Preparing Publication-Ready Manuscript Figures with PowerPoint and Excel

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About the Author

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Manuscripts audited by Word-Medex have been published in *The Lancet*, *The New England Journal of Medicine*, *Nature*, *Cancer*, *Blood*, *Chest*, *BJA*, and *Hepatology*, among others. Of the thousands audited and published, the Japanese authors of 245 papers have formally thanked the help of Dr. Issa (Word-Medex) in the Acknowledgments sections of their papers.

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This Guide Does Not Use APA or AMA “Figure Styles”

Formatting figures in biomedical research manuscripts is governed by the following three systems:

1. Journal-Specific Instructions for Authors (IFAs): Each journal defines its own rules for file formats, resolution, color mode, panel labels, and maximum figure dimensions. These requirements vary widely and always take precedence over any general style guide.

2. ICMJE Image-Integrity Standards: The International Committee of Medical Journal Editors provides rules that govern *ethics*, not design. It defines image adjustments, anonymization of clinical images, and image manipulation. It does not prescribe fonts, colors, or layout.

3. CSE (Council of Science Editors) Guidelines: CSE governs how figures are numbered, cited, and captioned, but it does not define visual design standards.

4. Discipline-Specific Conventions: Biomedical publishing has strong informal norms shaped by journals policies. These conventions influence expectations for clarity, minimalism, scale bars, color palettes, and multi-panel layouts, but they are not formalized into a universal style.

Therefore, this guide ensures that the prepared figures meet the expectations of major international biomedical journals, regardless of discipline or publisher.

Most figure rejections have nothing to do with the underlying data — they come from formatting and consistency errors that reviewers catch within seconds. This guide walks through exactly how to avoid them.

Table of Contents

.....1
This Guide Does Not Use APA or AMA “Figure Styles”.....4
1. Before You Start.....12
1.1 Choosing the Right Figure Type.....12
1.2 Understanding Journal Requirements.....15
1.3 Recommended Fonts and Sizes.....16
1.4 Color vs. Grayscale.....17
1.5 Turning On PowerPoint’s Essential Tools.....19
2. Creating a New Figure in PowerPoint.....21
2.1 Choosing Portrait vs. Landscape.....21
2.2 Setting Slide Size.....22
Set the figure size using:.....23
2.3 Setting a Clean Working Canvas.....25
2.4 Using the Drawing Tools Correctly.....26
3. Importing Data Visualizations from Excel.....27

3.1 Preparing Clean Data in Excel 27
3.2 Choosing the Correct Chart Type 28
3.3 Removing Excel's Default "Chart Junk" 30
3.4 Copying Charts into PowerPoint (Paste Special → EMF) 33
4. Editing Charts in PowerPoint 38
4.1 Adjusting Line Thickness 38
4.2 Adjusting Marker Size 39
4.3 Setting Consistent Colors 40
4.4 Removing Unnecessary Borders 41
4.5 Adjusting Axis Labels and Tick Marks 42
4.6 Ensuring Consistent Font Sizes Across Panels 43
5. Creating Multi-Panel Figures 45
5.1 Deciding on Panel Layout (2×2, 1×3, 3×1, etc.) 45
5.2 Using Alignment Tools (Mandatory) 46
5.3 Creating Panel Labels (A, B, C, D) 47
5.4 Ensuring Equal Spacing Between Panels 48
5.5 Grouping and Locking Elements 49

6. Adding Images (Microscopy, Radiology, Clinical Photos) 51
6.1 Importing High-Resolution Images 51
6.2 Cropping Without Distortion 53
6.3 Adjusting Brightness/Contrast Safely 54
6.4 Adding Scale Bars 55
6.5 Avoiding Over-Editing (Ethics and Journal Rules) 56
7. Adding Annotations and Callouts 58
7.1 Arrows, Circles, and Highlights 58
7.2 Using Semi-Transparent Overlays 60
7.3 Ensuring Annotations Do Not Obscure Data 61
7.4 Color-Blind-Safe Annotation Choices 63
8. Finalizing the Figure 64
8.1 Checking Alignment and Spacing 64
8.2 Ensuring Consistent Font Sizes 65
8.3 Ensuring Consistent Line Weights 66
8.4 Checking Color Contrast 67
8.5 Figure Numbering and Author Identification (Optional — check target journal) ... 68

8.6 Adding Panel Labels (Mandatory) 68
9. Exporting the Figure 70
9.1 Exporting as PNG (High Resolution) 70
9.2 Exporting as TIFF (Journal-Ready) 72
9.3 Exporting as PDF (Vector-Safe) 73
9.4 Checking Resolution (300–600 dpi) 74
9.5 Avoiding Compression Artefacts 75
10. Common Mistakes to Avoid 77
10.1 Using Screenshots Instead of Real Charts 77
10.2 Using Excel Defaults (“Chart Junk”) 78
10.3 Inconsistent Font Sizes 79
10.4 Inconsistent Colors Across Panels 79
10.5 Misaligned Panels 80
10.6 Over-Edited Clinical or Microscopy Images 80
10.7 Low-Resolution Exports 81
10.8 Using JPEG for Line Art 81
10.9 Overcrowded Figures 82

