for "*A) Adherent Cells"* and freeze the cell pellet immediately. Pellets must be shipped on dry ice.

C) Tissues

An additional charge of $200 per sample will apply for submission of tissue samples to be processed at Kinexus. Freshly harvested tissues are preferred if possible. When harvesting, the tissues should be cut into small pieces on the surface. Wrap the tissues individually in tinfoil and snap freeze them in liquid nitrogen for 10 minutes before storing them at -80 °C. The tissues should be shipped on dry ice.

Shipping Information

15. STORAGE OF SAMPLES

The final protein concentration of the cell/tissue samples should be approximately 3 mg/ml. Please record the actual concentration and volume of each sample on the Sample Description Form (KAM-NSDF or KAM-CSDF). We request ideally **200 µg** of cell or tissue lysate for each sample submitted for analysis with the Kinex™ Antibody Microarray. (If possible, it is also recommended to send an additional 10-15 µL aliquot of each sample specifically for the Bradford assay). It is possible to use as little as 25 µg of lysate protein for our analyses.

If any of our custom validation immunoblotting studies are to be performed based on the analysis of your Kinex™ results, we recommend sending additional lysate at this time to save on future shipping costs. We need ~350-500 µg of additional material for every 18 antibodies selected for validation Western blotting.

Samples should be stored in screw cap vials. The vials should be clearly labeled with an indelible marker with a unique identification number, parafilmed to protect against leakage, and put into another support structure such as a small box or a 50-ml conical or centrifuge tube to provide extra protection during shipping. **All samples that have not been subjected to chemical cleavage at the time of homogenization must be shipped on dry ice.** Approximately 5% of the time, it has been necessary for clients to re-send samples to Kinexus due to thawed samples at the time of arrival. This is most often due to insufficient dry ice for shipping or inadequate completion of shipping documentation. If the lysate samples have been prepared with chemical cleavage reagents at the time of cell or tissue lysis, they are stable for at least 2 weeks at room temperature and special refrigeration or freezing is not necessary during shipping.

16. DRY ICE SHIPMENTS

Shipments sent within North America normally arrive at our facility the following day. Therefore, we recommend shipping from Monday to Wednesday to allow sufficient time to arrive safely at our facility in case of delays due to Customs or weather. For shipments from outside of North America, we recommend sending your package on Monday as shipments can take up to 5 days to arrive depending on location. You should pack enough dry ice to last a minimum of 3 days in transit (for within North America) or 5 days (for outside of North America) and preferably use large dry ice chunks mixed with nuggets to fill in the extra spaces. Dry ice sublimes at a rate of 10 to 30% (or 5-10 pounds) every 24 hours depending on the thickness of the Styrofoam container used and the size and weight of the dry ice. Pack the dry ice just before shipping to help preserve its shelf-life. Appropriate dry ice labels must be placed on the outside of the box and the weight of dry ice in kilograms written inside the label.

17. SHIPPING DETAILS

The aforementioned procedure has been designed to reduce the use of shipping materials and courier costs, and to ensure that your precious samples arrive in a safe and stable form at our laboratory facilities. Note that clients are responsible for payment of courier costs. Frozen sample vials should be sent to the address listed below by any express courier that accepts dry ice shipments. We recommend Federal Express for shipments originating in North America, and World Express is the preferred courier choice outside of North America. Ship the samples to the following address and e-mail info@kinexus.ca with the courier details so we can track your package for you while it is in transit:

Kinex™ Screening Services
Kinexus Bioinformatics Corporation
Suite 1, 8755 Ash Street
Vancouver, B.C. Canada V6P 6T3

Telephone: 604-323-2547
Facsimile: 604-323-2548
Email: info@kinexus.ca

FORMS REQUIRED

18. FORMS TO BE COMPLETED

Fillable MS-Word versions of our forms are directly downloadable from the Kinexus website or by request. Customers are required to complete the following forms for each order placed. The forms can be printed and included with your samples.

A. Service Order Form (KAM-900P-SOF)

Please ensure:

- Address and contact name and numbers are specified
- Billing or accounting information is completed
- Any quotations are listed in the billing sections
- Include a Purchase Order, Visa or MasterCard number for payment
- The form is signed and dated

B. Service Identification Form (KAM-900P-SIF)

For each sample submitted, please ensure the following:

- At least 100 µg of protein is provided for each sample to be analyzed, 2 samples per screen
- In Section A, the customer must assign a unique Client Screen Identification Name to correlate the proteins to be analyzed for each sample submitted
- In Section B, the type of analysis (Kinex™ Screen Name) for each sample is specified.
- For Section C, your sample(s) are identified by completion of Client Supplied Non-Confidential (NSDF-LY) or Confidential (CSDF-LY) Sample Description Forms. Make sure that the Client Screen ID Name in Box A of these forms, matched the Client Screen ID Name in Box A of the KABM-SIF form
- In Section D, the level of confidentiality is indicated for correct pricing
- The form is certified correct and signed and dated

C. Sample Description Forms

Customers should choose which type of Sample Description Form is applicable to their lysate samples. The Non-Confidential Sample Description Form (NSDF-LY) is required to obtain the lower, non-confidential price. One form is required to be completed in full for every cell or tissue lysate submitted at this pricing level. If your samples are confidential, the the Confidential Sample Description Form (CSDF-LY) should be used.

For each lysate submitted, please ensure the following:

- Each sample tube is labeled and properly identified on the form in Section B, including the final concentration and volume
- A minimum of 100 µg of protein is provided for each sample submitted
- Please be as accurate as possible in completing the Non-Confidential Form. A Technical Service Representative may contact you for additional information regarding any sample details that are unclear
- The form is certified correct and signed and dated

D. Proteomics Services Agreement

A Proteomics Services Agreement is required to be signed before the first order can be processed. This Agreement is required to be signed and dated by an authorized representative, typically a Senior Officer, Senior Scientist, Principal Investigator, or Director of Research, before the first order can be processed, but does not have to be signed again for repeat orders. The Proteomics Service Agreement is typically valid for 15 years. If you require changes or modifications to be made to our standard service agreement, please email sales@kinexus.ca to request a Microsoft Word version of the document so your requested changes can be made directly into the agreement and emailed back to us for our final approval.

E. Courier Airway Bill

Airway bill for Federal Express or any courier that accepts dry ice shipments if the samples must be sent frozen.

Complete the airway bill and specify:

- Priority overnight delivery
- Bill transportation charges to your institute
- If chemical cleavage of the samples is not performed and samples must be sent frozen, use sufficient dry ice to last several days into a large Styrofoam shipping container
- Dry ice is a "*hazardous"* item, so ensure proper labels are attached to the outside of the box
- Do not specify Saturday delivery or hold at courier location
- Contact the courier to pick up the samples from you institute before the cut off time.
- For shipments coming from within Canada or the United States, it is preferable to ship any day from Monday to Wednesday. Do not ship on a Thursday or Friday.
- For international shipments coming from outside of North America, the best day to ship is on a Monday to ensure arrival in Canada for delivery later the same week
- Customers should e-mail the date of shipment and the courier airway bill number with number of samples to Kinexus at info@kinexus.ca to ensure we can track and monitor your package in transit
- For customers located outside of Canada, 3 copies of a commercial invoice are required to accompany your shipment (see below)

FOR U.S AND INTERNATIONAL CUSTOMER ONLY

F. Commercial Invoice (not required by Canadian customers)

Please complete one of the two attached commercial invoices (one for regular shipping and the other with dry ice) as applicable with the following information:

- Date of exportation
- Shipper name, address, and telephone number
- Country of export and country of origin
- Name of courier and the airway bill number
- Number, type and total weight of package(s)

- Total declared value of shipment (number of samples x $1.00 per sample) and please specify currency
- Date, name, signature, and title of authorized person
- Include three (3) copies of the commercial invoice on the outside of the package along with the airway bill

The regular Shipping Commercial Invoice should be used if the lysate samples are obtained from cells and tissues that have been subjected to chemical cleavage and/or homogenized in SDS-PAGE sample buffer (for immunoblotting validation studies). For lysate samples or cell/tissue pellets that must be shipped frozen, use the Shipping Commercial Invoice that corresponds to a dry ice shipment.

