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12. **Digital Images:** All images submitted to *The Journal of Immunology* must accurately represent the original data. Original data (digital files, autoradiographs, films, etc.) for all experiments should be fully annotated, secured, and retrievable. The original image file (raw data file) should be kept in an unprocessed and noncompressed file format. Figures that are compiled into multi-figure panels should be kept individually.

Although manipulation of images should be kept to an absolute minimum, there are some circumstances when manipulations are necessary. If, however, the quality of an image is too poor to clearly convey the conclusion, the experiment should be repeated.

- **Collecting Images:** If multiple images are compared to one another, collect each image in the same manner. Any post-collection processing should be applied in a uniform manner to all images. If differences in collection/postcollection are necessary, these need to be described in the legend or *Materials and Methods* section.
- **Brightness and Contrast:** If the brightness or contrast of an image needs minor adjustment, adjustments must be applied to the **entire** image and must not obscure or eliminate any information. Significant adjustments are not recommended. Always note any adjustment in the legend or *Materials and Methods* section.
- **Cloning Tools:** Images should not be “airbrushed” (with Clone Stamp Tool/Clone Brush) to remove “blemishes.” Do not use cloning tools to insert something into an image from elsewhere.
- **Gels/Blots:** All gels should contain a positive and a negative control, and a set of molecular weight markers. For Western blots, control panels (actin, GAPDH, etc.) should come from a stripped and reprobed membrane of the experimental blot shown. If this is not possible, the control blots should be derived from the same samples and this should be indicated in the figure legend.
- **Cropping:** Conservative cropping of gels and blots to improve clarity and conciseness may be permitted if the following points are observed:
  - important bands must be retained
  - at least several band widths should be retained above and below the cropped band
  - cropping must be noted in the legend
  - band(s) of interest must be clearly labeled
  - molecular weight marker positions should be shown in all gels/blots

- **Splicing:** Occasionally, images are spliced to rearrange the order of samples for the sake of presentation, such as those in a Western blot. If splicing of data from a single experiment is necessary, draw contrasting (black or white) lines to indicate where the images were joined and state the manipulation in the legend. It would be preferable to rerun the gel so the order is correct. Images from different experiments should not be spliced to form a new single image.

**Cover Art:** Cover art is selected from images in accepted articles and changes with each issue of *The JI*. Authors are encouraged to submit color figures with their manuscripts for possible use as cover illustrations. If an image is selected as cover art, the file must have a resolution of at least 300 dpi at a size of 8.5" × 11".

**Estimating Manuscript Length:** One printed page in *The JI* contains approximately 8,000 characters, including spaces. Thus, an eight-page, full-length article would contain approximately 64,000 characters. Each line in a table occupies about 60 characters for a single-column table (120 characters for a double-column table). Figures occupy about 180 characters per centimeter height for single-column figures (360 characters for double-column figures). Determine the total character count for the text of your manuscript and add the character-equivalents for the tables and figures. This will provide a reasonable estimate for the printed length of a manuscript.

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## DEPOSITING IN PUBLIC DATABASES

**High-resolution structural data:** Any paper submitted to *The JI* that contains new high-resolution structural data requires an accession number from the Protein Data Bank ([www.rcsb.org/pdb/Welcome.do](http://www.rcsb.org/pdb/Welcome.do)) and assurance that unrestricted release will occur at or before the time of publication. The accession number should be accompanied by the Web site address of the databank.

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verification, and statistical analyses are expected. Microarray experiments should be Minimum Information About a Microarray Experiment (MIAME) compliant (for guidelines, see <http://www.mged.org/Workgroups/MIAME/miame.html>). Whereas limited online space may be available for supplemental tables associated with the manuscript, complete microarray data must be deposited in the appropriate public database (e.g., GEO [<http://www.ncbi.nlm.nih.gov/geo/>], ArrayExpress [<http://www.ebi.ac.uk/microarray-as/ae/>], or CIBEX [<http://cibex.nig.ac.jp/index.jsp>]), and must be accessible without restriction from the date of publication. An entry name or accession number must be included in the paper before publication. The accession number should be accompanied by the Web site address of the databank.

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**Allergen nomenclature:** Nomenclature for allergens should be assigned in cooperation with the International Union of Immunological Societies (IUIS) Allergen Sub-Committee. Authors of accepted manuscripts that describe novel allergens will be requested to complete a brief standard form available at IUIS Allergen Nomenclature (<http://www.allergen.org/Allergen.aspx>).

