Digital Art Guidelines

To meet PNAS' quality standards for publication, it is important to submit digital art that conforms to the appropriate resolution, size, color mode, and file format. Doing so will help to avoid delays in publication and maximize the quality of images, both online and in print. Before preparing your figures, please review the PNAS policy on figure preparation in the Information for Authors.

3D images: For information on submitting 3D images, please see page 4 of this document.
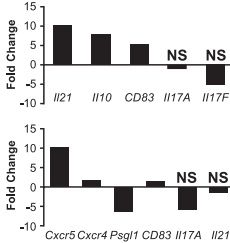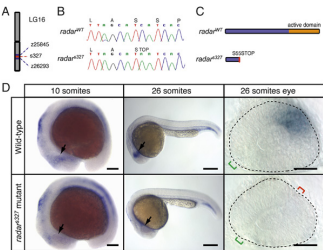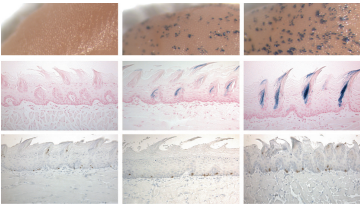
Two categories of digital artwork:
- **Raster images** (i.e., pixel-based; also called bitmapped images; TIF files support only raster data) or
- **Vector images** (i.e., object-based; EPS, AI, and PDF files support both vector and raster data.)

Vector images are preferred because they have the highest quality and produce the best results in publication.

Resolution and Raster Images: Low-resolution images are one of the leading causes of art resubmission and schedule delays. Avoid creating text in raster format—vector text is preferred because it can be scaled to any size without quality loss. If you must use raster, submitted raster images must meet the minimum resolution requirements. Raster images can be classified as monochrome (line art), halftone, or combination halftone. TIFF, EPS, or PDF file formats are preferred.

- **Monochrome (1-bit) images (line art):** Common examples are graphs and charts made of solid black and white, with no gray values. The preferred resolution for this type of image is between 1000 and 1200 ppi at publication size.
- **Combination halftones:** Common examples are color or grayscale figures containing halftone and line art elements. The preferred resolution for this type of image is between 600 and 900 ppi at publication size.
- **Halftones:** Common examples are color or grayscale figures containing pictures only, with no text or thin lines. The suggested minimum resolution for this type of image is 300 ppi at publication size.

Note: When saving these files, please use LZW compression (i.e., do not use jpeg compression).

Monochrome (line art)	Combination Halftones (grayscale or color images with type)	Halftones (grayscale or color images with no type or lettering)
1000–1200 ppi	**600–900 ppi**	**300 ppi**

Color mode: All color image files must be submitted in their original RGB color. This will ensure that the brightest possible RGB colors will show online, as the RGB color space is capable of producing many more colors than the CMYK (ink-based) color space. For this reason, there will be a color shift when images are converted to CMYK for print—please see the example below. Whenever possible, tag the submitted RGB image with the originating ICC profile to ensure the best possible conversion to CMYK for the printed journal.

RGB - online   CMYK - print

Labeling and font usage: Please use the same font for all figures in your manuscript. Use standard fonts such as Arial, Helvetica, Times, Symbol, Mathematical Pi, and European Pi. Embed all fonts used in vector files. In Illustrator, check the box that reads **Embed Fonts** when saving the file. See page 3 for more detailed instructions on embedding fonts.

Sizing tips: It may be necessary to reduce the size of your figures to meet the PNAS page length restriction. To ensure that text within your figures remains legible if you do need to reduce the size of your figures, please follow these steps:
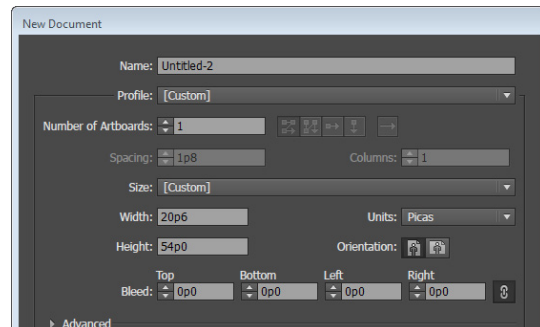
1. Prepare your figures at the size you would like them to appear in the final publication. Do not prepare your figure at the full page size—this can lead to poor quality when the figure is reduced.

