



FINDING THE
PATHWAY TO
ASSAY OPTIMIZATION
IS EASY

LANCE *Ultra* Serine/Threonine Kinase Selection Guide

LANCE® *Ultra* TR-FRET reagents comprise the widest portfolio of validated kinase assay offerings available for rapid, sensitive and robust screening of purified kinase targets in a biochemical format.

- We provide S/B ratiometric data for each LANCE *Ultra* assay to guide you to the best performing solution for your assay.
- Rapid assay optimization every time.
- Our selection guides contain over 300 kinases from a variety of suppliers.

How to use this guide:

1. Locate your kinase
 - In many cases, up to three commercial kinase vendors have been tested.
 - Many common aliases are shown in parenthesis.
2. Best performing *ULight*™ substrates are listed for each enzyme according to performance criteria where signal to background (S/B) ratios are greater than 5.0
 - S/B ratios (Signal at 665 nm / minus ATP control at 665 nm) are indicated in parenthesis.
 - All S/B ratios were obtained at fixed experimental conditions unless otherwise noted (see page 10).
3. Based on your substrate choice, find the corresponding Europium-labeled anti-phospho-antibody on page 11 (**LANCE *Ultra* products used for this study**) to identify the TR-FRET donor anti-phospho-antibody for your LANCE *Ultra* assay.

If you cannot find your kinase of interest, please ask your PerkinElmer sales specialist, as our list continues to expand. Two kits are available for testing purposes:

- **KinaSelect Ser/Thr kit** (5 x 250 data points, TRF0300-C)
 - 5 *ULight*-labeled SER/THR kinase specific substrates + 5 matching Europium-labeled Antiphospho-Antibodies
- **KinaSelect TK kit** (1,000 data points, TRF0301-D)
 - 1 *ULight*-labeled kinase specific substrate + 1 matching Europium-labeled Anti-phospho-Antibody


LANCE[®] Ultra Reagents for Ser/Thr Kinase Assays

Up to three kinase substrates are listed based on signal to background (S/B) ratios obtained with commercially available enzymes.

S/B ratios (Signal at 665 nm / minus ATP control at 665 nm) are indicated in parenthesis.

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|------------------------------------|--------------------------------------|-------------------------------------|-------------------------|-------------------|-------------------|
| ACTR2B (ACVR2B) | ULight-Histone H3 (Thr3; 10.4) | ULight-Topo IIX (7.2) | | Carna Biosciences | 09-132 |
| ACV-R1 | ULight-Topo IIX (10.9) | | | ProQinase | 0372-0000-1 |
| ACVR2A | ULight-Histone H3 (Thr3; 9.4) | | | Carna Biosciences | 09-131 |
| ACVRL1 (ALK1) | ULight-Topo IIX (5.6) | ULight-PLK (5.4) | | Invitrogen | PV4883 |
| BARK1 (ADRBK1, GRK2) | ULight-Topo IIX (22.9) | | | Carna Biosciences | 01-111 |
| ADRBK2 (BARK2, GRK3) | ULight-Topo IIX (27.9) | | | Invitrogen | PV3827 |
| BARK2 (ADRBK2, GRK3) | ULight-Topo IIX (22.9) | ULight-Histone H3 (Thr3; 10.1) | | Carna Biosciences | 01-112 |
| AKT1 | ULight-rpS6 (20.5) | ULight-PLK (19.1) | ULight-PKC (15.2) | Carna Biosciences | 01-101 |
| AKT2 | ULight-rpS6 (21.7) | ULight-PLK (20.1) | ULight-Crosstide (16.6) | Carna Biosciences | 01-102 |
| AKT3 | ULight-rpS6 (21.6) | ULight-PLK (20.7) | ULight-PKC (15.6) | Carna Biosciences | 01-103 |
| ALK4 (ACVR1B) | ULight-Topo IIX (20.6) | | | Carna Biosciences | 09-135 |
| AMPKX1/Y1/Z1 (PRKAA1/B1/G1) | ULight-Acetyl-CoA Carboxylase (30.5) | ULight-PLK (15.1) | ULight-CREBtide (11.9) | Carna Biosciences | 02-113 |
| AMPKX2/Y1/Z1 (PRKAA2/B1/G1) | ULight-Acetyl-CoA Carboxylase (29.9) | ULight-CREBtide (16.0) | ULight-PLK (11.5) | Carna Biosciences | 02-114 |
| ARK5 (NuaK1) | ULight-Topo IIX (7.7) | ULight-CREBtide (5.8) | | ProQinase | 0300-0000-1 |
| ARK5 (NuaK1) | ULight-CREBtide (5.1) | | | Carna Biosciences | 02-126 |
| AurA (Aurora-A) | ULight-PLK (20.5) | ULight-Histone H3 (Ser10; 13.0) | | Carna Biosciences | 05-101 |
| AurB (AURKB)/INCENP | ULight-rpS6 (21.0) | ULight-PLK (17.6) | ULight-CREBtide (12.7) | Carna Biosciences | 05-102 |
| Aurora-B | ULight-Histone H3 (Ser10; 12.7) | ULight-PLK (7.6) | | ProQinase | 0190-0000-1 |
| AurC (AURKC) | ULight-PLK (16.2) | ULight-Histone H3 (Ser10; 12.1) | | Carna Biosciences | 05-103 |
| Aurora-C | ULight-Histone H3 (Ser10; 8.4) | | | ProQinase | 0315-0000-1 |
| BMPR1B | ULight-Topo IIX (18.7) | | | Carna Biosciences | 09-138 |
| BMPR2 | ULight-Histone H3 (Thr3; 11.0) | | | Carna Biosciences | 09-139 |
| BRAF-wt | GST-MAP2K1/ ULight anti-GST (9.3) | | | ProQinase | 0403-0000-1 |
| BRAF [VE] | GST-MAP2K1/ ULight anti-GST (9.6) | | | ProQinase | 0404-0000-1 |
| BRSK2 | ULight-CDC25 (8.4) | ULight-Acetyl-CoA Carboxylase (7.9) | | Carna Biosciences | 02-116 |
| CaMK1X (CAMK1)² | ULight-CREBtide (16.6) | | | Carna Biosciences | 02-104 |
| CaMK1Y (PNCK)² | ULight-CREBtide (18.6) | | | Carna Biosciences | 02-105 |
| CaMK1I (CAMK1D)² | ULight-CREBtide (17.2) | | | Carna Biosciences | 02-106 |
| CaMK2X (CAMK2A)² | ULight-rpS6 (22.3) | ULight-PKC (16.1) | ULight-CREBtide (15.5) | Carna Biosciences | 02-109 |
| CaMK2Y (CAMK2B)² | ULight-rpS6 (23.6) | ULight-CREBtide (20.8) | ULight-mTOR (12.0) | Carna Biosciences | 02-110 |
| CaMK2I (CAMK2D)² | ULight-rpS6 (25.4) | ULight-CREBtide (20.5) | ULight-PLK (14.0) | Carna Biosciences | 02-111 |
| CaMK2Z (CAMK2G)² | ULight-rpS6 (18.2) | ULight-PKC (15.6) | ULight-Crosstide (15.3) | Carna Biosciences | 02-112 |
| CaMK4² | ULight-CREBtide (14.6) | ULight-mTOR (8.6) | ULight-PLK (6.0) | Carna Biosciences | 02-108 |