10.10 Inconsistent Line Weights 82
10.11 The Law of Diminishing Returns in Figure Preparation 83
11. Quick Reference Sheet 84

Why Figure Quality Directly Affects Manuscript Acceptance Rate

Reviewers at high-impact journals spend an average of 2–4 minutes on their first pass of your manuscript. In that time, they see the abstract, figures, and conclusions. Figures that are misaligned, inconsistently formatted, or exported at low resolution signal one thing to a busy reviewer: *this manuscript was not prepared with care.*

At Word-Medex, we have audited hundreds of manuscripts submitted to various journals including *The Lancet*, *JAMA*, *NEJM*, and *The BMJ*. In our experience, **poor figure preparation is one of the top 5 reasons manuscripts are returned for revision before peer review** — even when the underlying science is excellent.

This guide teaches you to prepare publication-ready figures using tools you already own: Microsoft PowerPoint and Excel. It is not about graphic design. It is about **scientific credibility communicated visually**.

1. Before You Start

Preparing publication-ready figures begins long before you open PowerPoint. Journals expect figures that are clear, consistent, and scientifically honest. This section helps young clinicians and researchers understand the essential decisions they must make *before* creating a figure.

1.1 Choosing the Right Figure Type

Different scientific messages require different figure types. Selecting the wrong type can weaken your results, confuse reviewers, or lead to desk rejection.

Use charts for:

- trends over time (line chart)
- comparisons between groups (bar chart)
- distributions (box plot, histogram)
- relationships between variables (scatter plot)

Use images or schematic diagrams for:

- microscopy findings
- radiology scans
- clinical photographs
- study protocol
- gel electrophoresis bands
- pathology slides

Use multi-panel figures for:

- need to combine related results
- show “before vs after”
- compare multiple conditions
- display different magnifications or modalities

Clinical Research Specific Figure Types

Clinical researchers often need figure types not covered in standard basic science guides:

- **CONSORT flow diagrams** for randomized controlled trials
- **Kaplan-Meier survival curves** for time-to-event analyses
- **Forest plots** for meta-analyses and subgroup analyses
- **Patient flowcharts** for observational studies and registries
- **STROBE-compliant diagrams** for cohort and case-control studies

These figures have specific formatting requirements governed by reporting guidelines (CONSORT, STROBE, PRISMA) in addition to journal Instructions for Authors. Always check both.

A strong figure communicates one idea clearly. Use two figures to communicate two ideas.

1.2 Understanding Journal Requirements

Every journal has its own rules for figures. Before you begin, check the Instructions For Authors:

File format: TIFF, PNG, PDF, EPS
Resolution: usually 300 dpi for photos, 600 dpi for line art
Color mode: RGB for online, CMYK for print
Font requirements: many journals prefer Arial, Helvetica, or Calibri
Panel labels: A, B, C… in bold, upper-left corner
Maximum figure size: often 8.5 cm (single column) or 17.8 cm (double column)

Preparing figures after submission guidelines is a common mistake. Preparing them before saves time and prevents rejection.

1.3 Recommended Fonts and Sizes

Use fonts that remain readable after resizing and printing.

Recommended fonts:

- Arial
- Helvetica
- Calibri
- Source Sans Pro (if allowed)
-

Recommended sizes:

- Axis labels: 8–10 pt
- Tick labels: 7–9 pt
- Panel labels (A, B, C): 12–14 pt, bold
- Figure title (if used): 12–14 pt

Never mix different fonts within the same figure.

1.4 Color vs. Grayscale

Many journals still print in grayscale, even if the online version is in color. Check the Instruction for Authors for extra costs for submission of colored figures.

Use color to:

- show multiple lines or groups
- highlight differences
- present heatmaps or complex data

Use grayscale to:

- prepare images for print
- show radiology or microscopy

Remember, color does not add meaning by itself — use it only when it encodes real information (e.g., distinguishing groups), not as decoration.

Color-blind-safe palette (recommended):

- Blue (#0072B2)
- Vermillion (#D55E00)
- Sky Blue (#56B4E9)
- Bluish Green (#009E73)
- Orange (#E69F00)

Avoid red-green combinations.

1.5 Turning On PowerPoint's Essential Tools

Before beginning drawing or importing charts, turn on the tools that help maintain precision.

