

NFκB Consensus and Mutant Oligonucleotides

BACKGROUND

Electrophoretic mobility shift assays (EMSAs), also known as gel shift assays, provide a relatively straightforward and sensitive method for studying binding interactions between transcription factors and consensus DNA binding elements. For such studies, DNA probes are provided as double-stranded oligonucleotides designed with 5' OH blunt ends to facilitate labeling to high specific activity with polynucleotide kinase. These are constructed both with specific DNA binding consensus sequences for various transcription factors and as control or "mutant" probes in which one or more nucleotides mapping within the consensus binding site has been substituted.

REFERENCES

1. Dignam, J.D., et al. 1983. Accurate transcription initiation by RNA polymerase II in a soluble extract from isolated mammalian nuclei. *Nucleic Acids Res.* 11: 1475-1489.
2. Lenardo, M.J., et al. 1989. NFκB: a pleiotropic mediator of inducible and tissue-specific gene control. *Cell* 58: 227-229.
3. Murre, C., et al. 1991. B cell- and myocyte-specific E2-box-binding factors contain E12/E47-like subunits. *Mol. Cell. Biol.* 11: 1156-1160.

GEL SHIFT ASSAYS

For gel shift analysis, prepare nuclear extracts following the method of Dignam, et al (1).

- **NOTE:** Spin oligonucleotide vial before opening. Product may be lodged in vial cap.
- Label oligonucleotide probe (TransCruz™ Gel Shift Oligonucleotides) with [γ ³²P]-ATP to 50,000 cpm/ng by using polynucleotide kinase.
- Prepare gel shift reaction buffer as follows: 10 mM Tris (Tris: sc-3715), pH 7.5, 50 mM NaCl (NaCl: sc-29108, 1 mM dithiothreitol (DTT: sc-29089), 1 mM EDTA (EDTA: sc-29092), 5% glycerol (glycerol: sc-29095).
- Prepare 20 μ l reaction mixture containing 3-10 μ g nuclear extract and 1 μ g poly dI-dC in gel shift reaction buffer. Add 0.5 ng labeled oligonucleotide probe and incubate for 20 minutes at room temperature. This constitutes the control sample for detection of DNA-protein complexes (2).
- To detect an antibody supershift or block of the DNA-protein complex, prepare reaction mixture as described above, also adding 1-2 μ l of the appropriate TransCruz™ Gel Supershift antibody per 20 μ l of reaction volume. Antibody is normally added subsequent to addition of labeled oligonucleotide probe, but result may be improved by adding antibody prior to probe. Incubate at 4° C for 1 hour to overnight, or at room temperature for 15-45 minutes.
- Resolve DNA-protein complexes by electrophoresis (25-35 ma) through a 4% polyacrylamide gel containing 50 mM Tris, pH 7.5, 0.38 M glycine (glycine: sc-29096) and 2 mM EDTA. Dry the gel and visualize by autoradiography.

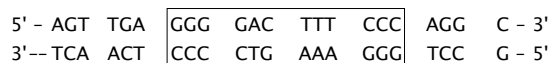
RESEARCH USE

For research use only, not for use in diagnostic procedures.

PRODUCT

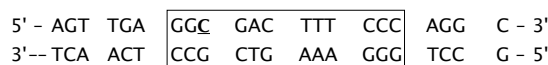
NFκB CONSENSUS OLIGONUCLEOTIDE: sc-2505

- binding site for NFκB/c-Rel homodimeric and heterodimeric complexes (3)



NFκB MUTANT OLIGONUCLEOTIDE: sc-2511

- identical to sc-2505 with the exception of a "G"→"C" substitution in the NFκB/Rel DNA binding motif (3)



SELECT PRODUCT CITATIONS

1. Barton, E., et al. 2001. Junction adhesion molecule is a receptor for reovirus. *Cell* 104: 441-451.
2. Reyes-Reyes, M., et al. 2001. Phosphatidylinositol 3-kinase mediates integrin-dependent NFκB and MAPK activation through separate signaling pathways. *J. Cell Sci.* 114: 1579-1589.
3. Abboushi, N., et al. 2004. Ceramide inhibits IL-2 production by preventing protein kinase C-dependent NFκB activation: possible role in protein kinase C θ regulation. *J. Immunol.* 173: 3193-200.
4. Stoffel, A., et al. 2004. Activation of NFκB and inhibition of p53-mediated apoptosis by API2/mucosa-associated lymphoid tissue 1 fusions promote oncogenesis. *Proc. Natl. Acad. Sci. USA* 101: 9079-84.
5. Andela, V.B., et al. 2004. The proteasome inhibitor MG132 attenuates retinoic acid receptor *trans*-activation and enhances *trans*-repression of nuclear factor κB. Potential relevance to chemo-preventive interventions with retinoids. *Mol. Cancer* 3: 8.
6. Yang, G., et al. 2004. Maturation differences in lung NFκB activation and their role in tolerance to hyperoxia. *J. Clin. Invest.* 114: 669-678.
7. Chakrabarti, A., et al. 2008. Protein kinase R-dependent regulation of interleukin-10 in response to double-stranded RNA. *J. Biol. Chem.* 283: 25132-25139.
8. Mastrofrancesco, A., et al. 2010. KDPT, a tripeptide derivative of α -melanocyte-stimulating hormone, suppresses IL-1 β -mediated cytokine expression and signaling in human sebocytes. *J. Immunol.* 185: 1903-1911.
9. Masuda, M., et al. 2010. Regulation of renal sodium-dependent phosphate co-transporter genes (Npt2a and Npt2c) by all-*trans*-retinoic acid and its receptors. *Biochem. J.* 429: 583-592.
10. Juvekar, A., et al. 2011. Bortezomib induces nuclear translocation of IκB α resulting in gene-specific suppression of NFκB—dependent transcription and induction of apoptosis in CTCL. *Mol. Cancer Res.* 9: 183-194.