 Newly added Kinases highlighted in Green

 New LANCE Ultra assays highlighted in Blue

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|---------------------|--------------------------------|--------------------------------|-------------------------------------|-------------------|-------------------|
| CAMKK1 ² | ULight-p70S6K (25.1) | | | Carna Biosciences | 05-107 |
| CAMKK2 | ULight-Histone H3 (Thr3; 12.2) | | | Carna Biosciences | 05-108 |
| CAMKK2 ² | ULight-Histone H3 (Thr3; 12.0) | ULight-p70S6K (5.5) | | Carna Biosciences | 05-108 |
| CDC2/CycB1 | ULight-MBP (43.2) | ULight-4E-BP1 (37.2) | | Carna Biosciences | 04-102 |
| CDC2L6/CycC | ULight-Histone H3 (Thr3; 10.0) | | | Carna Biosciences | 04-112 |
| CDC42BPB (MRCKY) | ULight-Histone H3 (Ser10; 6.7) | | | ProQinase | 0382-0000-1 |
| MRCKY (CDC42BPB) | ULight-Histone H3 (Ser10; 6.9) | | | Carna Biosciences | 01-108 |
| CDC7/ASK | ULight-Topo IIX (14.6) | | | Carna Biosciences | 05-109 |
| CDK1/CycA | ULight-4E-BP1 (37.9) | ULight-MBP (21.9) | | ProQinase | 0134-0054-1 |
| CDK1/CycB1 | ULight-4E-BP1 (39.6) | ULight-MBP (27.8) | | ProQinase | 0134-0135-1 |
| CDK1/CycE | ULight-4E-BP1 (39.2) | ULight-MBP (21.5) | | ProQinase | 0134-0055-1 |
| CDK2/CycA | ULight-MBP (39.9) | ULight-4E-BP1 (36.7) | | Carna Biosciences | 04-103 |
| CDK2/CycE1 | ULight-4E-BP1 (33.5) | ULight-MBP (28.5) | | Carna Biosciences | 04-165 |
| CDK3/CycE1 | ULight-MBP (38.9) | ULight-4E-BP1 (23.3) | | Carna Biosciences | 04-104 |
| CDK4/CycD1 | ULight-4E-BP1 (38.7) | ULight-MBP (21.6) | ULight-Histone H3 (Thr3; 6.3) | ProQinase | 0142-0143-1 |
| CDK4/CycD3 | ULight-MBP (37.2) | ULight-4E-BP1 (32.3) | | Carna Biosciences | 04-105 |
| CDK5/p25 | ULight-MBP (37.1) | ULight-4E-BP1 (36.5) | | Carna Biosciences | 04-106 |
| CDK5/p25NCK | ULight-4E-BP1 (34.2) | ULight-MBP (24.9) | | ProQinase | 0356-0389-1 |
| CDK5/p35NCK | ULight-4E-BP1 (40.3) | ULight-MBP (22.9) | ULight-Histone H3 (Thr3; 7.0) | ProQinase | 0356-0355-1 |
| CDK6/CycD1 | ULight-4E-BP1 (39.6) | ULight-MBP (17.0) | | ProQinase | 0051-0143-1 |
| CDK6/CycD3 | ULight-MBP (35.7) | ULight-4E-BP1 (35.4) | ULight p70S6K (5.9) | Carna Biosciences | 04-107 |
| CDK7/CycH/MAT1 | ULight-MBP (19.0) | | | Carna Biosciences | 04-108 |
| CDK9/CycT1 | ULight-4E-BP1 (28.1) | ULight-MBP (14.4) | | Carna Biosciences | 04-110 |
| CGK2 (PKG2, PRKG2) | ULight-PLK (14.1) | ULight-CREBtide (11.1) | ULight-Histone H3 (Thr3; 7.1) | Carna Biosciences | 01-143 |
| PRKG2 (CGK2, PKG2) | ULight-PLK (15.7) | ULight-CREB (12.9) | ULight-rpS6 (5.5) | Invitrogen | PV3973 |
| CHK1 (CHEK1) | ULight-PKC (15.7) | ULight-CREBtide (11.2) | ULight-Acetyl-CoA Carboxylase (8.1) | Carna Biosciences | 02-117 |
| CHK2 (CHEK2) | ULight-CREBtide (14.1) | ULight-PLK (7.3) | ULight-rpS6 (6.4) | Carna Biosciences | 02-162 |
| CK1X (CSNK1A1) | ULight-Topo IIX (13.7) | ULight-Histone H3 (Thr3; 5.8) | | Carna Biosciences | 03-101 |
| CK1-alpha1 | ULight-Topo IIX (15.0) | ULight-Histone H3 (Thr3; 5.7) | | ProQinase | 0406-0000-1 |
| CK1[(CSNK1D) | ULight-Topo IIX (23.5) | | | Carna Biosciences | 03-103 |
| CK1t (CSNK1E) | ULight-Topo IIX (23.7) | ULight-Histone H3 (Thr3; 10.2) | | Carna Biosciences | 03-104 |
| CK1Z1 (CSNK1G1) | ULight-Histone H3 (Thr3; 14.6) | | | Carna Biosciences | 03-105 |
| CK1Z2 (CSNK1G2) | ULight-Histone H3 (Thr3; 10.1) | ULight-Topo IIX (7.2) | | Carna Biosciences | 03-106 |
| CK1Z3 (CSNK1G3) | ULight-Histone H3 (Thr3; 12.9) | | | Carna Biosciences | 03-107 |
| CK2-alpha1 | ULight-Topo IIX (22.0) | ULight-Histone H3 (Thr3; 6.8) | | ProQinase | 0124-0000-1 |
| CK2X1/Y (CSNK2A1/B) | ULight-IaBX (28.7) | ULight-Topo IIX (13.8) | ULight-Histone H3 (Thr3; 10.9) | Carna Biosciences | 05-184 |
| CK2-alpha2 | ULight-Topo IIX (21.4) | | | ProQinase | 0412-0000-1 |
| CK2X2/Y (CSNK2A2/B) | ULight-IaBX (29.6) | ULight-Topo IIX (14.6) | ULight-Histone H3 (Thr3; 10.1) | Carna Biosciences | 05-185 |
| CLK1 | ULight-MBP (41.2) | ULight-4E-BP1 (25.7) | ULight-Histone H3 (Ser10; 8.5) | Carna Biosciences | 04-126 |

Newly added Kinases highlighted in Green

New LANCE Ultra assays highlighted in Blue

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|---------------------|---|--|---|-------------------|-------------------|
| CLK2 | ULight-MBP (11.9) | ULight-CREBtide (9.0) | ULight-Histone H3 (Ser10; 8.3) | Carna Biosciences | 04-127 |
| CLK3 | ULight-rpS6 (8.5) | ULight-MBP (8.5) | ULight-Histone H3 (Ser10; 7.2) | Carna Biosciences | 04-128 |
| COT | GST-MAP2K1 / ULight-anti-GST (Mn ²⁺ ; 8.0) | GST-MAP2K1 / ULight-anti-GST (6.6) | ULight-p70S6K (Mn ²⁺ ; 5.3) | ProQinase | 0180-0000-1 |
| COT (MAP3K8) | GST-MAP2K1 / ULight-anti-GST (8.6) | | | Carna Biosciences | 07-301 |
| COT (MAP3K8) | ULight-p70S6K (Mn ²⁺ ; 11.0) | ULight-Acetyl-CoA Carboxylase (Mn ²⁺ ; 7.8) | GST-MAP2K1 / ULight-anti-GST (Mn ²⁺ ; 7.8) | Carna Biosciences | 07-301 |
| CRIK (CIT) | ULight-Histone H3 (Ser10; 8.3) | | | Carna Biosciences | 01-104 |
| DAPK1 | ULight-PLK (18.1) | ULight-Histone H3 (Ser10; 9.3) | ULight-Histone H3 (Thr3; 8.8) | Carna Biosciences | 02-134 |
| DAPK1 | ULight-Histone H3 (Thr3; 9.8) | | | ProQinase | 0332-0000-1 |
| DAPK2 | ULight-PLK (6.4) | | | Invitrogen | PV3614 |
| DAPK3 | ULight-Histone H3 (Thr3; 6.6) | ULight-Histone H3 (Ser10; 6.3) | ULight-PLK (6.1) | Carna Biosciences | 02-136 |
| DCAMKL1 | ULight-CREBtide (7.2) | | | Carna Biosciences | 02-139 |
| DCAMKL2 | ULight-CREBtide (9.3) | | | Carna Biosciences | 02-140 |
| DLK (MAP3K12) | ULight-PKC (11.6) | ULight-CREBtide (11.3) | ULight-Histone H3 (Thr3; 10.9) | Carna Biosciences | 09-111 |
| DNA PK ³ | ULight-mTOR (40 U; S/B +/- DNA; 6.6) | | | Promega | V7870 |
| DRAK1 (STK17A) | ULight-Histone H3 (Thr3; 6.2) | | | Carna Biosciences | 02-137 |
| DYRK1A | ULight-MBP (18.5) | ULight-4E-BP1 (7.4) | | Carna Biosciences | 04-130 |
| DYRK1B | ULight-4E-BP1 (24.6) | ULight-MBP (23.2) | | Carna Biosciences | 04-131 |
| DYRK2 | ULight-MBP (33.4) | ULight-4E-BP1 (30.0) | ULight-Histone H3 (Thr3; 9.5) | Carna Biosciences | 04-132 |
| DYRK3 | ULight-4E-BP1 (39.9) | ULight-MBP (22.0) | ULight-Histone H3 (Thr3; 7.0) | Carna Biosciences | 04-133 |
| DYRK4 | ULight-4E-BP1 (36.3) | ULight-MBP (26.7) | ULight-Histone H3 (Thr3; 10.1) | Invitrogen | PV3871 |
| Erk1 (MAPK3) | ULight-4E-BP1 (37.9) | GST-ATF-2 / ULight-anti-GST (37.6) | ULight-MBP (26.6) | Carna Biosciences | 04-142 |
| Erk2 (MAPK1) | ULight-4E-BP1 (37.1) | GST-ATF-2 / ULight-anti-GST (35.1) | ULight-MBP (28.0) | Carna Biosciences | 04-143 |
| ERK2 | GST-ATF-2 / ULight-anti-GST (40.0) | ULight-4E-BP1 (31.9) | ULight-MBP (19.4) | ProQinase | 0634-0000-7 |
| Erk5 (MAPK7) | ULight-4E-BP1 (22.4) | ULight MBP (5.5) | | Carna Biosciences | 04-146 |
| Erk7 (MAPK15) | ULight-4E-BP1 (22.3) | | | Carna Biosciences | 04-147 |
| GPRK4 (GRK4) | ULight-Topo IIX (18.8) | ULight-p70S6K (14.2) | ULight-Histone H3 (Thr3; 11.6) | Carna Biosciences | 01-313 |
| GPRK6 (GRK6) | ULight-Histone H3 (Thr3; 10.8) | | | Carna Biosciences | 01-315 |
| GPRK7 (GRK7) | ULight-Histone H3 (Thr3; 10.2) | ULight-Topo IIX (5.9) | | Carna Biosciences | 01-116 |
| GRK5 | ULight-IaBX (26.5) | ULight-Topo IIX (26.3) | ULight-Histone H3 (Thr3; 11.7) | Invitrogen | PV3824 |
| GSK3X (GSK3A) | ULight-4E-BP1 (34.5) | ULight-Histone H3 (Thr3; 8.0) | ULight MBP (5.1) | Carna Biosciences | 04-140 |
| GSK3Y (GSK3B) | ULight-4E-BP1 (35.9) | ULight-IaBX (13.3) | | Carna Biosciences | 04-141 |
| Haspin (GSG2) | ULight-Histone H3 (Thr3; 15.5) | ULight MBP (5.5) | | Carna Biosciences | 05-111 |
| HGK (MAP4K4) | ULight-p70S6K (23.8) | ULight-Histone H3 (Thr3; 6.3) | | Carna Biosciences | 07-137 |
| HIPK1 | ULight-4E-BP1 (30.8) | ULight-MBP (22.9) | ULight-Histone H3 (Thr3; 5.3) | Carna Biosciences | 04-135 |
| HIPK2 | ULight-MBP (37.4) | | | Carna Biosciences | 04-136 |
| HIPK3 | ULight-4E-BP1 (36.9) | ULight-MBP (22.9) | | Carna Biosciences | 04-137 |
| HIPK4 | ULight-4E-BP1 (37.7) | ULight-MBP (21.2) | ULight-Histone H3 (Thr3; 7.1) | Carna Biosciences | 04-138 |
| HRI | ULight-PLK (6.2) | | | ProQinase | 0444-0000-1 |
| IKKX (CHUK) | ULight-IaBX (22.4) | ULight-rpS6 (17.9) | ULight-Acetyl-CoA Carboxylase (11.8) | Carna Biosciences | 05-112 |