Please ensure 3 copies of a signed commercial invoice accompany your shipment which specifies your samples are “non-hazardous, non-infectious, and non-toxic and for research purposes only”. Since the samples are not for resale, the value of your shipment should be priced low, we recommend $1.00 per sample, to avoid paying additional duties and taxes on entry into Canada. It is also highly recommended that customers e-mail their courier airway bill number and the date of departure to info@kinexus.ca so we can track your shipment in transit and ensure it arrives in a timely manner. If we know your package tracking number, we can often pick up your package if it misses the cut off time for the courier delivery. We will send an e-mail confirmation once your shipment arrives safely at our facility.

The international air waybill is required for all international shipments. It is your customs declaration, which can possibly be used to clear your shipment through customs at the destination. If the description on your commercial invoice is too vague or missing information, customs authorities may select the shipment for further inspection. All customs paperwork, such as the commercial invoice, must have detailed commodity descriptions. A detailed description on the air waybill and other customs documentation will help speed up the clearance time and reduce your delivery time.

Form: KAM-900P-SOF

KINEX™ ANTIBODY MICROARRAY SERVICES — SERVICE ORDER FORM

Subject to terms of the Kinexus Proteomics Services Agreement

KINEXUS ORDER NUMBER
For Kinexus internal use only.

CUSTOMER INFORMATION ☐ REPEAT CUSTOMER OR ☐ NEW CUSTOMER

☐ Dr. ☐ Mr. ☐ Ms. _____
Name of Authorized Representative or Principal Investigator — *Title/Position*

_____
Company Name or Institute — *Department*

_____
Street Address

_____
City — *State or Province* — *Country* — *Zip or Postal Code*

_____
Email Address — *(Area Code) Telephone Number* — *(Area Code) Facsimile Number*

_____
Contact Person (if different from Authorized Representative) — *Email Address* — *(Area Code) Telephone Number*

KINEX™ KAM-900P REPORTS

RESULTS SENT BY EMAIL TO: ☐ AUTHORIZED REPRESENTATIVE/INVESTIGATOR **AND/OR** ☐ CONTACT PERSON

BILLING INFORMATION

Kinex™ Antibody Microarray KAM-900P Services offered for the detection with up to 265 pan- and 613 phosphosite-specific antibodies for cell signalling proteins in two (2) samples in duplicate measurements:

PRICE PER SAMPLE ON EACH MICROARRAY - *Refer to Section E of the Sample Identification Forms:* ***All prices in U.S. Funds***
NOTE: EACH MICROARRAY ORDERED INCLUDES THE ANALYSIS OF TWO (2) SAMPLES

Sample Analysis Options

KAM-900P-N Ab microarrays (2 non-confidential samples) @ $1770 per microarray x # arrays $_____
KAM-900P-C Ab microarrays (2 full confidential samples) @ $2998 per microarray x # arrays + $_____
KAM-900P-NC Ab microarrays (1 non-confidential & 1 full confidential sample) @ $2384 per microarray x # arrays + $_____

Total # of samples submitted: _____ Total # of Kinex™ antibody microarrays: _____ **Subtotal** = $_____

Quotation or Reference Number: _____ Quotation Price $_____

TOTAL COST FOR THIS ORDER = $_____

FOR CANADIAN CUSTOMERS ONLY:
Add applicable GST to the above total (No. 893907329 RT0001): + **$**_____ = **$**_____

TOTAL AMOUNT PAYABLE IN U.S FUNDS

PAYMENT METHOD

☐ PURCHASE ORDER ACCEPTED FROM COMPANIES AND INSTITUTES WITH APPROVED CREDIT. P.O. NUMBER: _____

☐ VISA OR ☐ MASTERCARD

_____ _____ _____ _____
Print Cardholder Name — *Visa Number* — *Expires (M/Y)* — *Cardholder Signature*

BILLING INFORMATION ☐ SEND INVOICE TO CUSTOMER AT ABOVE ADDRESS OR ☐ SEND INVOICE TO ACCOUNTS PAYABLE CONTACT:

☐ Dr ☐ Mr ☐ Ms _____
Accounts Payable Contact Name — *Company Name or Institute*

_____
Street Address — *City*

_____
State or Province — *Country* — *Zip or Postal Code* — *(Area Code) Telephone Number*

AUTHORIZATION

CUSTOMER HAS READ THE KINEXUS PROTEOMICS SERVICES AGREEMENT AND AGREES TO BE BOUND BY THE TERMS AND CONDITIONS:

_____ _____ _____
Print Name of Authorized Representative or Principal Investigator — *Authorized Signature* — *Date y/m/d)*

How did you originally hear about the KAM Services? ☐ ***Direct Mail*** ☐ ***Email*** ☐ ***Web Site*** ☐ ***Ad*** ☐ ***Referral*** ☐ ***Conference or Trade Show*** ☐ ***Other***

Form: KAM-900P-SIF

KINEX™ ANTIBODY MICROARRAY SERVICE IDENTIFICATION FORM

Subject to terms of the Kinexus Proteomics Services Agreement

KINEXUS ORDER NUMBER

NAME: _____ **COMPANY/INSTITUTE:** _____

(Authorized Representative or Principal Investigator)

STANDARD KINEX™ KAM-900P SCREENING SERVICES REQUESTED: (WITH CLIENT LYSATES + KINEXUS ANTIBODY MICROARRAY)

Use this form to order one or more of the three Standard Kinex™ Antibody Microarray KAM-900P Services currently offered by Kinexus. Please check the appropriate tick boxes. If you need assistance, please contact a technical service representative by calling toll free in North America 1-866-KINEXUS (866-546-3987) or by email at info@kinexus.ca. An electronic fillable MS-Word version of this form can be downloaded from the Kinexus website or supplied upon request.

☐ STANDARD SERVICE REQUESTED: KAM-900P

Standard Antibody Microarrays (265 pan-specific and 613 phospho-site-specific antibodies) and Two (2) Samples per Microarray

100 µg protein for each cell or tissue lysate sample are required

KINEXUS ID NUMBER

(Bar Code Identification Number)

For Kinexus Internal Use Only.

A. CLIENT SCREEN ID NAME:

Customer ID:

Provide ID name of your choice for your reference and for use in Box B of the "Client-Supplied Non-confidential Sample Description" (NSDF-LY) and "Client-Supplied Confidential Sample Description" (CSDF-LY) forms.