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## SUPPLEMENTAL MATERIALS

### Supplemental Data:

- Supporting data that are not essential to understanding the material presented in the manuscript may be submitted with the original paper for peer review; however, the print version of the paper must stand on its own without the supplemental material.
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Videos must be 320 × 480 pixels or smaller for best viewing within a browser. Videos must be no longer than 30 seconds and under 10MB, with no sound or voice-over. Submit videos in MPG or QuickTime format. Change QuickTime file extensions to “.mov” so that Web browsers will recognize the file type and play the movie. Compress videos as much as possible to help control file size. Name videos by order of citation appearance (e.g., video1.mov). Select “Video” as the “File Type” when uploading the files during online submission. Authors will be notified if problems exist with videos as submitted and will be asked to take responsibility for modifications. No editing will be done to videos at the Editorial Office. A legend or short explanation must accompany the video.

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## CUTTING EDGE MANUSCRIPT PREPARATION

Manuscripts submitted to the *Cutting Edge* section should conform to the *General Guidelines* for full-length manuscripts as well as the additional guidelines below:

1. *Cutting Edge* articles, including figures and references, **must fit within four journal pages**. Authors should estimate the size of figures and tables and limit the text accordingly. One printed page in *The JI* contains approximately 8,000 characters, including spaces. Thus, a four-page *Cutting Edge* article would contain approximately 32,000 characters. The formula for estimating the number of pages is provided in Manuscript Preparation.
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## STANDARD ABBREVIATIONS

The abbreviations listed here are used without definition in articles published in *The JI*. The form may be used for both singular and plural, or made plural with "s" at the author's option.

Å, angstrom  
aa, amino acid (only with numbers)  
Ab, antibody  
ABTS, 2,2'-azino-bis(3-ethylbenzthiazoline-6-sulfonic acid)  
ADP, adenosine 5'-diphosphate  
Ag, antigen  
AIDS, acquired immunodeficiency syndrome  
AMP, adenosine 5'-monophosphate  
ANOVA, analysis of variance  
AP-1, activator protein 1  
APC, Ag-presenting cell  
ATP, adenosine triphosphate  
BALB/c, a mouse strain  
BALT, bronchus-associated lymphoid tissue  
BAPTA-AM, 1,2-bis(2-aminophenoxy)ethane-*N,N,N',N'*-tetraacetic acid acetoxymethyl ester  
BCR, B cell receptor  
bp, base pair (only with numbers)  
BrdU, 5-bromo-2'-deoxyuridine  
BSA, bovine serum albumin  
C, complement  
C region, constant region of Ig  
cAMP, cyclic AMP  
C terminus, carboxyl terminus  
C-terminal, carboxyl-terminal  
CCL, CC chemokine ligand  
CCR, CC chemokine receptor

CD40L, CD40 ligand  
cDNA, complementary DNA  
CDP, cytidine 5'-diphosphate  
CDR, complementarity determining region  
C/EBP, CCAAT/enhancer-binding protein  
CFA, complete Freund's adjuvant  
CFSE, 5-(and 6)-carboxyfluorescein diacetate succinimidyl ester  
CFU, colony-forming unit  
cGMP, guanosine 3',5'-cyclic monophosphate  
CHAPS, 3-[(3-cholamidopropyl)dimethylammonio]-1-propanesulfonate  
Ci, curie  
CIITA, class II transactivator  
CLIP, class II-associated invariant-chain peptide  
cM, centiMorgan(s)  
CMP, cytidine 5'-monophosphate  
CMV, cytomegalovirus  
CNS, central nervous system  
CoA, coenzyme A  
Con A, concanavalin A  
CpG, cytosine guanine dinucleotide  
cpm, counts per minute  
CREB, cAMP response binding protein  
cRNA, complementary RNA  
CSF, colony-stimulating factor  
CTL, cytotoxic T lymphocyte  
CTLA, cytolytic T lymphocyte-associated Ag  
CTP, cytidine 5'-triphosphate  
CXCL, CXC chemokine ligand  
CXCR, CXC chemokine receptor  
d, deoxy; distilled (as in dH<sub>2</sub>O)  
D region, diversity region of Ig or T cell receptor for Ag  
Da, dalton (only with numbers)  
DAPI, 4',6'-diamidino-2-phenylindole  
DEAE, diethylaminoethyl  
df, degrees of freedom  
DMEM, Dulbecco's modified Eagle's medium  
DMSO, dimethylsulfoxide  
DNA, deoxyribonucleic acid  
DNase, deoxyribonuclease  
DNP, dinitrophenyl  
dpm, disintegrations per minute  
ds, double-stranded (as dsDNA)  
DTT, dithiothreitol  
E, erythrocyte  
EBV, Epstein-Barr virus  
EC<sub>50</sub>, 50% effective concentration  
ECL, enhanced chemiluminescence  
ED<sub>50</sub>, 50% effective dose  
EDTA, ethylenediaminetetraacetic acid  
EGTA, ethylene glycol-bis(β-aminoethyl ester)-*N,N,N',N'*-tetraacetic acid  
ELISA, enzyme-linked immunosorbent assay  
ELISPOT, enzyme-linked immunospot  
EMSA, electrophoretic mobility shift assay  
ERK, extracellular signal-regulated kinase  
E:T ratio, effector to target ratio  
Fab, Ag-binding fragment  
F(ab')<sub>2</sub>  
F-actin, filamentous actin  
FACS, fluorescence-activated cell sorting  
FAM, 6-carboxyfluorescein  
FBS, fetal bovine serum