2. Start by making the height of your canvas less than the height of the page to accomodate the figure legend.

   Recommended max height: 54 picas / 9" / 22.5 cm.

   Use one of the following widths:

   > 1 column wide (20.5 picas / 3.42" / 8.7 cm)
   > 1.5 columns wide (27 picas / 4.5" / 11.4 cm)
   > 2 columns wide (42.125 picas / 7" / 17.8 cm)

   * For example, if you are creating a combination figure (image+text) that you want to be 1 column wide using Adobe Illustrator (which is preferred to maintain vector text), choose **File>New...** and enter these settings (shown at right):
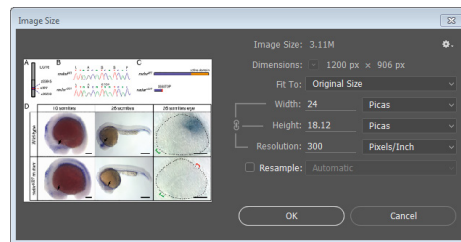

3. Place artwork onto the canvas/background and position appropriately.

4. Size any text in your figure to at least 6–8 points. This will allow us to reduce the file if necessary.

5. If you need to crop the height of your figure, in Adobe Illustrator, choose **File>Document Setup**, then either **Edit Artboards** to crop the artboard to size, or change the size of the document as needed. If you are using Photoshop, crop the canvas down to the size needed using the crop tool.
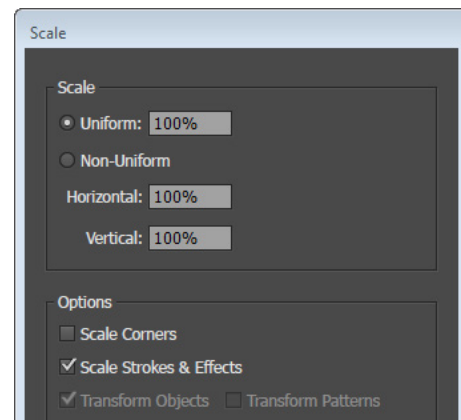
6. If it is necessary to reduce the size of existing figures:

   a. Eliminate or reduce unnecessary white space if possible.

   b. If you are using Adobe Photoshop, use **Image>Image Size** to resize your figure. Uncheck **Resample Image**. This will prevent Photoshop from interpolating pixels, which is a process of artificially adding pixels that does not improve the quality of digital art. It is best not to resample images even if the figure won't meet the required resolution per PNAS guidelines. In this case, preflight software will be able to accurately report on the resolution of your file, and alert our graphic experts to review your file and ensure it meets quality standards. Files that exceed the resolution requirements are acceptable and give our graphics team the flexibility to enlarge the figure if needed.
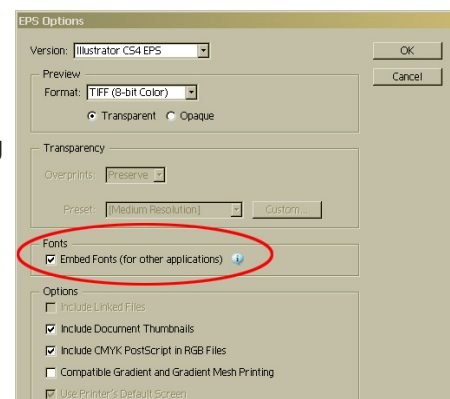

   c. If you are using Adobe Illustrator, use **Object>Transform>Scale...** then choose **Uniform Scale** and type in the desired percentage. Check the box that reads **Scale Strokes and Effects**.

   d. Confirm that text size is at least 6 points after reduction. If it is not, please use the text tool to reset the text before submission.

Vector graphics: Vector images are typically generated using drawing or illustration programs (e.g., Adobe Illustrator) and are composed of mathematically defined geometric shapes—lines, objects, and fills. Vector graphics are resolution independent and can be sized up or down without quality loss. Note that text created in most programs (i.e., Illustrator, InDesign, Word, PowerPoint, etc.) is vector text and can be enlarged without quality loss; however, text created in Photo-shop is raster (pixel based) and therefore does not possess the same quality.