B. KINEX™ SCREEN SELECTION:

Kinexus currently offers three (3) Standard Kinex™Antibody Microarray KAM-900P screening services. Check with the Kinexus website at www.kinexus.ca for new releases.

☐ **KAM-900P-N** 878 Pan & phospho-specific Ab microarray (2 non-confidential samples)

☐ **KAM-900P-C** 878 Pan & phospho-specific Ab microarray (2 full confidential samples)

☐ **KAM-900P-NC** 878 Ab microarray (1 non-confidential & 1 full confidential sample)

C. SAMPLE IDENTIFICATION:

For each client supplied sample, please complete a "Client-Supplied Non-confidential Sample Description Form" (NSDF-SDF-LY) or a "Client-Supplied Confidential Sample Description Form" (CSDF-LY). There should be 2 completed Sample Description Forms per Client Screen ID Name for each microarray slide.

D. CHEMICAL CLEAVAGE SELECTION:

☐ Check box if the lysate proteins are to be subjected to chemical cleavage to reduce protein-protein potential interactions.

E. PRICING:

☐ KAM-900P-N 2 non-confidential samples = $1770.

☐ KAM-900P-C 2 full confidential samples = $2998

☐ KAM-900P-NC 1 non-confid. + 1 confidential sample = $2384

Use this pricing information for completion and submission of Service Order Form KAM-900P-SOF.

_____ _____ _____

Name of person completing this form *Signature* *Date (y/m/d)*

Form: NSDF-LY

FOR LYSATES

CLIENT SUPPLIED NON-CONFIDENTIAL SAMPLE DESCRIPTION FORM

Subject to terms of the Kinexus Service Agreement

KINEXUS ORDER NUMBER

NAME: _____ **COMPANY/INSTITUTE:** _____

(Authorized Representative or Principal Investigator)

Non-Confidential Service Requested and Lysate Sample Details:

Please refer to the Customer Information Package for the particular Kinexus proteomics service that you are requesting for details on how to prepare and ship your lysates to Kinexus for testing. Clients are required to complete all Sections A-K to qualify for the Non-Confidential pricing level for the Kinexus' Proteomics Services if they provide their own lysates for analysis. If sample details are to remain Confidential, please complete instead the "Client-Supplied Confidential Sample Description Form" (CSDF-LY) in Sections A-C. If you need further assistance, please contact a technical service representative by calling toll free in North America 1-866-KINEXUS (866-546-3987) or by email at info@kinexus.ca. Please check the appropriate tick boxes.

A. CLIENT SCREEN ID NAME + KINEXUS SERVICES NAME:

CLIENT ID: _____ KINEXUS PROTEOMICS SERVICES NAME: _____

Use the Client ID Name that you entered in Box B on the Service Identification Form (SIF). The Kinexus Proteomics Services abbreviated name should be used from the SIF.

B. SAMPLE IDENTIFICATION:

Client Name for Sample: _____

Control: ❑ Yes ❑ No

Concentration (mg/ml): _____ Volume (µl): _____

C. SPECIES:

❑ Human *(Homo sapiens)* Sex: ❑ Male ❑ Female ❑ M/F pooled ❑ Unknown

❑ Rat *(Rattus norvegicus)* # Animals: ____ Age: _____ Weight: _____

❑ Mouse *(Mus musculus)*

❑ Other – *Provide scientific & common name:* _____

KINEXUS ID NUMBER (FOR INTERNAL USE ONLY)

(Bar Code Identification Number)

D. SAMPLE SOURCE:

Tissues: ❑ Yes ❑ No *If yes, proceed to Section E*

Cells: ❑ Yes ❑ No *If yes, proceed to Section F*

E. TISSUES:

A. Organ source of tissue: _____

B. Tissue name: _____

C. Disease condition if appropriate: _____

F. CELLS: Is your sample a primary culture? ❑ Yes ❑ No

Is your sample an established cell line? ❑ Yes ❑ No

A. Name of cell line: _____

B. Organ source of cells: _____

C. Tissue or cell type: _____

D. Disease condition if appropriate: _____

G. CELL STATE: ❑ N/A

❑ Subconfluent ❑ Quiescent

❑ Confluent ❑ Scenescent

❑ Proliferating ❑ Apoptosing

❑ Differentiated ❑ Stressed

H. FRACTIONATION:

❑ Detergent-solubilized total lysate

❑ Cytosolic (Soluble)

❑ Particulate (Detergent-solubilized)

❑ IP - *If yes, indicate antibody or ligand used:* _____

❑ Other purification: _____

I. PERTURBATION:

❑ Normal untreated *If yes, proceed to Section K*

❑ Normal treated *If yes, proceed to Section J*

❑ Diseased untreated *If yes, proceed to Section K*

❑ Diseased treated *If yes, proceed to Section J*

J. TREATMENTS: *Please indicated if you used combined [CMB] or sequential [SEQ] treatments and provide details on your treatment:*

1. Name of compound/stimuli: _____ Concentration: _____ Time: _____ ❑ CMB ❑ SEQ

2. Name of compound/stimuli: _____ Concentration: _____ Time: _____ ❑ CMB ❑ SEQ

3. Name of compound/stimuli: _____ Concentration: _____ Time: _____ ❑ CMB ❑ SEQ

Details of treatment: _____

K. ADDITIONAL SAMPLE INFORMATION: *Please include any additional information that differentiates your samples:*

Transgenic: ❑ Yes ❑ No Knockout: ❑ Yes ❑ No Wildtype: ❑ Yes ❑ No Transfected/Over-expressed: ❑ Yes ❑ No Mutant: ❑ Yes ❑ No

If you answered yes to any of the above, please specify details including if there was any deprivation (such as serum/growth factor/drug/site of mutation) prior to treatment:

_____

_____

I hereby certify that all the sample information provided in this order is correct and accurate to the best of my knowledge. To qualify for the non-confidential pricing level, I agree that all Sections A-K must be completed in full otherwise the confidential pricing level will be applied. I further acknowledge that I may be contacted by a Kinexus representative for additional information if any section is unclear.

_____ _____ _____

Name of person completing this form *Signature* *Date (y/m/d)*

Form: CSDF-LY

FOR LYSATES

CLIENT SUPPLIED
CONFIDENTIAL SAMPLE DESCRIPTION FORM

Subject to terms of the Kinexus Service Agreement

KINEXUS ORDER NUMBER

NAME: _____ **COMPANY/INSTITUTE:** _____
(Authorized Representative or Principal Investigator)

Confidential Service Requested and Lysate Sample Details:

Please refer to the Customer Information Package for the particular Kinexus proteomics service that you are requesting for details on how to prepare and ship your lysates to Kinexus for testing. Clients are required to complete Sections A-C for the Confidential pricing level for Kinexus' Proteomics Services if they provide their own lysates for analysis. Note that a Confidential analysis is performed at a higher pricing level than a Non-Confidential analysis. Clients should instead complete all of Sections A-C on the "Client-Supplied Non-Confidential Sample Description Form" (NSDF-LY) to qualify for the non-confidential pricing. To obtain further assistance, please contact a technical service representative by calling toll free in North America 1-866-KINEXUS (866-546-3987) or by email at info@kinexus.ca. Please check the appropriate tick boxes.