Newly added Kinases highlighted in Green

New LANCE Ultra assays highlighted in Blue

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|-------------------|---|---|---|-------------------|-------------------|
| IKKY | ULight-p70S6K (30.4) | ULight-IaBX (25.6) | ULight-rpS6 (22.1) | Carna Biosciences | 05-084 |
| IKK-beta | ULight-IaBX (25.5) | ULight-Histone H3 (Thr3; 5.8) | | ProQinase | 0258-0000-1 |
| IKKt (IKBKE) | ULight-p70S6K (22.1) | ULight-rpS6 (20.2) | ULight-PLK (15.8) | Carna Biosciences | 05-114 |
| IKK-epsilon | ULight-rpS6 (22.0) | ULight-p70S6K (15.5) | ULight-PLK (12.5) | ProQinase | 0320-0000-1 |
| IRAK1 | ULight-p70S6K (28.3) | ULight-Acetyl-CoA Carboxylase (17.7) | ULight-Histone H3 (Thr3; 14.4) | Carna Biosciences | 09-101 |
| IRAK4 | ULight-Acetyl-CoA Carboxylase (31.9) | ULight-Histone H3 (Thr3; 9.9) | ULight-p70S6K (8.6) | Carna Biosciences | 09-145 |
| IRAK4 | ULight-p70S6K (Mn ²⁺ ; 32.4) | ULight-Acetyl-CoA Carboxylase (Mn ²⁺ ; 30.6) | ULight-Histone H3 (Thr3; Mn ²⁺ ; 8.3) | Carna Biosciences | 09-145 |
| IRAK4 | ULight-Acetyl-CoA Carboxylase (23.9) | ULight-Histone H3 (Thr3; 12.3) | | ProQinase | 0586-0000-1 |
| IRAK4 | ULight-p70S6K (Mn ²⁺ ; 28.1) | ULight-Acetyl-CoA Carboxylase (Mn ²⁺ ; 24.9) | ULight-Histone H3 (Thr3; Mn ²⁺ ; 10.0) | ProQinase | 0586-0000-1 |
| JNK1 (MAPK8) | ULight-4E-BP1 (34.5) | GST-ATF-2 / ULight-anti-GST (32.0) | ULight-MBP (21.4) | Carna Biosciences | 04-163 |
| JNK2 (MAPK9) | ULight-4E-BP1 (35.0) | GST-ATF-2 / ULight-anti-GST (32.8) | ULight-MBP (20.8) | Carna Biosciences | 04-164 |
| JNK3 (MAPK10) | GST-ATF-2 / ULight-anti-GST (33.7) | ULight-4E-BP1 (32.8) | ULight-MBP (19.8) | Carna Biosciences | 04-150 |
| LRRK2 | ULight-PLK (19.9) | ULight-CREBtide (15.4) | ULight-Histone H3 (Thr3; 10.4) | Carna Biosciences | 09-110 |
| LRRK2 [G2019S] | ULight-Histone H3 (Thr3; 15.4) | | | Invitrogen | PV4881 |
| MAP2K4 | GST-p38X / ULight-anti-GST (22.1) | | | Carna Biosciences | 07-044 |
| MAP2K6 (MKK6) | GST-p38X / ULight-anti-GST (23.1) | | | Carna Biosciences | 07-046 |
| MAP3K1 | ULight-Acetyl-CoA Carboxylase (5.3) | | | Carna Biosciences | 07-103 |
| MAP4K2 | ULight-rpS6 (18.3) | ULight-p70S6K (9.2) | | Carna Biosciences | 07-111 |
| MAP4K5 (KHS1) | ULight-p70S6K (35.6) | ULight-rpS6 (24.9) | ULight-Acetyl-CoA Carboxylase (23.8) | Invitrogen | PV3682 |
| MAPKAPK2 | ULight-4E-BP1 (32.2) | ULight-MBP (31.4) | | Carna Biosciences | 02-142 |
| MAPKAPK3 | ULight-rpS6 (13.2) | ULight-CREBtide (13.0) | ULight-PKC (12.3) | Carna Biosciences | 02-143 |
| MAPKAPK3 | ULight-mTOR (11.8) | ULight-CREBtide (11.3) | ULight-CDC25 (8.2) | ProQinase | 0633-0000-1 |
| MARK1 | ULight-PLK (18.1) | ULight-Acetyl-CoA Carboxylase (13.9) | | Carna Biosciences | 02-120 |
| MARK1 | ULight-Acetyl-CoA Carboxylase (9.4) | ULight-PLK (9.3) | ULight-CDC25 (6.7) | ProQinase | 0432-0000-1 |
| MARK2 (EMK1) | ULight-PLK (18.0) | ULight-Acetyl-CoA Carboxylase (15.6) | ULight-CDC25 (6.9) | Carna Biosciences | 02-121 |
| MARK3 (C-TAK1) | ULight-PLK (12.3) | ULight-Acetyl-CoA Carboxylase (11.9) | ULight-CDC25 (7.6) | Carna Biosciences | 02-122 |
| MARK3 (C-TAK1) | ULight-Acetyl-CoA Carboxylase (15.1) | ULight-PLK (13.2) | ULight-CDC25 (7.1) | ProQinase | 0433-0000-1 |
| MARK4 (MARKL1) | ULight-Acetyl-CoA Carboxylase (25.7) | ULight-PLK (18.8) | ULight-PKC (6.5) | Carna Biosciences | 02-123 |
| MELK | ULight-CREBtide (13.9) | | | Carna Biosciences | 02-124 |
| MGC42105 (B3KVM1) | ULight-PLK (10.8) | ULight-CDC25 (7.4) | ULight-CREBtide (7.2) | Carna Biosciences | 02-125 |
| MINK (MINK1) | ULight-p70S6K (55.1) | ULight-PKC (14.5) | ULight-rpS6 (11.8) | Carna Biosciences | 07-139 |
| MLK1 (MAP3K9) | GST-MAP2K1/ULight-anti-GST (11.4) | | | Carna Biosciences | 09-015 |
| MLK2 (MAP3K10) | ULight-Histone H3 (Thr3; 11.0) | | | Carna Biosciences | 09-116 |
| MLK3 (MAP3K11) | GST-MAP2K1/ULight-anti-GST (6.4) | | | Carna Biosciences | 2109-017 |
| MNK1 (MKNK1) | ULight-CREBtide (10.4) | ULight-Histone H3 (Ser10; 9.9) | | Carna Biosciences | 02-145 |
| MNK2 (MKNK2) | ULight-rpS6 (18.9) | ULight-CREBtide (13.6) | ULight-Histone H3 (Ser10; 13.2) | Carna Biosciences | 02-146 |
| MOS | ULight-Topo IIX (9.1) | GST-MAP2K1/ULight-anti-GST (6.3) | | Carna Biosciences | 05-118 |
| MRCKX (CDC42BPA) | ULight-Histone H3 (Ser10; 7.5) | | | Carna Biosciences | 01-107 |