- FcR, Fc receptors (e.g., Fc $\gamma$ RI)  
 FCS, fetal calf serum  
 FITC, fluorescein isothiocyanate  
 FLICE, Fas-associated death domain-like IL-1 $\beta$ -converting enzyme  
 FLIP, FLICE inhibitory protein  
 FLT3, *fms*-related tyrosine kinase 3  
 fMLF, formyl-methionyl-leucyl-phenylalanine  
 fura 2-AM, fura 2-acetoxymethyl ester  
 g, gram (only with numbers)  
 GALT, gut-associated lymphoid tissue  
 GAPDH or G3PDH, glyceraldehyde-3-phosphate dehydrogenase  
 G-CSF, granulocyte CSF  
 GDP, guanosine 5'-diphosphate  
 GFP, green fluorescent protein  
 GM-CSF, granulocyte-macrophage CSF  
 GMP, guanosine 5'-monophosphate  
 gp, glycoprotein (e.g., gp100)  
 GPI, glycosylphosphatidylinositol  
 GST, glutathione S-transferase  
 GTP, guanosine 5'-triphosphate  
 h, hour (only with numbers)  
 H chain, heavy chain  
 H&E, hematoxylin and eosin  
 HBSS, Hanks' balanced salt solution  
 HEPES, *N*-2-hydroxyethylpiperazine-*N'*-2-ethanesulfonic acid  
 HIV, human immunodeficiency virus  
 HLA, human histocompatibility leukocyte Ag  
 HPLC, high performance liquid chromatography  
 HRP, horseradish peroxidase  
 HSV, herpes simplex virus  
 HUVEC, human umbilical vein endothelial cell  
 IC<sub>50</sub>, 50% inhibition/inhibitory concentration  
 ICAM, intercellular adhesion molecule  
 ICOS, inducible costimulator  
 Id, idiotype; idiotype determinant  
 ID<sub>50</sub>, 50% infective dose or 50% inhibiting dose  
 IDO, indoleamine 2,3-dioxygenase  
 IFA, incomplete Freund's adjuvant  
 IFN, interferon (e.g., IFN- $\gamma$ )  
 Ig, immunoglobulin  
 IgH, Ig heavy chain  
 I $\kappa$ B or I- $\kappa$ B, inhibitory NF- $\kappa$ B  
 IL, interleukin (e.g., IL-2)  
 i.m., intramuscular  
 IMDM, Iscove's modified Dulbecco's medium  
 IMEM, Iscove's minimal essential medium  
 i.p., intraperitoneal  
 ITAM, immunoreceptor tyrosine-based activation motif  
 ITIM, immunoreceptor tyrosine-based inhibitory motif  
 IU, international unit  
 i.v., intravenous  
 J region, joining region of Ig or T cell receptor for Ag  
 JAK or Jak, Janus kinase  
 JNK, c-Jun N-terminal kinase  
 kb, kilobase (only with numbers)  
 kbp, kilobase pair (only with numbers)  
 $K_a$ , association constant  
 $K_d$ , distribution coefficient; dissociation constant  
 $K_D$ , affinity constant  
 kDa, kilodalton (only with numbers)  
 L chain, light chain  
 LD<sub>50</sub>, 50% lethal dose  
 LFA, leukocyte (lymphocyte) function-associated Ag  
 LIF, leukemia inhibitory factor  
 LPS, lipopolysaccharide  
 LU, lytic unit  
 2-ME, 2-mercaptoethanol  
 mAb, monoclonal Ab  
 2-ME, 2-mercaptoethanol  
 MACS, magnetic-activated cell sorting  
 MALDI, matrix-assisted laser desorption ionization  
 MALDI-TOF, matrix-assisted laser desorption ionization-time of flight  
 MALT, mucosa-associated lymphoid tissue  
 MAPK, mitogen-activated protein kinase  
 MCP, monocyte chemoattractant protein  
 M-CSF, macrophage CSF  
 2-ME, 2-mercaptoethanol  
 MEK, mitogen-activated protein kinase kinase  
 MEM, minimum essential medium  
 MES, 2-(*N*-morpholino)ethanesulfonic acid  
 mg, milligram (only with numbers)  
 MHC, major histocompatibility complex  
 min, minute (only with numbers)  
 MIP, macrophage-inflammatory protein  
 ml, milliliter (only with numbers)  
 MLC, mixed lymphocyte culture  
 MLR, mixed leukocyte reaction  
 mo, month(s) (only with numbers)  
 MOPS, 4-morpholinepropanesulfonic acid  
 $M_r$ , relative molecular mass  
 mRNA, messenger RNA  
 MTT, 3-(4,5-dimethylthiazol-2-yl)-2,5-dimethyltetrazolium bromide  
 $\mu$ g, microgram (only with numbers)  
 $\mu$ l, microliter (only with numbers)  
 m.w., molecular weight  
 MyD88, myeloid differentiating factor 88  
*n*, number in study or group  
 NAD, nicotinamide adenine dinucleotide  
 NADH, reduced NAD  
 NaDodSO<sub>4</sub>, sodium dodecyl sulfate  
 NADP, NAD phosphate  
 NADPH, reduced NAD phosphate  
 NBT, nitroblue tetrazolium  
 ND, not determined  
 NDP, nucleoside 5'-diphosphate  
 NF, nuclear factor  
 NFAT or NF-AT, nuclear factor of activated T cells  
 NF- $\kappa$ B, nuclear factor  $\kappa$ B  
 Ni-NTA, nickel-nitrilotriacetic acid  
 NK cell, natural killer cell  
 NMP, nucleoside 5'-monophosphate  
 NO, nitric oxide  
 NOD, nonobese diabetic  
 NS, not significant  
 nt, nucleotide (only with numbers)  
 N-terminal, NH<sub>2</sub>-terminal or amino-terminal  
 N terminus, NH<sub>2</sub> terminus or amino terminus  
 NTP, nucleoside 5'-triphosphate  
 OCT, octamer-binding factor  
 OD, optical density  
 OVA, ovalbumin  
*p*, probability  
 PAGE, polyacrylamide gel electrophoresis  
 PBL, peripheral blood lymphocyte