A. CLIENT SCREEN ID NAME + KINEXUS SERVICES NAME:

CLIENT ID: _____ KINEXUS PROTEOMICS SERVICES NAME: _____
Use the Client ID Name that you entered in Box B on the Service Identification Form (SIF). The Kinexus Proteomics Services abbreviated name should be used from the SIF.

B. SAMPLE IDENTIFICATION:

Client Name for Sample: _____ Control: ❑ Yes ❑ No

Concentration (mg/ml): _____ Volume (µl): _____

C. SPECIES:

❑ Human *(Homo sapiens)* Sex: ❑ Male ❑ Female ❑ M/F pooled ❑ Unknown

❑ Rat *(Rattus norvegicus)* # Animals: ____ Age: _____ Weight: _____

❑ Mouse *(Mus musculus)*

❑ Other – *Provide scientific & common name:* _____

KINEXUS ID NUMBER (FOR INTERNAL USE ONLY)

(Bar Code Identification Number)

A. CLIENT SCREEN ID NAME + KINEXUS SERVICES NAME:

CLIENT ID: _____ KINEXUS PROTEOMICS SERVICES NAME: _____
Use the Client ID Name that you entered in Box B on the Service Identification Form (SIF). The Kinexus Proteomics Services abbreviated name should be used from the SIF.

B. SAMPLE IDENTIFICATION:

Client Name for Sample: _____ Control: ❑ Yes ❑ No

Concentration (mg/ml): _____ Volume (µl): _____

C. SPECIES:

❑ Human *(Homo sapiens)* Sex: ❑ Male ❑ Female ❑ M/F pooled ❑ Unknown

❑ Rat *(Rattus norvegicus)* # Animals: ____ Age: _____ Weight: _____

❑ Mouse *(Mus musculus)*

❑ Other – *Provide scientific & common name:* _____

KINEXUS ID NUMBER (FOR INTERNAL USE ONLY)

(Bar Code Identification Number)

A. CLIENT SCREEN ID NAME + KINEXUS SERVICES NAME:

CLIENT ID: _____ KINEXUS PROTEOMICS SERVICES NAME: _____
Use the Client ID Name that you entered in Box B on the Service Identification Form (SIF). The Kinexus Proteomics Services abbreviated name should be used from the SIF.

B. SAMPLE IDENTIFICATION:

Client Name for Sample: _____ Control: ❑ Yes ❑ No

Concentration (mg/ml): _____ Volume (µl): _____

C. SPECIES:

❑ Human *(Homo sapiens)* Sex: ❑ Male ❑ Female ❑ M/F pooled ❑ Unknown

❑ Rat *(Rattus norvegicus)* # Animals: ____ Age: _____ Weight: _____

❑ Mouse *(Mus musculus)*

❑ Other – *Provide scientific & common name:* _____

KINEXUS ID NUMBER (FOR INTERNAL USE ONLY)

(Bar Code Identification Number)

I hereby certify that all the sample information provided in this order is correct and accurate to the best of my knowledge. I further acknowledge that I may be contacted by a Kinexus representative for additional information if any section is unclear.

_____ _____ _____

Name of person completing this form *Signature* *Date (y/m/d)*

COMMERCIAL INVOICE

DATE OF EXPORTATION	EXPORT REFERENCES
SHIPPER/EXPORTER	**CONSIGNEE** Kinexus Bioinformatics Corporation Suite 1 8755 Ash Street Vancouver, B.C. Canada V6P 6T3 Telephone: (604) 323-2547 Facsimile: (604) 232-2548 Email: info@kinexus.ca
COUNTRY OF EXPORT	**TERMS OF SALE** Not for resale, sample for analysis
COUNTRY OF ORIGIN	**PURPOSE** Research and development
COUNTRY OF ULTIMATE DESTINATION Canada	**EXPORTING CARRIER**
INTERNATIONAL AIR WAYBILL NUMBER Courier Name: Number:	

NO. OF PKGS	TYPE OF PACKAGING	QUANTITY OF SAMPLES	COMPLETE AND ACCURATE COMMODITY DESCRIPTION	UNIT VALUE
	☐ FedEx Letter ☐ FedEx Pak ☐ Box ☐ Other	*Total number of 1.5 ml Eppendorf tubes:*	Non-hazardous, non-infectious degraded protein lysate for research and development diagnostic purposes. Samples are not for resale and there is no commercial value.	$1.00 *per sample*

TOTAL NO. OF PACKAGES	TOTAL WEIGHT OF PACKAGES	TOTAL DECLARED VALUE
		$

These commodities were exported from the Country indicated above in accordance with the Export Administration Regulations and are licensed for the ultimate designation shown. It is hereby certified that this commercial invoice shows the actual price of the goods described, that no other invoice has been or will be issued for these goods, and that all particulars are true and correct.

SIGNATURE AND STATUS OF AUTHORIZED PERSON

Print Name	*Title*
Authorized Signature	*Date (month/day/year)*

INCLUDE THREE (3) COPIES OF THIS INVOICE WITH YOUR SHIPMENT

COMMERCIAL INVOICE

DATE OF EXPORTATION	EXPORT REFERENCES
SHIPPER/EXPORTER	**CONSIGNEE** Kinexus Bioinformatics Corporation Suite 1 8755 Ash Street Vancouver, B.C. Canada V6P 6T3 Telephone: (604) 323-2547 Facsimile: (604) 232-2548 Email: info@kinexus.ca
COUNTRY OF EXPORT	**TERMS OF SALE** Not for resale, frozen sample for analysis
COUNTRY OF ORIGIN	**PURPOSE** Research and development
COUNTRY OF ULTIMATE DESTINATION Canada	**EXPORTING CARRIER**
INTERNATIONAL AIR WAYBILL NUMBER Courier Name: Number:	

NO. OF PKGS	TYPE OF PACKAGING	QUANTITY OF SAMPLES	COMPLETE AND ACCURATE COMMODITY DESCRIPTION	UNIT VALUE
	☐ FedEx Letter ☐ FedEx Pak ☐ Box ☐ Other	*Total number of 1.5 ml Eppendorf tubes:*	Non-hazardous, non-infectious protein lysate for research and development diagnostic purposes. Samples are not for resale and there is no commercial value. Samples are packaged on Dry Ice, Class 9, UN 1845, Group 3 (____ X ____ kgs).	$1.00 *per sample*

TOTAL NO. OF PACKAGES	TOTAL WEIGHT OF PACKAGES	TOTAL DECLARED VALUE
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24. LISTING OF ANTIBODIES AND THEIR TARGETS ON THE 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

PROTEOMICS SERVICES AGREEMENT

SERVICE AGREEMENT NO.

This Proteomics Services Agreement (the "Agreement") is entered into effective as of the Effective Date by and between Kinexus Bioinformatics Corporation ("**Kinexus**"), a Canadian corporation with a principal place of business at Suite 1, 8755 Ash Street, Vancouver, British Columbia, Canada, V6P 6T3 **AND** the corporation or other entity ("**Customer**") having the following name and business or institution address: _____

_____

_____

R E C I T A L S

WHEREAS Kinexus is a bioinformatics company employing proprietary proteomics and bioinformatics services to create and interpret data to map protein signalling networks and compile databases with this knowledge to enable disease biomarker and therapeutics discovery.

WHEREAS the Customer desires to have Kinexus perform standard and/or customized proteomics services with materials and/or information provided by the Customer.