- **Vector line art:** Common examples are graphs and charts created in illustration programs. It is preferable to have these saved as EPS files, with all fonts embedded, and graph lines at least 0.25 points wide. If you are using Illustrator, check the box that reads **Embed Fonts** when saving the file.
- **Combination line/halftone:** Common examples are color or grayscale figures containing halftone and line art elements. The halftone elements should be processed in Photoshop and the line elements in Illustrator, and the two elements from the two applications should be combined in Illustrator. It is preferable to have these saved as EPS files, with all fonts embedded, and graph lines at least 0.25 points wide.
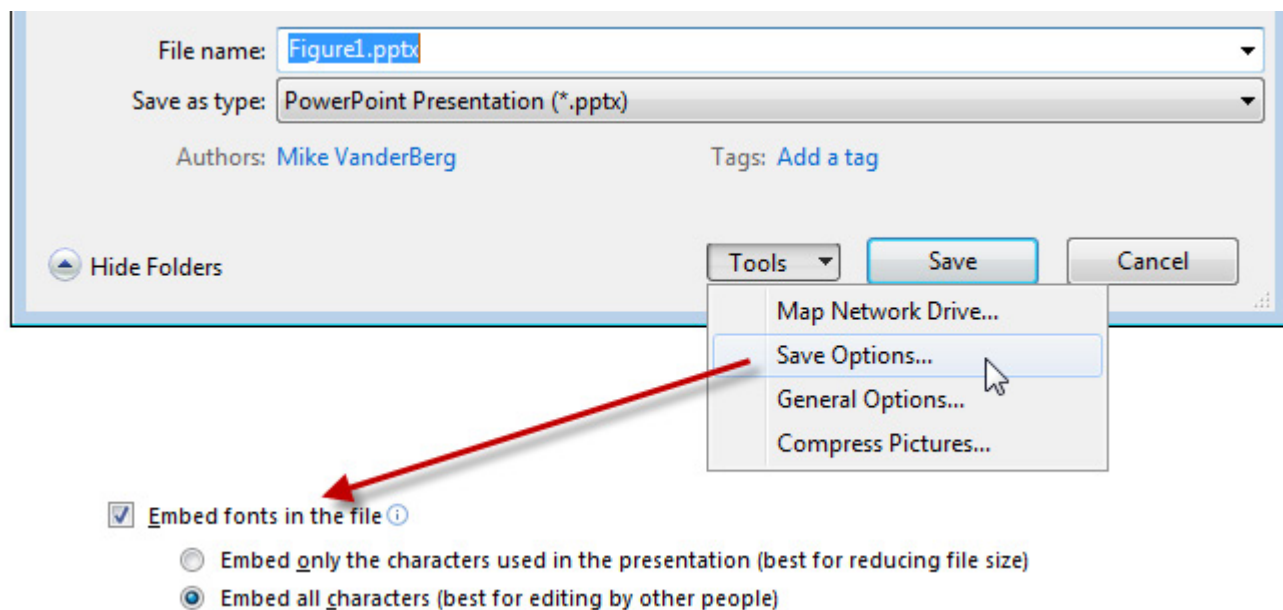
Microsoft Office: Figures submitted in Word, Excel, or PowerPoint may take additional time to process and may cause delays in publication; therefore, we do not recommend submitting figures in MS Office. If you must create the original file in a Microsoft Office application, please follow these general rules to ensure that the file is properly prepared:

1. Do not use pattern or textured fills in graphics. Instead, use solid fills or percentage screens that will be effectively converted to vector images during file conversion. **Note:** A 20% difference in percent screens is most effective for differentiation.
2. Artwork placed within any MS Office application should be of acceptable minimum resolution for print production: 300 dpi for halftones, 600–900 dpi for combinations, and 1000–1200 dpi for line art.
3. When inserting pictures/images into files, be sure to select "insert" rather than "insert link." The latter will not properly embed the high-resolution image into the MS Office file.
4. For each and every file created in MS Office, **before** saving the file, choose **File>Options>Advanced** and check the box labeled "Do not compress images in file." (This will help ensure that high-resolution is maintained.)
5. Always embed fonts in your documents. See guidelines below for embedding fonts in MS Office documents.
6. Do **not** export MS Office files to TIF format—this will rasterize the vector text and line art.