Newly added Kinases highlighted in Green

New LANCE Ultra assays highlighted in Blue

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|------------------------------|---|---|--------------------------------------|-------------------|-------------------|
| MSK1 (RPS6KA5) | ULight-rpS6 (26.4) | ULight-PLK (20.6) | ULight-CREBtide (14.5) | Carna Biosciences | 01-147 |
| MSK2 (RPS6KA4) | ULight-rpS6 (25.0) | ULight-PLK (19.8) | ULight-Crosstide (16.9) | Carna Biosciences | 01-148 |
| MST1 (STK4) | ULight-p70S6K (13.3) | ULight-PKC (12.8) | ULight-Histone H3 (Thr3; 8.9) | Millipore | 14-624 |
| MST1 (STK4) | ULight-PKC (11.9) | ULight-Histone H3 (Thr3; 8.4) | ULight-p70S6K (6.5) | Carna Biosciences | 07-116 |
| MST1 (STK4) | ULight-PKC (14.0) | ULight-Histone H3 (Thr3; 6.5) | ULight-rpS6 (5.5) | ProQinase | 0667-0000-1 |
| MST2 (STK3) | ULight-Histone H3 (Thr3; 8.0) | ULight-PKC (5.2) | | Carna Biosciences | 07-117 |
| MST2 (STK3) | ULight-p70S6K (12.5) | ULight-PKC (9.0) | ULight-Histone H3 (Thr3; 6.2) | ProQinase | 0699-0000-1 |
| MST3 (STK24) | ULight-PKC (9.3) | ULight-rpS6 (8.9) | | Carna Biosciences | 07-118 |
| MST4 (MASK) | ULight-PKC (14.6) | | | Carna Biosciences | 07-119 |
| MST4 | ULight-PKC (16.3) | ULight-rpS6 (8.5) | | ProQinase | 0286-0000-1 |
| mTOR (1362-end) | ULight-4E-BP1 (Mn ²⁺ ; 36.9) | ULight-p70S6K (Mn ²⁺ ; 18.3) | | Millipore | 14-770 |
| NDR1 (STK38) | ULight-Histone H3 (Ser10; 8.7) | | | Carna Biosciences | 01-125 |
| NEK1 | ULight-p70S6K (60.0) | ULight-Acetyl-CoA Carboxylase (24.0) | ULight-rpS6 (18.6) | Carna Biosciences | 05-123 |
| NEK2 | ULight-p70S6K (43.3) | ULight-rpS6 (18.2) | ULight-PKC (15.5) | Carna Biosciences | 05-226 |
| NEK2 | ULight-p70S6K (30.7) | ULight-rpS6 (14.1) | ULight-CREB (10.9) | ProQinase | 0290-0000-1 |
| NEK3 | ULight-p70S6K (26.9) | ULight-4E-BP1 (18.2) | ULight-Histone H3 (Thr3; 10.1) | Carna Biosciences | 05-127 |
| NEK4 | ULight-p70S6K (40.1) | ULight-Histone H3 (Thr3; 13.6) | ULight-rpS6 (6.1) | Carna Biosciences | 05-128 |
| NEK6 | ULight-p70S6K (32.0) | | | Carna Biosciences | 05-130 |
| NEK7 | ULight-p70S6K (33.4) | | | Carna Biosciences | 05-131 |
| NEK9 | ULight-p70S6K (48.9) | ULight-rpS6 (16.5) | ULight-Acetyl-CoA Carboxylase (13.0) | Carna Biosciences | 05-133 |
| NEK11 | ULight-p70S6K (20.0) | ULight-Histone H3 (Thr3; 14.9) | | Carna Biosciences | 05-125 |
| NLK | ULight-PLK (6.0) | | | ProQinase | 0253-0000-1 |
| Nuak2 (SNARK) | ULight-Histone H3 (Thr3; 7.2) | | | Carna Biosciences | 02-127 |
| Nuak2 (SNARK) | ULight-Histone H3 (Thr3; 5.8) | ULight-PLK (5.5) | | ProQinase | 0414-0000-1 |
| OSR1 (OXSR1) | ULight-Histone H3 (Thr3; 5.6) | | | Carna Biosciences | 07-122 |
| p38X (MAPK14) | ULight-4E-BP1 (37.0) | GST-ATF-2 / ULight-anti-GST (32.1) | ULight-MBP (27.9) | Carna Biosciences | 04-152 |
| p38-alpha (MAPK14) | GST-ATF-2 / ULight-anti-GST (36.7) | ULight-4E-BP1 (33.1) | ULight-MBP (5.4) | ProQinase | 0443-0000-3 |
| p38Y (MAPK11) | ULight-MBP (40.6) | GST-ATF-2 / ULight-anti-GST (36.9) | ULight-4E-BP1 (32.6) | Carna Biosciences | 04-153 |
| p38-beta (MAPK11) | GST-ATF-2 / ULight-anti-GST (36.8) | ULight-4E-BP1 (35.8) | ULight-MBP (14.2) | ProQinase | 0455-0000-3 |
| p38[(MAPK13) | ULight-MBP (41.2) | GST-ATF-2 / ULight-anti-GST (35.1) | ULight-4E-BP1 (30.7) | Carna Biosciences | 04-154 |
| p38Z (MAPK12) | ULight-4E-BP1 (37.7) | GST-ATF-2 / ULight-anti-GST (37.0) | ULight-MBP (33.6) | Carna Biosciences | 04-155 |
| p70S6K (S6K; RPS6KB1) | ULight-rpS6 (18.1) | ULight-CREBtide (15.0) | ULight-Histone H3 (Ser10; 9.4) | Carna Biosciences | 01-154 |
| S6K (p70S6K, RPS6KB1) | ULight-rpS6 (16.0) | ULight-mTOR (11.8) | | ProQinase | 0318-0000-2 |
| p70 S6 Kinase (T412E) | ULight-mTOR (11.6) | ULight-Crosstide (8.1) | | Millipore | 14-486 |
| PAK1 | ULight-PLK (12.3) | | | Carna Biosciences | 07-123 |
| PAK1 | ULight-PLK (15.6) | | | ProQinase | 0357-0000-1 |
| PAK2 | ULight-PLK (18.7) | ULight-Histone H3 (Ser10; 10.5) | ULight-CREBtide (8.3) | Millipore | 14-481 |
| PAK2 | ULight-PLK (16.7) | | | Carna Biosciences | 07-124 |
| PAK2 | ULight-PLK (13.2) | | | ProQinase | 0304-0000-1 |