WHEREAS Kinexus is willing to provide these proteomics services under the terms and conditions set forth herein.

THEREFORE, in consideration of the premises and covenants and agreements contained herein, and other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, Kinexus and the Customer agree as follows:

1. DEFINITIONS

1.1 "Academic Collaborator" means a principal investigator, employed at a university or other not-for-profit academic research institution.

1.2 "Affiliate" means any corporation or other entity that directly or indirectly controls, is controlled by or is under common control with a party to this Agreement. A corporation or other entity shall be regarded as in control of another corporation or entity if it owns or directly or indirectly controls more than fifty percent (50%) of the outstanding voting stock or other ownership interest of the other corporation or entity.

1.3 "Corporate Partner" means any Third Party which enters into an agreement with the Customer or its Affiliates involving the grant to such Third Party of rights for the development or commercialization of a product that was discovered, identified, selected, characterized or determined to have therapeutic or diagnostic use through use of the Proteomics Analyses provided to the Customer pursuant to this Agreement.

1.4 "Confidential Information" means any information or data received by a party (the "Receiving Party") from the other party (the "Disclosing Party") in connection with the performance of this Agreement that, if

disclosed in writing, is marked or otherwise identified by the Disclosing Party as confidential or, if disclosed orally is identified in writing by the Disclosing Party as confidential within ten (10) days following the disclosure. Confidential Information shall not include any information or data that the Receiving Party can demonstrate:

(a) was generally available to the public before its disclosure to the Receiving Party or became generally available to the public after its disclosure to the Receiving Party, provided that such information or data did not become generally available to the public by means of an unauthorized act or omission of the Receiving Party;

(b) was already in the possession of the Receiving Party before its disclosure under this Agreement, as demonstrated by Receiving Party's written records, provided that such information or data was not obtained directly or indirectly from the Disclosing Party under an obligation of confidentiality;

(c) was disclosed to the Receiving Party, whether before or after its disclosure under this Agreement, by a Third Party, provided that such information or data was not obtained directly or indirectly from the Disclosing Party under an obligation of confidentiality; or

(d) was independently developed or discovered by employees or agents of the Receiving Party without any use of Confidential Information of the Disclosing Party as demonstrated by Receiving Party's written records.

All of the Proteomics Services technologies provided by Kinexus will be deemed to have been identified as proprietary and considered the Confidential Information of Kinexus.

1.5 "Contact" means the contact person of the Customer that is designated on the Service Order Forms, who is deemed to have the authority to deliver Samples, Service Order Forms, Service Information Forms, and Sample Description Forms to Kinexus, on behalf of the Customer, under this Agreement.

1.6 "Proteomics Analyses" means one or more of the custom and standard proteomics services offered by Kinexus that may permit the identification and/or quantification of proteins, their phosphorylation states, their interactions with proteins, peptides, and other compounds, and the regulation of their functional activities by these agents.

1.7 "Proteomics Products" means the products of the custom proteomics services offered by Kinexus to manufacture one or more proteins using recombinant DNA technology, and designer peptides by chemical synthesis.

1.8 "Sample" means a lysate or semi-purified fraction from cells and tissues, a protein, and/or a compound provided to Kinexus by the Customer, which the Customer has prepared and shipped in a manner that it can be properly used by Kinexus for the Proteomics Analyses. Samples for Proteomics Analyses may also be provided by Kinexus at the request of the Customer.

1.9 "Sample Description Form" means the Kinexus form to be completed by the Customer to provide information on the nature of each Sample submitted for the Proteomics Analyses. It is included in the Proteomics Services Customer Information Package that is incorporated into this Agreement by reference, and may be amended from time to time as updated on the Kinexus website.

1.10 Antibody" means the immunoglobulin reagent that permits detection of a target protein or phosphorylation site.

1.11 "Antibody Description Form" means the Kinexus form to be completed by the Customer to provide information on the nature of each Antibody submitted by the Customer for the Proteomics Analyses. It is included

in the Proteomics Services Customer Information Package with this Agreement, and may be amended from time to time as updated on the Kinexus website.

1.12 "Service Order Form" means the Kinexus form to be completed by the Customer to provide Kinexus with the Customer's contact and billing information for the Proteomics Analyses or Proteomics Products. This form indicates the level of confidentiality requested by the Customer. It is included in the Proteomics Services Customer Information Package with this Agreement, and may be amended from time to time as updated on the Kinexus website.

1.13 "Service Information Form" means the Kinexus form to be completed by the Customer to provide Kinexus with a specific listing of the Samples to be tested for the Proteomics Analysis or a specific description of the Proteomics Products that are requested. It is included in the Proteomics Services Customer Information Package with this Agreement, and may be amended from time to time as updated on the Kinexus website.

1.14 "Report" means the underlying raw data and the report provided to the Customer hereunder consisting of the Proteomic Analyses of Samples, including, but not limited to tables of the experimental results. For Proteomics Products, the Report may include raw data confirming the composition and purity of the Proteomics Products.

1.15 "Field of Use" means use by Kinexus and its Affiliates and Academic Collaborators of data from the Report for research and commercial purposes relating to the creation and interpretation of knowledge about the composition, architecture and operation of cell signalling networks, improving its Proteomics Services, and the compilation of databases that may become accessible to Third Parties on-line over the Internet.

1.16 "Third Party" means any entity other than Kinexus', Kinexus' Affiliates, the Customer and the Customer's Affiliates.

1.17 "Effective Date" means the date of the last signature on this Agreement.

2. REQUEST FOR AND DELIVERY OF PROTEOMICS SERVICES

2.1 Request for Proteomics Services. From time to time, over the Term of this Agreement (as defined in Section 6.1 herein), the Customer can engage Kinexus to provide its Proteomics Analyses or Proteomics Products. After submission of a quotation from Kinexus to the Customer, by delivery to Kinexus of a Service Order Form, a Service Information Form and a Sample Description Form with Samples as appropriate, the Customer hereby requests and authorizes Kinexus to perform those Proteomics Services stated in the Services Order Form and deliver the results of these services to the Customer, pursuant to the terms and conditions in this Agreement. In the case of Customer requested Proteomics Analyses, this would include the delivery of a Report. In the case of Customer requested Proteomics Products, this would include the delivery of the Proteomics Products and a Report.

2.2 Representation and Warranty. The Customer represents and warrants that: (a) it has all right and authority to provide the Sample to Kinexus for analysis under the terms and conditions of this Agreement, (b) it collected the Sample lawfully and with all necessary consents and approvals, and (c) that the collection, use and disclosure of the Sample to Kinexus pursuant to this Agreement will not violate the rights of any Third Party.

2.3 Delivery Conditions for Customer Sample. The Customer shall be responsible for making shipping arrangements to deliver Samples to Kinexus. The Customer shall also be responsible for complying with all applicable laws and regulations (including but not limited to customs requirements and relevant handling procedures and protocols) and obtaining any and all permits, forms or permissions that may be required by all regulatory authorities to ship and deliver the Sample~~,~~ to Kinexus and for Kinexus to accept delivery of the Sample.

2.4 Processing and Delivery of Report and Proteomics Products. Subject to the terms of this Agreement, Kinexus shall analyze Samples with the Customer-specified Proteomics Services or produce Customer-specified Proteomics Products, and deliver a Report to the Customer as requested on the Service Order Form and Service Information Form.