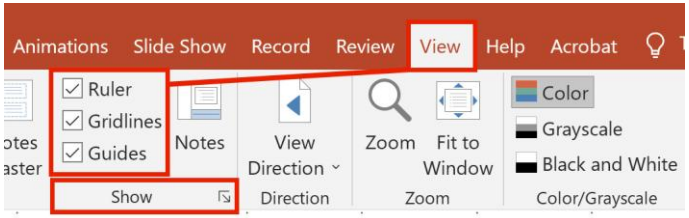
Turn on:

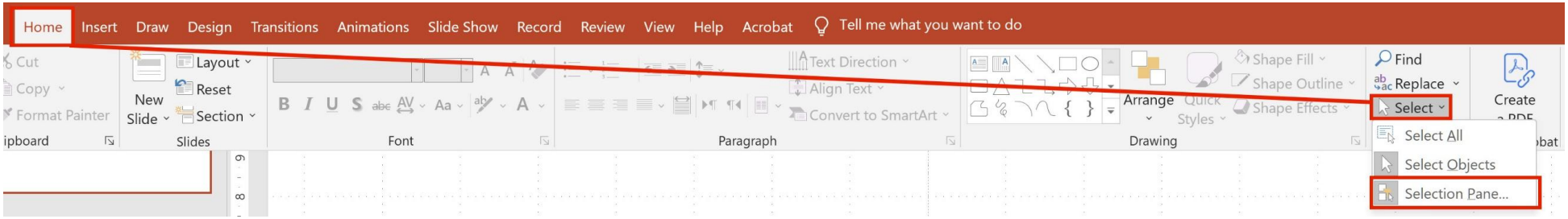
- Gridlines
- Guides
- Rulers
- Selection Pane (Home → Arrange → Selection Pane)

These tools help in:

- aligning panels
- maintaining equal spacing
- selecting hidden objects
- avoiding accidental misalignment

This is the equivalent of "turning on the ruler" in Word before formatting a table.


Animations
Slide Show
Record
Review
View
Help
Acrobat
Ruler
Gridlines
Guides
Notes
View Direction
Zoom
Fit to Window
Color
Grayscale
Black and White
Show
Direction
Zoom
Color/Grayscale


Home
Insert
Draw
Design
Transitions
Animations
Slide Show
Record
Review
View
Help
Acrobat
Tell me what you want to do
Cut
Copy
Format Painter
New Slide
Layout
Reset
Section
Text Direction
Align Text
Convert to SmartArt
Arrange
Quick Styles
Shape Fill
Shape Outline
Shape Effects
Find
Replace
Select
Select All
Select Objects
Selection Pane...
Slides
Font
Paragraph
Drawing

2. Creating a New Figure in PowerPoint

PowerPoint is a powerful tool for producing publication-ready figures, but only if the workspace is set up correctly. Most errors in scientific figures — misalignment, inconsistent spacing, blurry exports — originate from poor setup at the beginning. This section is a guide to create a clean, controlled canvas that supports high-quality figure production.

2.1 Choosing Portrait vs. Landscape

Choose the orientation that best fits your figure layout.

Use portrait when:

- the figure is tall (e.g., microscopy panels stacked vertically)
- for a 1×3 or 1×4 panel layout
- the journal requires narrow figures

Use landscape when:

- figure is wide (e.g., time-series charts)
- have a 2×2 or 3×2 layout
- more horizontal space is needed for labels

Orientation should support the scientific message, not the other way around.

2.2 Setting Slide Size

Before adding any content, set the slide size to match the final print-ready figure dimensions. This ensures that exported images have the correct proportions and resolution.

Recommended sizes:

- 1 Leaf (single-column) figure: 8.5-9.0 cm (3.3-3.5") width
- 2 Leaves (2 side-by-side columns) figure: 17.8-18.5 cm (6.9-7.3") width
- Full-page figure: 20–22 cm (7.9-8.7") width
- Maximum height: 24 cm (9.5")