Newly added Kinases highlighted in Green

New LANCE Ultra assays highlighted in Blue

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|------------------------------|--|---------------------------------|--------------------------------------|-------------------|-------------------|
| PAK3 | ULight-PLK (19.9) | ULight-Histone H3 (Ser10; 12.2) | ULight-CREBtide (8.2) | Carna Biosciences | 07-125 |
| PAK3 | ULight-PLK (19.0) | | | ProQinase | 042-0000-1 |
| PAK5 (PAK7) | ULight-PLK (18.5) | | | Carna Biosciences | 07-127 |
| PAK6¹ | ULight-PLK (5h; 7.0) | | | Carna Biosciences | 07-128 |
| PAK6 | ULight-Histone H3 (Thr3; 8.5) | ULight-PLK (5.5) | | ProQinase | 0423-0000-1 |
| PASK | ULight-CREBtide (12.8) | ULight-Crossside (12.6) | ULight-mTOR (10.4) | Carna Biosciences | 02-128 |
| PBK¹ | ULight-Acetyl-CoA Carboxylase (5 h; 7.1) | | | Carna Biosciences | 05-168 |
| PEK (EIF2AK3) | ULight-p70S6K (51.9) | ULight-Topo IIX (18.0) | ULight-Acetyl-CoA Carboxylase (15.4) | Carna Biosciences | 05-155 |
| PGK (PRKG1) | ULight-CREBtide (11.2) | ULight-PLK (11.1) | ULight-Histone H3 (Thr3; 10.6) | Carna Biosciences | 01-142 |
| PRKG1 (PGK) | ULight-CREBtide (13.8) | ULight-PLK (12.5) | | Invitrogen | PV4340 |
| PHKG1 | ULight-CREBtide (13.0) | ULight-Histone H3 (Thr3; 8.5) | ULight-rpS6 (7.0) | Carna Biosciences | 02-152 |
| PHKG2 | ULight-rpS6 (15.6) | ULight-CREBtide (14.1) | ULight-mTOR (9.7) | Carna Biosciences | 02-153 |
| PIM1 | ULight-CREBtide (8.5) | ULight-mTOR (8.5) | | Carna Biosciences | 02-054 |
| PIM1 | ULight-rpS6 (21.5) | ULight-mTOR (12.6) | ULight-CREBtide (11.0) | ProQinase | 0186-0000-1 |
| PIM2 | ULight-rpS6 (20.9) | ULight-CREBtide (13.3) | ULight-mTOR (11.3) | Carna Biosciences | 02-155 |
| PIM2 | ULight-rpS6 (10.4) | ULight-mTOR (6.6) | ULight-Histone H3 (Thr3; 6.4) | ProQinase | 0223-0000-1 |
| PIM3 | ULight-rpS6 (24.7) | ULight-CREBtide (18.6) | ULight-mTOR (11.7) | Carna Biosciences | 02-156 |
| PKACX (PRKACA) | ULight-rpS6 (16.8) | ULight-PLK (16.6) | ULight-CROSSside (16.6) | Carna Biosciences | 01-127 |
| PKACY (PRKACB) | ULight-rpS6 (23.7) | ULight-PLK (20.8) | ULight-CREBtide (18.2) | Carna Biosciences | 01-128 |
| PKCX (PRKCA) | ULight-rpS6 (19.4) | ULight-PKC (14.5) | ULight-CREBtide (11.7) | Carna Biosciences | 01-133 |
| PKCY1 (PRKCB1) | ULight-PKC (15.6) | ULight-CREBtide (13.0) | ULight-Histone H3 (Thr3; 6.4) | Carna Biosciences | 01-134 |
| PKC-beta1 | ULight-PKC (15.5) | ULight-CREB (10.8) | ULight-PLK (6.3) | ProQinase | 0067-0000-1 |
| PKCY2 (PRKCB2) | ULight-rpS6 (19.1) | ULight-PKC (14.0) | ULight-CREBtide (12.5) | Carna Biosciences | 01-165 |
| PKC-beta2 (PRKCB2) | ULight-PKC (16.2) | ULight-CREBtide (11.1) | | ProQinase | 0116-0000-1 |
| PKC[(PRKCD) | ULight-PKC (14.8) | ULight-CREBtide (13.4) | | Carna Biosciences | 01-135 |
| PKC-delta | ULight-PKC (14.3) | ULight-CREB (10.9) | ULight-rpS6 (8.6) | ProQinase | 0232-0000-1 |
| PKCt (PRKCE) | ULight-PKC (14.9) | ULight-CREBtide (13.5) | | Carna Biosciences | 01-136 |
| PKC-epsilon | ULight-PKC (13.0) | ULight-CREB (9.3) | ULight-PLK (5.7) | ProQinase | 0203-0000-1 |
| PKCZ (PRKCG) | ULight-PKC (15.6) | ULight-CREBtide (13.7) | ULight-rpS6 (9.1) | Carna Biosciences | 01-137 |
| PKC-gamma (PRKCG) | ULight-PKC (13.5) | ULight-rpS6 (10.2) | ULight-CREBtide (9.9) | ProQinase | 0204-0000-1 |
| PKC^ (PRKCH) | ULight-CREBtide (14.9) | ULight-PKC (14.3) | ULight-rpS6 (9.5) | Carna Biosciences | 01-138 |
| PKC-eta (PRKCH) | ULight-rpS6 (22.4) | ULight-PLK (13.2) | ULight-PKC (10.6) | ProQinase | 0420-0000-1 |
| PKC' (PRKCI) | ULight-PKC (15.4) | ULight-CREBtide (14.2) | ULight-rpS6 (8.9) | Carna Biosciences | 01-139 |
| PKC-iota | ULight-PKC (15.0) | ULight-CREB (10.8) | | ProQinase | 0114-0000-1 |
| PKC_ (PRKCQ) | ULight-PKC (15.1) | ULight-CREBtide (13.5) | ULight-rpS6 (12.3) | Carna Biosciences | 01-140 |
| PKC-theta | ULight-PKC (14.5) | ULight-CREB (10.4) | ULight-rpS6 (5.5) | ProQinase | 0113-0000-1 |
| PKC] (PRKCZ) | ULight-PKC (14.1) | ULight-CREBtide (14.0) | ULight-rpS6 (12.9) | Carna Biosciences | 01-141 |
| PKC-zeta | ULight-PKC (14.1) | ULight-CREBtide (8.5) | ULight-PLK (5.6) | ProQinase | 0117-0000-1 |
| PKC-mu (PKD-1, PRKD1) | ULight-CREBtide (10.2) | ULight-PLK (8.4) | ULight-PKC (5.6) | ProQinase | 0115-0000-1 |

Newly added Kinases highlighted in Green

New LANCE Ultra assays highlighted in Blue

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|-------------------------------------|--------------------------------------|-------------------------------|--------------------------------------|-------------------|-------------------|
| PKD1 (PRKD1, PKC-mu) | ULight-PLK (14.4) | ULight-CREBtide (6.0) | | Carna Biosciences | 02-157 |
| PKC-nu (PRKD3, EPK2) | ULight-CREBtide (12.5) | ULight-PLK (5.4) | | ProQinase | 0661-0000-1 |
| PKD3 (PRKD3, PKC-nu) | ULight-CREBtide (14.4) | ULight-Histone H3 (Thr3; 8.8) | ULight-PLK (6.0) | Carna Biosciences | 02-159 |
| PKD2 (PRKD2) | ULight-CREBtide (14.1) | ULight-PLK (10.3) | | Carna Biosciences | 02-158 |
| PKN1 (PRK1) | ULight-CREBtide (14.1) | ULight-PKC (10.5) | ULight-rpS6 (7.5) | Carna Biosciences | 01-144 |
| PRK1 (PKN1) | ULight-rpS6 (17.9) | ULight-PKC (13.0) | ULight-CREBtide (11.0) | ProQinase | 0207-0000-1 |
| PKN2 | ULight-CREBtide (11.9) | | | Carna Biosciences | 01-145 |
| PKR (EIF2AK2) | ULight-Histone H3 (Thr3; 10.8) | | | Carna Biosciences | 05-156 |
| PLK1 | ULight-p70S6K (24.8) | ULight-Topo IIX (23.0) | ULight-Histone H3 (Thr3; 13.4) | Carna Biosciences | 05-157 |
| PLK1 | ULight-Topo IIX (7.0) | ULight-Histone H3 (Thr3; 5.7) | | ProQinase | 0183-0000-1 |
| PLK2 (SNK) | ULight-Topo IIX (22.9) | ULight-Histone H3 (Thr3; 6.4) | | Carna Biosciences | 05-158 |
| PLK2 (SNK) | ULight-Topo IIX (22.6) | ULight-PLK (8.7) | | ProQinase | 0277-0000-1 |
| PLK3 | ULight-IaBX (27.5) | ULight-Topo IIX (20.4) | ULight-4E-BP1 (15.0) | Carna Biosciences | 05-159 |
| PLK3 | ULight-Topo IIX (18.6) | ULight-Histone H3 (Thr3; 6.1) | ULight-4E-BP1 (5.1) | ProQinase | 0437-0000-1 |
| PRKX | ULight-PLK (19.7) | ULight-CREBtide (13.8) | ULight-PKC (13.7) | Carna Biosciences | 01-130 |
| QIK (SNF1LK2) | ULight-Acetyl-CoA Carboxylase (28.8) | ULight-CREBtide (15.1) | ULight-PLK (14.1) | Carna Biosciences | 02-129 |
| SNF1LK2 (QIK) | ULight-Acetyl-CoA Carboxylase (24.8) | ULight-PLK (14.5) | ULight-CREBtide (9.3) | Invitrogen | PV4792 |
| RIPK5 | ULight-p70S6K (5.7) | | | Invitrogen | PV4678 |
| ROCK1 | ULight-rpS6 (23.4) | ULight-PLK (19.6) | ULight-PKC (11.3) | Carna Biosciences | 01-109 |
| ROCK2 | ULight-rpS6 (20.0) | ULight-PLK (16.9) | ULight-CREBtide (10.4) | Carna Biosciences | 01-110 |
| RSK1 (RPS6KA1) | ULight-rpS6 (22.0) | ULight-PLK (20.5) | ULight-CREBtide (16.0) | Carna Biosciences | 01-149 |
| RSK2 (RPS6KA3) | ULight-rpS6 (20.9) | ULight-Crosstide (18.8) | ULight-PLK (16.7) | Carna Biosciences | 01-150 |
| RSK3 (RPS6KA2) | ULight-rpS6 (25.9) | ULight-PLK (18.5) | ULight-CREBtide (16.2) | Carna Biosciences | 01-151 |
| RSK4 (RPS6KA6) | ULight-rpS6 (23.8) | ULight-CREBtide (22.1) | ULight-PLK (18.4) | Carna Biosciences | 01-152 |
| SGK | ULight-rpS6 (20.8) | ULight-PLK (20.6) | ULight-Crosstide (18.4) | Carna Biosciences | 01-158 |
| SGK2 | ULight-PLK (21.3) | ULight-rpS6 (21.1) | ULight-Crosstide (18.9) | Carna Biosciences | 01-159 |
| SGK3 (SGKL) | ULight-rpS6 (22.7) | ULight-PLK (17.7) | ULight-Crosstide (17.4) | Carna Biosciences | 01-160 |
| SGK3 | ULight-rpS6 (21.4) | ULight-PLK (18.0) | ULight-mTOR (12.7) | ProQinase | 0198-0000-2 |
| SIK | ULight-rpS6 (11.6) | | | Millipore | 14-652 |
| SLK | ULight-CREBtide (5.8) | | | Carna Biosciences | 07-129 |
| skMLCK (MYLK2)¹⁻² | ULight-PLK (5h; 15.5) | ULight-CREBtide (5h; 12.9) | | Carna Biosciences | 02-150 |
| SRPK2 | ULight-Histone H3 (Thr3; 6.1) | | | ProQinase | 0381-0000-1 |
| STK33 | ULight-rpS6 (13.1) | ULight-mTOR (9.5) | ULight-Topo IIX (5.8) | Millipore | 14-671 |
| TAK1-TAB1 (MAP3K7) | ULight-p70S6K (5.6) | | | Carna Biosciences | 09-019 |
| TAOK2 | ULight-p70S6K (15.6) | ULight-PKC (5.7) | ULight-rpS6 (5.2) | Carna Biosciences | 07-133 |
| TAOK3 | ULight-Histone H3 (Thr3; 9.3) | ULight-p70S6K (7.9) | | Carna Biosciences | 07-135 |
| TBK1 | ULight-p70S6K (34.5) | ULight-rpS6 (24.8) | ULight-Acetyl-CoA Carboxylase (24.5) | Carna Biosciences | 05-115 |