2.5 Quality of Samples for Proteomics Analyses. Kinexus shall not deliver a Report on any Sample that Kinexus, in its sole discretion, reasonably believes has not been prepared and delivered in a manner that would compromise its ability to provide a reliable result. Under such a circumstance, the Sample will be destroyed by Kinexus after fourteen (14) days notification by e-mail to the Customer or at the request of the Customer prior to the scheduled destruction of the Sample, it will be returned to the Customer provided that the Customer agrees to reimburse Kinexus for the courier costs for its delivery.

3. PAYMENTS

3.1 Payments for Proteomics Services. For each Proteomics Analyses and Proteomics Product requested under this Agreement, the Customer shall pay to Kinexus a fee in accordance with the amount specified on the Service Order Form and the Service Identification Form for the requested service, which may be amended from time to time as updated on Kinexus' website. This amount will be the same amount that was specified on the formal quotation issued by Kinexus to the Customer. In the absence of a formal quotation, the pricing will be based on the pricing specified in the latest versions of the Customer Information Packages for Proteomics Services that are downloadable from the Kinexus website (www.kinexus.ca). The category of pricing depends on the level of requested confidentiality for analysis:

(a) Non-Confidential Proteomics Analyses. If the Samples are provided by the Customer, then all of the Sample information on the Client Supplied **Non-Confidential** Sample Description Form is completed and **is not** designated as Confidential Information on the Service Identification Form. If Antibodies are supplied by the Customer, then all of the Antibody information on the Client Supplied Antibody Description Form (see example in Appendix) must be completed and **is not** designated as Confidential Information on the Service Identification Form.

(b) Confidential Proteomics Analyses. If the Samples are provided by the Customer, then all of the Sample information on the Client Supplied **Confidential** Sample Description Form must be completed and **is** designated as Confidential Information on the Service Identification Form.

3.2 The Customer shall issue a purchase order or provide a charge account at the time the Customer sample arrives at Kinexus' offices at Suite 1, 8755 Ash Street, Vancouver, British Columbia, Canada, V6P 6T3. Kinexus will invoice Customer when the Proteomics Analyses or Proteomics Products are complete and delivered to Customer. Payment terms are net 30 days from date of invoice.

3.3 Interest on Late Payments. Any overdue payments by the Customer to Kinexus under this Agreement shall bear interest, to the extent permitted by applicable law at 18% per annum, calculated on the total number of days payment is delinquent; provided, however, that interest shall not accrue pursuant to this Section 3.3 on any amounts payable under this Agreement with respect to which payment is disputed in good faith; provided, further that interest shall accrue pursuant to this Section 3.3 once such dispute has been resolved if payment is not made promptly thereafter.

4. INTELLECTUAL PROPERTY RIGHTS

4.1 Ownership of Sample Information. The Customer owns all rights to the Sample information provided to Kinexus. For Non-Confidential Proteomics Analyses, the Customer grants Kinexus a non-exclusive, royalty-free fully paid up worldwide perpetual license to use, copy, publish, compile, display, communicate, modify, translate and otherwise exploit (and authorize Third Parties to do any of the foregoing) to use the information on the Client Supplied **Non-Confidential** Sample Description Form in the Field of Use, provided that the Customer's identity is not linked to, or otherwise disclosed with respect to, such data.

4.2 Ownership of Report. The Customer shall own the data in the Report. For Non-Confidential Proteomics Analyses, the Customer grants Kinexus a non-exclusive, royalty-free fully paid up worldwide perpetual license to use, copy, publish, compile, display, communicate, modify, translate and otherwise exploit (and authorize Third Parties to do any of the foregoing) data from the Report in the Field of Use.

4.3 Confidentiality of Sample Information. Kinexus will have no rights with respect to the Confidential Sample information until the Sample information is published or otherwise enters the public domain. Thereafter, Kinexus can use the results of the Proteomics Analyses of the Customer Samples for its internal research and development programs.

4.4 Ownership of Proteomics Products. The Customer owns the Proteomics Products that have been delivered to the Customer in the amounts specified in the Service Order Form and the Service Information Form. Kinexus owns any excess Proteomics Products and may dispose of these in its best interests.

4.5 Ownership of New Intellectual Property.

(a) The Customer shall own and have rights to all inventions, discoveries, improvements, know-how, technical information, data or other technology discovered, conceived, made, developed and/or reduced to practice through the use of the data in the Report and Proteomics Products solely by employees of the Customer or jointly with its Affiliates;

(b) Kinexus shall own and have rights to all inventions, discoveries, improvements, know-how, technical information, data or other technology discovered, conceived, made, developed and/or reduced to practice through the use of the data in the Report and Proteomics Products solely by employees of Kinexus or jointly with its Affiliates.

4.6 Non-Exclusive License to Preserve Kinexus Proteomics Services Freedom of Operation. In the event one or more claims of an issued patent arising from the use of a Report by the Customer, its Affiliates, Academic Collaborators or Corporate Partners would, absent a license from the Customer or its Affiliates, prevent Kinexus from using or permitting others to use the Kinexus Proteomics Services or any data therein, then the Customer and/or its Affiliates (as applicable) shall grant to Kinexus a non-exclusive, royalty-free fully-paid up perpetual license, including the right to grant sublicenses, under any such patent claim to use and permit others to use the Proteomics Services.

5. CONFIDENTIALITY

5.1 Confidentiality. Each Receiving Party shall treat the Confidential Information of the Disclosing Party as strictly confidential and (a) take reasonable precautions to protect such Confidential Information (including, without limitation, all precautions such as the Receiving Party employs with respect to its own confidential information), (b) not disclose or make available to any Third Party such Confidential Information without the express prior written consent of the Disclosing Party and (c) use such Confidential Information only for purposes specifically authorized under this Agreement. Each Receiving Party may disclose Confidential

Information of the Disclosing Party to its officers, directors, employees, consultants, Affiliates and agents, and to licensees or prospective licensees of its rights to any invention, on a need-to-know basis and on the condition that such employees, Affiliates, agents, licensees and prospective licensees are obligated to maintain the confidentiality of the Confidential Information in a manner no less restrictive than the terms and conditions of this Section 5. Each Receiving Party may disclose Confidential Information of the Disclosing Party pursuant to a demand issued by a court or governmental agency or as otherwise required by law, provided, however, that the Receiving Party notifies the Disclosing Party promptly upon receipt thereof, giving the Disclosing Party sufficient advance notice to permit it to seek a protective order or other similar order with respect to such Confidential Information, and provided, further, that the Receiving Party furnishes only that portion of the Confidential Information of the Disclosing Party that it is advised by counsel is legally required whether or not a protective order or other similar order is obtained by the Disclosing Party.

5.2 Publication. The Customer may publish and/or present the Report, abstracts or manuscripts generated utilizing the Report, and any data and/or results generated by the Customer utilizing the Report. The Customer is encouraged to disclose in scientific publications any Proteomics Analyses that were performed by Kinexus and any Proteomics Products were produced by Kinexus that meaningfully contributed to the described work. Please refer to "Kinexus Bioinformatics Corporation (Vancouver, Canada)." For all Samples submitted for analysis and identified as Non-Confidential by the Customer, Kinexus will not use, copy, publish, compile, display, communicate, modify, or translate the Sample Information or the data from the Report for a period of 180 days (6 months) following the return of the Report to the Customer. At any time, the Customer may opt to pay the difference in price between the Non-Confidential pricing level to the Confidential pricing level for each applicable Sample, to ensure the confidentiality status of such sample is changed.