- PBMC, peripheral blood mononuclear cell  
 PBS, phosphate-buffered saline  
 PCR, polymerase chain reaction  
 PE, phycoerythrin  
 PECAM-1, platelet endothelial cell adhesion molecule-1  
 PerCP, peridinin chlorophyll protein  
 PFU, plaque-forming unit  
 PG, prostaglandin  
 PHA, phytohemagglutinin  
 PI3K, phosphatidylinositol 3-kinase  
 PIPES, piperazine-*N,N'*-bis(2-ethane sulfonic acid)  
 PMA, phorbol myristate acetate  
 PMSF, phenylmethylsulfonyl fluoride  
 PWM, pokeweed mitogen  
 r, recombinant (e.g., rIFN- $\gamma$ )  
 R, receptor (e.g., IL-2R)  
 RACE, rapid amplification of cDNA end  
 RAG, recombination-activating gene  
 RANTES, regulated upon activation, normal T cell expressed and secreted  
 RBC, red blood cell  
 RFLP, restriction fragment length polymorphism  
 RIA, radioimmunoassay  
 RNA, ribonucleic acid  
 RNase, ribonuclease  
 rpm, revolutions per minute  
 RPMI, (usually RPMI 1640)  
 rRNA, ribosomal RNA  
 RT-PCR, reverse transcriptase polymerase chain reaction  
 s, second (use only with numbers)  
 s.c., subcutaneous  
 SCID, severe combined immunodeficiency  
 SD, standard deviation  
 SDS, sodium dodecyl sulfate  
 SDS-PAGE, sodium dodecyl sulfate-polyacrylamide gel electrophoresis  
 SE, standard error  
 SEM, standard error of the mean  
 SHIP, src homology 2-containing inositol 5'-phosphatase  
 SIV, simian immunodeficiency virus  
 sp. act., specific activity  
 SRBC, sheep red blood cell  
 ss, single-stranded (e.g., ssDNA)  
 SSC, standard saline citrate  
 STAT, signal transducer and activator of transcription  
 SV40, simian virus 40  
 $t_{1/2}$ , half-life, half-time  
 TAMRA, 5-(and 6)-carboxytetramethylrhodamine  
 TAP, transporter associated with Ag processing  
 Tat, terminal deoxynucleotidyltransferase  
 TBS, Tris-buffered saline  
 TBST, TBS with Tween 20  
 TCA, trichloroacetic acid  
 TCR, T cell receptor for Ag  
 TDP, thymidine 5'-diphosphate  
 TdT, terminal deoxynucleotidyltransferase  
 TGF, transforming growth factor  
 Th cell, T helper cell  
 TLC, thin layer chromatography  
 TLR, Toll-like receptor  
 TMP, thymidine 5'-monophosphate  
 TNF, tumor necrosis factor  
 TNP, trinitrophenyl  
 TRAIL, TNF-related apoptosis-inducing ligand  
 Tris, tris(hydroxymethyl)aminomethane  
 tRNA, transfer RNA  
 TTP, thymidine 5'-triphosphate  
 TUNEL, Tdt-mediated dUTP nick end labeling  
 U, unit (only with numbers)  
 UDP, uridine 5'-diphosphate  
 UMP, uridine 5'-monophosphate  
 UTP, uridine 5'-triphosphate  
 UV, ultraviolet  
 v/v, volume to volume ratio (%)  
 v/w, volume to weight ratio (%)  
 V region, variable region of Ig  
 VCAM, vascular cell adhesion molecule  
 V(D)J or VDJ, variable diversity joining  
 VLA, very late activation Ag  
 W, watt (only with numbers)  
 WBC, white blood cell  
 WEHI medium  
 wk, week (only with numbers)  
 xid, X-linked immunodeficiency  
 Zap70,  $\zeta$ -associated protein 70 (or  $\zeta$ -chain-associated protein 70)