Newly added Kinases highlighted in Green

New LANCE Ultra assays highlighted in Blue

| Kinase | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 | Kinase Supplier | Supplier Cat. No. |
|------------------------|--------------------------------------|--------------------------------------|-------------------------------|-------------------|-------------------|
| TGFYR1 (TGFBR1) | ULight-Topo IIX (21.3) | | | Carna Biosciences | 09-141 |
| TLK1 | ULight-Topo IIX (17.4) | ULight-Histone H3 (Thr3; 15.2) | ULight-p70S6K (9.4) | Carna Biosciences | 05-166 |
| TLK2 | ULight-Topo IIX (17.9) | ULight-Histone H3 (Thr3; 17.2) | ULight-p70S6K (13.8) | Carna Biosciences | 05-167 |
| TSK2 | ULight-Acetyl-CoA Carboxylase (17.9) | ULight-PLK (16.2) | ULight-Histone H3 (Thr 3;8.3) | ProQinase | 0220-0000-1 |
| TSSK1 | ULight-PLK (17.9) | ULight-Acetyl-CoA Carboxylase (16.2) | ULight-CDC25 (6.6) | Carna Biosciences | 02-364 |
| TSSK2 | ULight-PLK (20.2) | ULight-Acetyl-CoA Carboxylase (15.6) | ULight-CREBtide (11.9) | Carna Biosciences | 02-165 |
| TTBK1 | ULight-Topo IIX (24.9) | ULight-Histone H3 (Thr3; 17.8) | ULight-p70S6K (13.4) | Carna Biosciences | 03-108 |
| TTBK2 | ULight-Topo IIX (24.2) | ULight-Histone H3 (Thr3; 17.4) | ULight-rpS6 (10.3) | Carna Biosciences | 03-109 |
| VRK1 | ULight-Histone H3 (Thr3; 8.7) | | | ProQinase | 0302-0000-1 |
| VRK2 | ULight-Histone H3 (Thr3; 15.1) | | | Carna Biosciences | 03-111 |
| WEE1 | ULight-Histone H3 (Thr3; 6.4) | | | Carna Biosciences | 05-177 |
| YSK1 (STK25) | ULight-rpS6 (14.3) | ULight-p70S6K (5.7) | | Carna Biosciences | 07-136 |
| ZAK | ULight-p70S6K (36.1) | ULight-Histone H3 (Thr3; 15.5) | ULight-mTOR (11.4) | Carna Biosciences | 09-120 |

Newly added Kinases highlighted in Green

New LANCE Ultra assays highlighted in Blue

¹ Kinase reaction time is 5h

² CaCl₂ and Calmodulin at 1 mM and 10 µg/mL, respectively, are added to the kinase reactions

³ DNA PK: assay buffer and conditions as recommended by Promega. ATP: 200 µM final, kinase reaction incubation time 1 h

Kinases were assayed in standard conditions, using reagent concentrations and kinase buffer described below. All modifications to standard assay conditions are indicated in the table.

Kinase assay components:

Kinases: 20 nM (various suppliers)

ATP: 200 µM

ULight substrates in kinase reactions: 50 nM (100 nM for ULight-CDC25)

GST-protein substrates in kinase reactions: 30 nM (when indicated)

ULight-anti-GST antibody in assay: 30 nM (when indicated)

Europium anti-phospho-substrate antibodies in assay: 2 nM

Kinase buffer (pH 7.5):

50 mM HEPES

10 mM MgCl₂

3 mM MnCl₂ (when indicated)

1 mM EGTA

2 mM DTT and 0.01% Tween 20

After incubation at 23°C for 1 h (or 5 h when indicated), kinase reactions were stopped with EDTA. Antibodies were added and incubated for 1 h prior to detection with the EnVision.

NOTE: All kinases were sourced from commercial vendors from commercially available lots. In many cases, the same kinase was tested from multiple vendors. If the results obtained with kinases from different vendors were very different in our testing, we have shown all suppliers' data. If the results were similar, we have shown only one representative set of test results. We encourage you to qualify your kinase activity to ensure that the assay signal is specific to the enzyme tested.

LANCE® *Ultra* products used for this study:

| Labeled Antibody | Description | Catalog No. | Phospho-Motif |
|---|---|--|---|
| <i>ULight</i> -CREBtide Europium-anti-phospho-CREB | <i>ULight</i> -CREBtide (Ser133) Europium-anti-phospho-CREB (Ser133) | TRF0107 TRF0200 | RRP <u>S</u> YRK |
| <i>ULight</i> -MBP Europium-anti-phospho-MBP | <i>ULight</i> -Myelin Basic Protein Peptide Europium-anti-phospho-Myelin Basic Protein | TRF0109 TRF0201 | VTPR <u>T</u> PPP |
| <i>ULight</i> -Crosstide Europium-anti-phospho-Crosstide | <i>ULight</i> -Crosstide (GSK-3X Ser21) Europium-anti-phospho-Crosstide (GSK-3X Ser21) | TRF0106 TRF0202 | PRT <u>S</u> SFAE |
| <i>ULight</i> -PLK Europium-anti-phospho-PLK | <i>ULight</i> -PLK (Ser137) Peptide Europium-anti-phospho-PLK (Ser137) | TRF0110 TRF0203 | RRR <u>S</u> LLE |
| <i>ULight</i> -PKC Europium anti-phospho-PKC | <i>ULight</i> -PKC Substrate (Ala25Ser) Europium anti-phospho-PKC Peptide (Ala25Ser) | TRF0108 TRF0207 | RKGS <u>S</u> LRO |
| <i>ULight</i> -IaBX Europium-anti-phospho-IaBX | <i>ULight</i> -IκappaB-alpha (Ser32/36) Peptide Europium-anti-phospho-IκappaB-alpha (Ser32/36) | TRF0113 TRF0206 | RHD <u>S</u> GLDSM |
| <i>ULight</i> -Histone H3 (Thr3/Ser10) Europium-anti-phospho-Histone H3 (Ser10) Europium-anti-phospho-Histone H3 (Thr3) | <i>ULight</i> -Histone H3 (Thr3/Ser10) Peptide Europium-anti-phospho-Histone H3 (Ser10) Europium-anti-phospho-Histone H3 (Thr3) | TRF0125 TRF0210 TRF0211 | ART <u>K</u> QTARK <u>S</u> TG |
| <i>ULight</i> -mTOR Europium-anti-phospho-mTOR | <i>ULight</i> -mTOR (Ser2448) Peptide Europium-anti-phospho-mTOR (Ser2448) | TRF0119 TRF0209 | TRTDS <u>S</u> YAG |
| <i>ULight</i> -p70S6K Europium-anti-phospho-p70S6K | <i>ULight</i> -p70S6K (Thr389) Peptide Europium-anti-phospho-p70S6K (Thr389) | TRF0126 TRF0214 | FLGF <u>T</u> YVAP |
| <i>ULight</i> -Acetyl-CoA Carboxylase Europium-anti-phospho-Acetyl-CoA Carboxylase | <i>ULight</i> -Acetyl-CoA Carboxylase (Ser79) SAMS Peptide Europium-anti-phospho-Acetyl-CoA Carboxylase (Ser79) | TRF0118 TRF0208 | RSAM <u>S</u> GLHL |
| <i>ULight</i> -Cdc25C Europium-anti-phospho-(Ser) 14-3-3 binding motif | <i>ULight</i> -Cdc25C (Ser216) Peptide Europium-anti-phospho-(Ser) 14-3-3 binding motif, mAb 4E2 | TRF0123 AD0192 | YRSP <u>S</u> MPEN (R/K)XX <u>S</u> XP |
| <i>ULight</i> -4E-BP1 Europium-anti-phospho-4E-BP1 | <i>ULight</i> -eIF4E-binding protein 1 (Thr37/46) Peptide Europium-anti-phospho-eIF4E-binding protein 1 (Thr37/46) | TRF0128 TRF0216 | ST <u>T</u> PGGTLFST <u>T</u> PG |
| <i>ULight</i> -rpS6 Europium-anti-phospho-rpS6 | <i>ULight</i> -40S Ribosomal Protein S6 (pSer235/Ser236) Peptide Europium-anti-phospho-40S Ribosomal Protein S6 (Ser235/236) | TRF0129 TRF0217 | RRL(pS) <u>S</u> SLRA |
| <i>ULight</i> -Topo IIX Europium-anti-phospho-Topo IIX | <i>ULight</i> -DNA Topoisomerase 2-alpha (Thr1342) Peptide Europium-anti-phospho-DNA Topoisomerase 2-alpha (Thr1342) | TRF0130 TRF0218 | DE <u>K</u> IDDE |
| <i>ULight</i> -anti-GST Europium-anti-phospho-ATF-2 | <i>ULight</i> -anti-GST Europium-anti-phospho-ATF-2 (Thr53) | TRF0104 TRF0212 | |
| Europium-anti-phospho-p38X | ATF-2 Fusion Protein Europium-anti-phospho-MAP Kinase p38-alpha (Thr180/Tyr182) | Cell Signaling Technology cat. 9224 TRF0219 | |
| Europium-anti-phospho-MEK1/2 | GST-p38X (MAPK14), inactive Europium-anti-phospho-MEK1/2 (Ser217/221) | Carna Biosciences cat. 04-152-10 TRF0213 | |
| | GST-MAP2K1, inactive | Carna Biosciences cat. 07-141-10 | |