5.3 Confidential Sample Information. All parties agree that the term of confidentiality pertaining to that Sample information will expire when the Sample information is published or otherwise enters public domain through no fault of Kinexus.

5.4 Use of Customer Name. Except as expressly provided in Section 9.5, no right or license is granted hereunder by Customer for Kinexus to use the Customer's name in relation to data from a Report to a Third Party.

6. TERM AND TERMINATION

6.1 Term. The term of this Agreement ("**Term**") shall commence on the Effective Date and shall remain in effect for fifteen (15) years or until the termination of this Agreement pursuant to the terms hereof.

6.2 Early Termination. Each party shall have the right to terminate this Agreement at any time prior to Kinexus' delivery of a Report or Proteomics Product to the Customer hereunder, upon ten (10) business days written notice to the other party, if such party reasonably determines that the production, or use of such Sample infringes intellectual property rights of any Third Party, and the Customer elects not to obtain a license under the necessary Third Party intellectual property rights at its sole expense. If this Agreement is terminated by either party pursuant to this Section 6.2, neither party shall have any obligation to the other with respect to payments under this Agreement regarding the Sample or Proteomics Product at issue.

Kinexus shall have the right to terminate any Service Order Form for any Proteomics Services upon ten (10) business days written notice to the Customer, upon the identification of a technical difficulty related to the Sample or Proteomics Product which would prevent it from delivering the Report or Proteomics Product using reasonable efforts. If Kinexus terminates a work order as a result of a technical difficulty related to a Customer Sample that is the fault of Kinexus, Kinexus shall provide for the reanalysis of the same number of problematic Customer Samples for the Proteomics Analyses at the original agreed upon price without any additional expenses incurred by the Customer, or Kinexus shall repay any prepayment fee paid by the Customer for such a Customer Sample and neither party shall have any further obligation to the other with respect to that Customer Sample.

If Kinexus terminates a Service Order Form for Proteomics Analyses as a result of a technical difficulty related to the Customer Sample (including insufficient material or other problems associated with the quality of the Sample) that is the fault of the Customer, then Kinexus shall provide for the reanalysis of the problematic Customer Samples at the original agreed upon price without any additional expenses incurred by the Customer, provided Kinexus completes the full Proteomics Analyses for all Samples. For any subsequent resubmission of Customer Samples for Proteomics Analyses due to technical difficulty that is again the fault of the Customer, Kinexus shall provide for the reanalysis of the problematic Customer Samples at an additional charge per sample at a price mutually agreed by the Customer and Kinexus. If the Customer elects not to resubmit Samples for Proteomics Analyses, then the Customer will pay Kinexus an amount equivalent to 50% of the quoted price for the work performed by Kinexus to this point.

6.3 Events of Default. An event of default (an "Event of Default") shall be deemed to occur upon a material breach of this Agreement by a party (including, without limitation, any breach of the provisions of Section 5) if the breaching party fails to remedy such breach within thirty (30) days after written notice thereof by the non-breaching party.

6.4 Effect of an Event of Default.

(a) Remedies Available to Kinexus. If an Event of Default occurs relating to a material breach by the Customer, then Kinexus shall have the right, at its option exercisable in its sole discretion, in addition to any other rights or remedies available to it at law or in equity, to immediately terminate this Agreement upon notice thereof to the Customer, in which case the Customer shall return to Kinexus, or, upon Kinexus' written instruction, destroy any Report, Proteomics Products, and all information, other materials or documentation provided or made available by Kinexus pursuant to this Agreement, and any copies thereof (including electronic copies).

(b) Remedies Available to the Customer. If an Event of Default occurs relating to a material breach by Kinexus, then the Customer shall have the right, at its option exercisable in its sole discretion, in addition to any other rights or remedies available to it at law or in equity and subject to the limitations set forth in Section 7, to terminate this Agreement upon notice thereof to Kinexus.

6.5 Effect of Expiration or Termination of Agreement. The expiration or termination of this Agreement shall not relieve the parties of any obligation accruing prior to such expiration or termination. Kinexus will not be required to continue custom proteomics analyses on a Sample after termination, and the Customer will be required to pay for work done prior to termination. The provisions of Sections 4, 5, 6, 7, 8, and 9 hereof shall survive any expiration or termination of this Agreement.

7. DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY

7.1 Disclaimer of Warranties. THE PROTEOMICS SERVICES ARE BEING SUPPLIED TO CUSTOMER WITH NO EXPRESS, IMPLIED, STATUTORY OR OTHER WARRANTIES, REPRESENTATIONS, CONDITIONS OR GUARANTEES, INCLUDING THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND DURABILITY. WITHOUT LIMITING THE FOREGOING, KINEXUS MAKES NO REPRESENTATION OR WARRANTY THAT THE USE OF THE REPORT, ANY PROTEOMICS PRODUCTS OR THE DATA THEREIN OR THE PERFORMANCE OF THIS AGREEMENT WILL NOT INFRINGE ANY INTELLECTUAL PROPERTY OR OTHER RIGHTS OF ANY THIRD PARTY.

7.2 Limitation of Liability. Kinexus shall not be liable for any use by the Customer, its Affiliates, Corporate Partners, or Academic Collaborators of the Report and any Proteomics Products or any loss, claim,

damage or liability, of whatever kind or nature, which may arise from or in connection with the use of the Report or the data therein, and any Proteomics Products. NOTWITHSTANDING ANYTHING ELSE IN THIS AGREEMENT OR OTHERWISE TO THE CONTRARY, NEITHER KINEXUS NOR CUSTOMER WILL BE LIABLE TO EACH OTHER WITH RESPECT TO ANY MATTER ARISING UNDER THIS AGREEMENT UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR (I) ANY PUNITIVE, EXEMPLARY, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOST PROFITS OR (II) COST OF PROCUREMENT OF SUBSTITUTE GOODS, TECHNOLOGY OR SERVICES. WITHOUT IN ANY WAY LIMITING THE FOREGOING, KINEXUS SHALL NOT, IN ANY EVENT, HAVE ANY LIABILITY WHATSOEVER IN CONNECTION WITH THIS AGREEMENT IN EXCESS OF AN AMOUNT EQUAL TO THE FEES PAID TO KINEXUS BY CUSTOMER HEREUNDER IN RESPECT OF THE PROTEOMICS SERVICES AT ISSUE.

8. INDEMNIFICATION

Except to the extent prohibited by law, the Customer shall assume all liability for, and shall defend, indemnify and hold Kinexus, its Affiliates and their respective directors, officers, employees and agents harmless from, all claims, losses, damages or expenses (including reasonable attorneys' fees) arising directly or indirectly as a result of: (a) the use of the Report or the data therein and any Proteomics Products by the Customer or its Affiliates, Corporate Partners or Academic Collaborators, or (b) the breach, untruthfulness or inaccuracy of any of the Customer's representations and warranties in this Agreement.