STORAGE

Store at -20° C; stable for one year from the date of shipment.

NOTE: Spin oligonucleotide vial before opening. Product may be lodged in vial cap.

NFκB Consensus and Mutant Oligonucleotide Agarose Conjugates

PRODUCT

Transcription factor consensus gel shift oligonucleotides containing specific consensus sequences and mutant control oligonucleotides are provided as agarose conjugates for use in purifying or enriching for specific transcription factors. TransCruz™ Oligonucleotide Agarose Conjugates are provided as 15 μg double-stranded oligonucleotide in 0.25 ml packed beads (1.0 ml total volume). Provides sufficient reagent for 10 assays.

NFκB CONSENSUS OLIGONUCLEOTIDE: sc-2505 AC

- binding site for NFκB/c-Rel homodimeric and heterodimeric complexes (3)

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5' - AGT TGA GGG GAC TTT CCC AGG C - 3'
3' -- TCA ACT CCC CTG AAA GGG TCC G - 5'
  
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NFκB MUTANT OLIGONUCLEOTIDE: sc-2511 AC

- identical to sc-2505 with the exception of a "G"→"C" substitution in the NFκB/Rel DNA binding motif (3)

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5' - AGT TGA GGC GAC TTT CCC AGG C - 3'
3' -- TCA ACT CCG CTG AAA GGG TCC G - 5'
  
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REFERENCES

- Dignam, J.D., Lebovitz, R.M. and Roeder, R.G. 1983. Accurate transcription initiation by RNA polymerase II in a soluble extract from isolated mammalian nuclei. *Nucl. Acids Res.* 11: 1475-1489.
- Murre, C., Voronova, A. and Baltimore, D. 1991. B cell- and myocyte-specific E2-box-binding factors contain E12/E47-like subunits. *Mol. Cell. Biol.* 11: 1156-1160.
- Lenardo, M.J., et al. 1989. NFκB: a pleiotropic mediator of inducible and tissue-specific gene control. *Cell* 58: 227-229.

PREPARATION OF SOLUTIONS

- Binding buffer: 10 mM Tris, pH 7.5; 50 mM NaCl; 1 mM DTT; 1 mM EDTA; 5% glycerol; 1 μg/ml poly dl-dC.
- Elution buffer: Same as binding buffer, but increase NaCl concentration to 150 mM.

PROCEDURE

- Thoroughly mix oligonucleotide agarose conjugate slurry. Aliquot 100 μl slurry (containing 25 μl beads) into 1.5 ml microcentrifuge tube. To pellet beads, centrifuge at 12,000 rpm for 3-5 minutes in microcentrifuge at 4° C. Aspirate supernatant and wash pellet 3 times as follows: add 1 ml binding buffer, resuspend beads and centrifuge at 12,000 rpm for 3-5 minutes in microcentrifuge at 4° C, aspirating supernatant after each wash.
- To the washed agarose pellet, add 250-1000 μg nuclear extract or whole cell lysate (preferably <200 μl in volume). Add sufficient binding buffer to bring total volume to 500 μl. (If a large volume of extract/lysate is used, adjust final NaCl concentration to approximately 50 mM. Alternatively, extract/lysate can be prepared in binding buffer.)

- Incubate with rotation for 2 hours at room temperature or overnight at 4° C. Centrifuge at 12,000 rpm for 3-5 minutes in microcentrifuge at 4° C and aspirate supernatant. Wash pellet 3 times with binding buffer as described above.
- To elute protein from washed beads, add 250 μl elution buffer and incubate for 30 minutes with rotation at room temperature. Centrifuge at 12,000 rpm for 3-5 minutes at 4° C to pellet beads.
- Carefully collect supernatant; this is the protein sample. If desired, concentrate protein sample using a commercially available micro-concentrator.
- To 10-25 μl concentrated sample, add an equal volume of SDS-PAGE electrophoresis sample buffer. Boil for 90 seconds.
- Analyze by Western blot analysis (loading up to 20 μl per lane) or other suitable research application according to Santa Cruz Biotechnology, Inc. research applications protocols.

ALTERNATE PROCEDURE

- Complete preparation and incubation of sample as in steps 1-3 above.
- Directly add 20-50 μl SDS-PAGE electrophoresis sample buffer to the washed pellet. Boil for 90 seconds. Centrifuge at 12,000 rpm for 3-5 minutes in microcentrifuge at 4° C.
- Analyze supernatant by Western blot analysis as in final step above.

SELECT PRODUCT CITATIONS

- Peng, H.B., et al. 1995. Induction and stabilization of IκB-α by nitric oxide mediates inhibition of NFκB. *J. Biol. Chem.* 270: 14214-14219.
- Breithaupt, T.B., et al. 1996. The suppression of T cell function and NFκB expression by Serine protease inhibitors is blocked by N-acetylcysteine. *Cell. Immunol.* 173: 124-130.
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- Bourcier, T., et al. 1997. The NFκB signaling pathway participates in dysregulation of vascular smooth muscle cells *in vitro* and in human atherosclerosis. *J. Biol. Chem.* 272: 15817-15824.
- Xia, Y., et al. 1997. RelB regulation of chemokine expression modulates local inflammation. *Am. J. Pathol.* 151: 375-387.
- Kim, I.Y., et al. 1997. Inhibition of NFκB DNA binding and nitric oxide induction in human T cells and lung adenocarcinoma cells by selenite treatment *Proc. Natl. Acad. Sci. USA* 94: 12904-12907.

STORAGE

Store at 4° C; stable for one year from the date of shipment.

RESEARCH USE

For research use only, not for use in diagnostic procedures.