LANCE *Ultra* Tyrosine Kinase Selection Guide

How to use this guide:

1. Locate your kinase
 - In many cases, up to three commercial kinase vendors have been tested.
 - Many common aliases are shown in parenthesis.
2. Best performing *ULight*™ substrates are listed for each enzyme according to performance criteria where signal to background (S/B) ratios are greater than 3.0
 - S/B ratios (Signal at 665 nm / minus ATP control at 665 nm) are indicated in parenthesis.
 - All S/B ratios were obtained at fixed experimental conditions unless otherwise noted (see page 16).
3. Based on your substrate choice, find the corresponding Europium-labeled anti-phospho-antibody on page 16 (**LANCE *Ultra* products used for this study**) to identify the TR-FRET donor anti-phospho-antibody for your LANCE *Ultra* assay.

If you cannot find your kinase of interest, please ask your PerkinElmer sales specialist, as our list continues to expand. Two kits are available for testing purposes:

- **KinaSelect Ser/Thr kit** (5 x 250 data points, TRF0300-C)
 - 5 *ULight*-labeled SER/THR kinase specific substrates + 5 matching Europium-labeled Antiphospho-Antibodies
- **KinaSelect TK kit** (1,000 data points, TRF0301-D)
 - 1 *ULight*-labeled kinase specific substrate + 1 matching Europium-labeled Anti-phospho-Antibody

| Kinase | Kinase Concentration (nM) | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 |
|--------------------|---------------------------|------------------------|------------------------|------------------------|
| ABL | 0.25 | ULight-poly GT (13.1) | ULight-poly GAT (11.1) | ULight-TK (4.1) |
| ABL [T3151] (ABL1) | 0.5 | ULight-poly GT (6.6) | ULight-poly GAT (6.4) | ULight-TK (4.8) |
| ACK | 20 | ULight-poly GT (27.3) | ULight-poly GAT (27.2) | ULight-TK (17.3) |
| ALK | 4 | ULight-IRS-1 (16.8) | ULight-poly GT (9.8) | ULight-TK (8.8) |
| ARG | 0.5 | ULight-poly GT (13.2) | ULight-poly GAT (12.7) | ULight-TK (10.6) |
| AXL | 4 | ULight-poly GT (9.8) | ULight-poly GAT (5.6) | |
| BLK | 0.5 | ULight-TK (31.0) | ULight-poly GT (16.5) | ULight-CDK1 (9.6) |
| BMX | 0.5 | ULight-poly GT (13.2) | ULight-poly GAT (9.0) | ULight-TK (7.1) |
| BRK | 3 | ULight-poly GT (17.4) | ULight-poly GAT (3.0) | |
| BTK | 0.25 | ULight-poly GAT (19.6) | ULight-poly GT (11.8) | ULight-TK (6.8) |
| CSK | 20 | ULight-TK (27.2) | ULight-poly GAT (20.3) | ULight-poly GT (10.4) |
| CTK | 20 | ULight-poly GAT (18.8) | ULight-poly GT (12.6) | |
| DDR1 | 0.5 | ULight-poly GAT (3.0) | | |
| DDR2 | 0.5 | ULight-poly GAT (5.1) | ULight-IRS-1 (4.9) | ULight-poly GT (4.1) |
| EGFR | 0.5 | ULight-JAK-1 (19.0) | ULight-TK (10.0) | ULight-poly GAT (5.0) |
| EGFR [T790M] | 0.5 | ULight-poly GT (18.1) | ULight-poly GAT (10.8) | ULight-JAK-1 (3.9) |
| EphA1 | 0.5 | ULight-poly GT (24.1) | ULight-poly GAT (11.4) | ULight-TK (10.8) |
| EphA2 | 0.25 | ULight-TK (26.9) | ULight-poly GT (12.3) | ULight-poly GAT (7.1) |
| EphA3 | 0.5 | ULight-TK (22.4) | ULight-poly GT (17.4) | ULight-poly GAT (8.0) |
| EphA4 | 0.5 | ULight-TK (31.5) | ULight-poly GT (12.6) | ULight-poly GAT (11.3) |
| EphA5 | 1 | ULight-TK (35.5) | ULight-poly GAT (21.9) | ULight-JAK-1 (21.2) |
| EphA6 | 0.5 | ULight-poly GAT (15.5) | ULight-poly GT (14.2) | ULight-TK (5.4) |
| EphA7 | 0.5 | ULight-poly GT (22.7) | ULight-TK (17.2) | ULight-poly GAT (11.1) |
| EphA8 | 0.25 | ULight-TK (32.3) | ULight-poly GT (16.4) | ULight-poly GAT (7.8) |
| EphB1 | 0.5 | ULight-TK (29.9) | ULight-poly GT (25.1) | ULight-CDK1 (14.1) |
| EphB2 | 0.25 | ULight-TK (28.8) | ULight-poly GT (27.9) | ULight-poly GAT (13.2) |
| EphB3 | 0.1 | ULight-poly GT (29.0) | ULight-TK (24.7) | ULight-poly GAT (11.2) |
| EphB4 | 0.5 | ULight-TK (29.8) | ULight-poly GT (13.7) | ULight-CDK1 (12.6) |
| FAK | 3 | ULight-poly GT (20.0) | ULight-poly GAT (13.0) | |
| FER | 0.25 | ULight-TK (31) | ULight-poly GAT (17.1) | ULight-CDK1 (16.1) |
| FES | 1 | ULight-TK (29.4) | ULight-poly GAT (19.0) | ULight-poly GT (17.1) |
| FGFR1 | 0.5 | ULight-JAK-1 (30.8) | ULight-TK (26.4) | ULight-IRS-1 (13.5) |
| FGFR2 | 0.25 | ULight-JAK-1 (33.2) | ULight-TK (27.1) | ULight-IRS-1 (15.5) |
| FGFR3 | 0.25 | ULight-JAK-1 (27.6) | ULight-TK (24.4) | ULight-poly GT (16.0) |
| FGFR4 | 3 | ULight-JAK-1 (20.8) | ULight-TK (17.7) | ULight-poly GT (9.2) |