9. MISCELLANEOUS

9.1 Entire Agreement. The Appendices to this Agreement, together with all terms and conditions contained within this Agreement constitute the entire understanding between the parties with respect to the subject matter hereof and, with respect to any conflicting terms from prior agreements between the parties, supersedes and cancels such conflicting sections from all previous registrations, agreements, commitments and writings in respect thereof. This Agreement may be amended, or any term hereof modified, only by a written instrument duly executed by both parties hereto.

9.2 Assignment and Waiver. This Agreement may not be assigned or otherwise transferred by either party without the written consent of the other party, such consent will not be unreasonably withheld. Notwithstanding the foregoing, Kinexus may, without such consent, assign its rights and obligations under this Agreement (a) to any Affiliate or (b) to a Third Party in connection with a merger, consolidation or sale of such portion of its assets that includes rights under this Agreement provided, however, that Kinexus' rights and obligations under this Agreement shall be assumed by its successor in interest in any such transaction. In the event of such a transaction with Third Party, notwithstanding the other provisions of this Agreement, the intellectual property rights of such Third Party shall not be subject to the licenses granted by Kinexus under this Agreement. Any purported assignment in violation of the provisions of this Section 9.2 shall be void. Any permitted assignee shall assume all obligations of its assignor under this Agreement. The waiver by either party hereto of any right hereunder or the failure to perform or of a breach by the other party shall not be deemed a waiver of any other right hereunder or of any other breach or failure by said other party whether of a similar nature or otherwise.

9.3 Force Majeure. Neither party shall be held liable or responsible to the other party nor be deemed to have defaulted under or breached this Agreement for failure or delay in fulfilling or performing any obligation under this Agreement when such failure or delay is caused by or results from causes beyond the reasonable control of the affected party, including but not limited to fire, floods, embargoes, war, acts of war (whether war is declared or not), insurrections, riots, civil commotions, strikes, lockouts or other labor or supply disturbances, acts of God or acts, omissions or delays in acting by any governmental authority or the other party; provided, however, that the party so affected shall use reasonable commercial efforts to avoid or remove such causes of nonperformance, and

shall continue performance hereunder with reasonable dispatch whenever such causes are removed. Either party shall provide the other party with prompt written notice of any delay or failure to perform that occurs by reason of force majeure. The parties shall mutually seek a resolution of the delay or the failure to perform as noted above.

9.4 Notices. Any consent, notice, or report required or permitted to be given or made under this Agreement by one of the notification parties hereto to the other shall be in writing, delivered personally, by email or by facsimile (and promptly confirmed by telephone, personal delivery or courier) or courier, postage prepaid (where applicable), addressed to such other party at its address indicated below, or to such other address as the addressee shall have last furnished in writing to the addressor and shall be effective upon receipt by the addressee.

If to Kinexus:

Kinexus Bioinformatics Corporation
Suite 1, 8755 Ash Street
Vancouver, British Columbia, Canada V6P 6T3
Attention: Dr. Steven Pelech
President & C.S.O.
Telephone: (604) 323-2547 extension 10
Facsimile: (604) 323-2548

If to the Customer:

To the Customer at the address designated at the front of this Agreement and to the attention of the duly authorized representative signing this Agreement.

9.5 Publicity. Except as required by law, the terms of this Agreement shall be treated as Confidential Information and shall not be disclosed to anyone (except for the parties' respective directors, officers, employees, consultants, agents and attorneys assisting in the review and negotiation of this Agreement and/or who have a need to know the terms of this Agreement) without the written consent of the other party, such consent which will not be unreasonably withheld. Notwithstanding the foregoing, (a) Kinexus may, without such consent, publicly announce the execution of this Agreement with the Customer and may reference the Customer as a Kinexus client.

9.6 No Partnership. It is expressly agreed that the relationship between Kinexus and the Customer shall not constitute a partnership, joint venture or agency. Neither Kinexus nor the Customer shall have the authority to make any statements, representations or commitments of any kind, or to take any action, which shall be binding on the other, without the prior consent of the other party to do so.

9.7 Applicable Law. This Agreement shall be governed by, construed, interpreted and enforced in accordance with, the laws of the province of British Columbia and the laws of Canada, without reference to conflict of laws principles.

9.8 Dispute Resolution.

(a) The parties hereby agree that they will attempt in good faith to resolve any controversy or claim arising out of or relating to this Agreement promptly by negotiations. If a controversy or claim should arise hereunder, the matter shall be referred to an individual designated by the Chief Executive Officer or President of Kinexus and an individual designated by the Chief Executive Officer (or the equivalent position) of the Customer (the "Representatives"). If the matter has not been resolved within twenty-one (21) days of the first meeting of the Representatives of the parties (which period may be extended by mutual agreement) concerning such matter, subject to rights to injunctive relief and specific performance, and unless otherwise specifically provided for herein, any controversy or claim arising out of or relating to this Agreement, or the breach thereof, will be settled as set forth in Section 9.8(b).

(b) All disputes arising in connection with this Agreement that are not resolved pursuant to Section 9.8(a) above shall be finally settled in Vancouver, British Columbia, by a single arbitrator appointed pursuant to the provisions of the *Commercial Arbitration Act* (British Columbia). Notwithstanding the above, either party has the right to bring an action in a court of competent jurisdiction against the other party for (i) any breach of such other party's duties of confidentiality pursuant to Section 5 of this Agreement; (ii) any infringement of its proprietary rights by the other party; and (iii) for interim protection such as, by way of example, an interim injunction. Judgment upon the arbitrator's award may be entered in any court of competent jurisdiction. The award of the arbitrator may include compensatory damages against either party, but under no circumstances will the arbitrator be authorized to, nor shall he/she, award punitive, consequential or incidental damages against either party. The parties agree not to institute any litigation or proceedings against each other in connection with this Agreement except as provided in this Section 9.8.

9.9 Severability. Each party hereby agrees that it does not intend to violate any public policy, statutory or common laws, rules, regulations, treaty or decision of any government agency or executive body thereof of any country or community or association of countries. Should one or more provisions of this Agreement be or become invalid, the parties hereto shall substitute, by mutual consent, valid provisions for such invalid provisions which valid provisions in their economic effect are sufficiently similar to the invalid provisions that it can be reasonably assumed that the parties would have entered into this Agreement with such valid provisions. In case such valid provisions cannot be agreed upon, the invalidity of one or several provisions of this Agreement shall not affect the validity of this Agreement as a whole, unless the invalid provisions are of such essential importance to this Agreement that it is to be reasonably assumed that the parties would not have entered into this Agreement without the invalid provisions.

9.10 Counterparts. This Agreement may be executed in counterparts, each of which when executed and delivered is an original, but both of which together shall constitute one and the same instrument.

9.11 Fax Delivery. This Agreement may be executed by the parties and transmitted by facsimile or electronically as a portable document format (pdf) file or similar electronic file and if so executed and transmitted this Agreement will be for all purposes as effective as if the parties had delivered an executed original Agreement.

IN WITNESS WHEREOF, the parties have caused their duly authorized officer to execute and deliver this Agreement as of the Effective Date.

_____	**KINEXUS BIOINFORMATICS CORPORATION**
Printed Name of Institute or Company	
Per: _____	Per: _____
Signature of Authorized Representative	*Signature of Dr. Steven Pelech*
Name: _____	**Dr. Steven Pelech**
Printed Name of Authorized Representative	
Title: _____	**President and Chief Scientific Officer**
Printed Title of Authorized Representative	
Date signed: _____	Date signed: _____