Embedding Fonts in MS Office:
- From the file menu, select Save As...
- From the Tools menu, select Save Options, then select the Embed Fonts check box, and select Embed all characters (best for editing by others).

3D Images: 3D images can be embedded in PDFs to be used in online material. There are two options:

1. 3D image embedded in main article PDF or composed supporting information (SI) PDF (recommended).
2. 3D image embedded in noncomposed SI PDF.

Option 1: 3D image embedded in main article PDF or composed SI PDF

Please supply BOTH:
A. 3D image in .U3D or .PRC format
   These are standard 3D format that can be generated by a wide range of 3D modeling applications. It will be embedded in the PDF to be posted online.
B. 2D representation of your 3D file
   This two-dimensional version of your 3D image will be used for the online PDF display before the 3D image is activated.

Option 2: 3D image embedded in noncomposed SI PDF
   Please note: PNAS will not edit, compose, or make any adjustments to your noncomposed SI files.
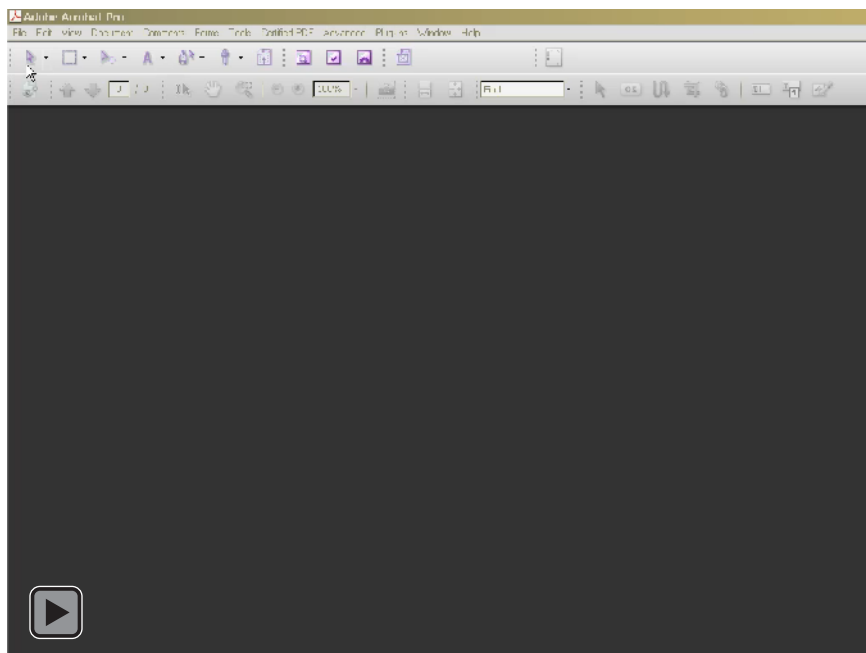
In this scenario, you will need to embed your 3D image into a PDF. Here's how to do it:

1. Open the PDF where you want to place your 3D image using Adobe Acrobat.
2. Choose **Tools>Rich Media>Add 3D.** (For older versions of Acrobat, choose **Tools>Multimedia>3D Tool**.)
3. Drag a marquee (rectangular box) around the area where you want your 3D image to appear.
4. In the resulting dialog box, click on **Browse** to choose your 3D image.
5. Click OK—this will embed the 3D image into the PDF.

Play the video below to see the process in action, using Acrobat 9 Professional.
Please note that you can use newer versions of Acrobat, and also use .PRC format—the procedure is the same.
When you are finished, you can close the video by clicking on the small "X" in the top right corner.

Authors who do not comply with these guidelines will be asked to resubmit their figures in a publication-quality format, which may delay production.

If you need additional help, email workflow_support.djs@sheridan.com