| Kinase | Kinase Concentration (nM) | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 |
|--------------|---------------------------|------------------------|------------------------|------------------------|
| FGR | 0.1 | ULight-TK (29.3) | ULight-poly GT (25.1) | ULight-poly GAT (17.7) |
| FLT1 | 0.25 | ULight-poly GT (22.2) | ULight-poly GAT (15.4) | ULight-JAK-1 (10.0) |
| FLT3 | 0.1 | ULight-TK (25.9) | ULight-JAK-1 (25.0) | ULight-poly GT (20.8) |
| FLT4 | 0.25 | ULight-JAK-1 (36.9) | ULight-TK (20.0) | ULight-IRS-1 (11.4) |
| FMS (CSFR) | 0.25 | ULight-poly GT (14.6) | ULight-JAK-1 (6.3) | ULight-poly GAT (6.2) |
| FRK | 0.5 | ULight-poly GAT (22.9) | ULight-poly GT (20.8) | ULight-TK (9.7) |
| FYN | 0.25 | ULight-TK (25.9) | ULight-CDK1 (19.7) | ULight-poly GT (12.8) |
| HCK | 0.25 | ULight-TK (29.7) | ULight-poly GT (21.3) | ULight-poly GAT (13.2) |
| HER2 | 10 | ULight-poly GT (9.3) | ULight-poly GAT (8.4) | |
| HER4 (ERBB4) | 0.1 | ULight-poly GT (25.2) | ULight-poly GAT (14.4) | ULight-TK (3.1) |
| IGF1R | 0.25 | ULight-TK (25.1) | ULight-poly GT (21.8) | ULight-IRS-1 (15.2) |
| INSR | 20 | ULight-poly GAT (25.4) | ULight-poly GT (18.3) | ULight-TK (4.0) |
| IRR | 0.5 | ULight-poly GT (21.6) | ULight-TK (19.2) | ULight-IRS-1 (15.6) |
| ITK | 0.5 | ULight-poly GT (9.8) | ULight-poly GAT (8.5) | ULight-TK (8.4) |
| JAK1 | 7 | ULight-JAK-1 (19.5) | ULight-poly GT (17.6) | ULight-poly GAT (16.4) |
| JAK2 | 1 | ULight-JAK-1 (41.8) | ULight-TK (35.5) | ULight-IRS-1 (21.4) |
| JAK3 | 0.5 | ULight-JAK-1 (37.3) | ULight-TK (16.1) | ULight-poly GAT (6.9) |
| KDR | 0.25 | ULight-JAK-1 (30.8) | ULight-TK (16.9) | ULight-poly GT (8.6) |
| KIT | 2 | ULight-poly GAT (21.7) | ULight-poly GT (13.0) | ULight-JAK-1 (3.3) |
| LCK | 0.5 | ULight-poly GAT (16.5) | ULight-TK (12.3) | ULight-poly GT (10.4) |
| LTK | 1 | ULight-poly GAT (25.1) | ULight-poly GT (21.3) | ULight-TK (13.7) |
| LYNX | 0.5 | ULight-TK (32.5) | ULight-poly GT (15.6) | ULight-CDK1 (14.3) |
| LYNY | 1 | ULight-TK (33.1) | ULight-CDK1 (24.0) | ULight-poly GT (18.6) |
| MATK (Hyl) | 1 | ULight-poly GT (20.7) | ULight-poly GAT (8.8) | |
| MER | 0.25 | ULight-poly GT (29.2) | ULight-poly GAT (15.9) | ULight-TK (12.9) |
| MET | 0.5 | ULight-TK (24.2) | ULight-JAK-1 (19.7) | ULight-poly GT (17.0) |
| MUSK | 1 | ULight-poly GAT (10.6) | ULight-JAK-1 (3.9) | ULight-TK (3.1) |
| PDGFRX | 0.5 | ULight-poly GT (17.8) | ULight-poly GAT (10.6) | ULight-JAK-1 (9.0) |
| PDGFRY | 0.25 | ULight-poly GAT (12.5) | ULight-poly GT (11.2) | ULight-TK (4.7) |
| PTK2B (FAK2) | 0.25 | ULight-polyGT (19.2) | ULight-poly GAT (12.3) | |
| PYK2 | 0.25 | ULight-poly GT (15.5) | ULight-poly GAT (7.7) | |
| RET | 0.5 | ULight-JAK-1 (23.6) | ULight-TK (20.3) | ULight-IRS-1 (6.9) |
| RON | 0.25 | ULight-poly GT (27.7) | ULight-poly GAT (25.7) | ULight-JAK-1 (4.9) |
| ROR1 | 20 | ULight-poly GT (3.4) | | |
| ROR2 | 20 | ULight-poly GT (4.2) | | |

Newly added Kinases highlighted in Green

| Kinase | Kinase Concentration (nM) | ULight Substrate 1 | ULight Substrate 2 | ULight Substrate 3 |
|--------------|---------------------------|------------------------|------------------------|------------------------|
| ROS | 0.25 | ULight-TK (24.5) | ULight-poly GT (23.8) | ULight-IRS-1 (20.5) |
| SRC | 0.5 | ULight-TK (31.7) | ULight-poly GAT (18.4) | ULight-CDK1 (16.6) |
| SRM | 0.5 | ULight-TK (32.5) | ULight-poly GAT (20.1) | ULight-poly GT (18.3) |
| SYK | 0.5 | ULight-TK (24.6) | ULight-JAK-1 (20.0) | ULight-poly GAT (4.1) |
| TEC | 0.5 | ULight-poly GT (25.4) | ULight-TK (18.6) | ULight-poly GAT (15.4) |
| TIE2 | 0.5 | ULight-poly GT (19.3) | ULight-TK (17.7) | ULight-poly GAT (9.4) |
| TNK1 | 1 | ULight-poly GAT (15.2) | ULight-poly GT (9.3) | ULight-TK (6.8) |
| TRKA (NTRK1) | 0.5 | ULight-TK (23.2) | ULight-poly GAT (17.5) | ULight-poly GT (16.3) |
| TRKB (NTRK2) | 0.5 | ULight-TK (28.0) | ULight-poly GAT (26.3) | ULight-poly GT (22.9) |
| TRKC (NTRK3) | 0.5 | ULight-poly GT (34.1) | ULight-poly GAT (22.3) | ULight-TK (6.4) |
| TXK | 3 | ULight-poly GAT (18.9) | ULight-poly GT (11.0) | ULight-TK (5.9) |
| TYK2 | 4 | ULight-JAK-1 (15.2) | ULight-IRS-1 (7.3) | ULight-TK (7.3) |
| TYRO3 | 0.25 | ULight-poly GT (21.5) | ULight-poly GAT (9.1) | ULight-TK (6.1) |
| YES | 0.25 | ULight-TK (28.0) | ULight-poly GT (15.3) | ULight-poly GAT (14.0) |
| ZAP70 | 4 | ULight-poly GAT (15.3) | ULight-poly GT (11.1) | ULight-TK (7.6) |

Kinase assay components:

Kinases: see table for concentration

ATP: 200 µM in kinase reaction

ULight-poly GT, ULight-poly GAT and ULight-IRS-1:100 nM in kinase reaction

ULight-JAK-1, ULight-TK and ULight-CDK1: 50 nM in kinase reaction

Europium anti-phospho-substrate antibodies: 2 nM in final volume

Kinase buffer:

50 mM HEPES pH 7.5

10 mM MgCl₂

1 mM EGTA

2 mM DTT and 0.01% Tween 20

Kinase reactions were performed in 10 µL in white OptiPlates™-384 (cat# 6007290). After 2 h incubation at 23 °C, kinase reactions were stopped with EDTA (10 mM final concentration in 20 µL). Eu-anti-phospho antibodies were added and incubated for one hour prior to detection with the EnVision®. All kinases used in the tyrosine study were from commercially available lots purchased from Carna Biosciences.

NOTE: Signal to background (S/B) ratios have also been measured in an alternative manner: the control reaction contained ATP, but no substrate, and the substrate was added after stopping the reaction with EDTA. In most cases the S/B ratios are similar using either method. The data with the alternative S/B ratios is available upon request.

LANCE Ultra products used for this study:

| | Catalog number | Phospho-Motif |
|--------------------------------------|----------------|---------------------------|
| ULight-poly GT | TRF0100 | [EY(4:1)] _n |
| ULight-poly GAT | TRF0101 | [EAY(1:1:1)] _n |
| ULight-IRS-1 (Tyr983) Peptide | TRF0120 | SRGD <u>Y</u> MTMQ |
| ULight-JAK-1 (Tyr1023) Peptide | TRF0121 | DKEY <u>Y</u> TVKD |
| ULight-CDK1 (Tyr15) Peptide | TRF0122 | GEGT <u>Y</u> VVY |
| ULight-TK Peptide | TRF0127 | <u>Y</u> |
| Europium-anti-phosphotyrosine (PT66) | AD0068, AD0069 | <u>Y</u> |
| KinaSelect TK kit* | TRF0301-D | <u>Y</u> |

*contains ULight-TK Peptide, 0.5 nmole, Europium-anti-phosphotyrosine (PT66), 10 µg and Lance Detection Buffer 10X, 1.8 mL

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