## Keywords

### Animals

Human  
 Rodent  
 Other Animals

### Cells

B Cells  
 Dendritic Cells  
 Endothelial Cells  
 Eosinophils  
 Mast Cells/Basophils  
 Monocytes/Macrophages  
 Natural Killer Cells  
 Neutrophils  
 Stem Cells  
 Stromal Cells  
 T Cells  
 T Cells, Cytotoxic  
 Th1/Th2 Cells

### Diseases

Autoimmunity  
 Diabetes  
 EAE/MS

### Endotoxin Shock

Graft Versus Host Disease  
 Immunodeficiency Diseases  
 Rheumatoid Arthritis  
 Systemic Lupus Erythematosus

### Infections

AIDS  
 Bacterial  
 Fungal  
 Parasitic-Helminth  
 Parasitic-Protozoan  
 Viral

### Molecules

AcutePhase Reactants  
 Adhesion Molecules  
 Antibodies Antigens/Peptides/Epitopes  
 Autoantibodies  
 Cell Surface Molecules  
 Chemokines  
 Complement  
 Cytokine Receptors  
 Cytokines

### Fc Receptors

Lipid Mediators  
 Lipopolysaccharide  
 MHC  
 Nitric Oxide  
 Protein Kinases/Phosphatases  
 Superantigens  
 T Cell Receptors  
 Transcription Factors

### Processes

Allergy  
 Antigen Presentation/Processing  
 Apoptosis  
 Cell Activation  
 Cell Differentiation  
 Cell Proliferation  
 Cell Trafficking  
 Chemotaxis  
 Comparative Immunology/Evolution  
 Costimulation  
 Cytotoxicity  
 Gene Rearrangement  
 Gene Regulation

### Hematopoiesis

Inflammation  
 Memory  
 Neuroimmunology  
 Phagocytosis  
 Repertoire Development  
 Reproductive Immunology  
 Signal Transduction  
 Tolerance/Suppression/Anergy  
 Transplantation  
 Tumor Immunity  
 Vaccination

### Techniques

Gene Therapy  
 Molecular Biology  
 Transgenic/Knockout Mice

### Tissues

Lung  
 Mucosa  
 Skin  
 Spleen & Lymph Nodes  
 Thymus



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