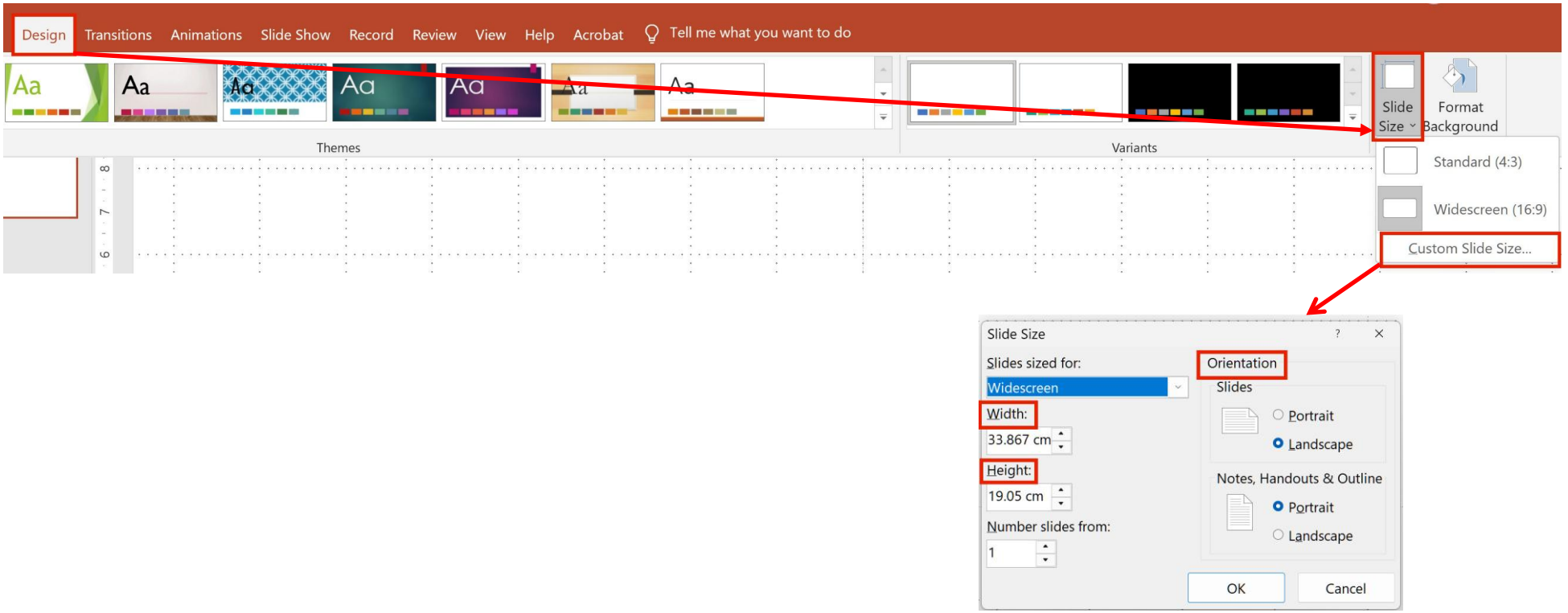
Set the figure size using:
Design → Slide Size → Custom Slide Size

- Select orientation (portrait or landscape)
- Set width and height
- Avoid setting slide size to A4 or Letter.

Why this matters:
If you design on a default widescreen slide and export later, PowerPoint will rescale your figure, causing:

- blurry text
- inconsistent line weights
- distorted proportions

Setting the slide size first prevents these issues.


Design
Transitions
Animations
Slide Show
Record
Review
View
Help
Acrobat
Tell me what you want to do
Themes
Variants
Slide Size
Format Background
Standard (4:3)
Widescreen (16:9)
Custom Slide Size...
Slide Size
Slides sized for:
Widescreen
Width:
33.867 cm
Height:
19.05 cm
Number slides from:
1
Orientation
Slides
Portrait
Landscape
Notes, Handouts & Outline
Portrait
Landscape
OK
Cancel

2.3 Setting a Clean Working Canvas

A clean canvas helps you maintain consistency and avoid visual clutter.

Recommended setup:

- White background
- No borders
- No shadows
- No default text boxes
- No title placeholders

Delete everything on the slide except the blank canvas. This ensures that every added element is intentional.

2.4 Using the Drawing Tools Correctly

PowerPoint's drawing tools allows the creation of shapes, annotations, and layout guides with precision.

Essential tools:
Rectangle — for panel backgrounds
Line — for dividers or scale bars
Oval — for highlighting features
Arrow — for annotations
Text Box — for labels and panel letters

Key principles:
Hold **Shift** to draw perfect circles or straight lines
Use **Format Shape → Line → Weight** to set consistent line thickness
Use **No Outline** for shapes that should blend into the background
Use **Align** tools to maintain symmetry

These tools form the backbone of clean, professional figure design.

3. Importing Data Visualizations from Excel

Excel is excellent for generating raw charts, but its default settings produce figures that are unsuitable for publication. PowerPoint becomes the “finishing studio” where you refine, clean, and standardize your charts. This section explains how to prepare your data in Excel, choose the correct chart type, remove “chart junk,” and import clean, editable graphics into PowerPoint.

3.1 Preparing Clean Data in Excel

A figure is only as good as the data behind it. Before creating a chart:

Ensure your data table is:

- free of empty rows
- free of merged cells
- labeled clearly
- using consistent units sorted logically (e.g., time → ascending)

Avoid:

- long text labels
- unnecessary decimal places
- mixing percentages and absolute values
- mixing units in the same chart

Tip:
If your data requires explanation to understand, the figure will not be clear. Simplify the data before visualizing it.

3.2 Choosing the Correct Chart Type

Selecting the right chart type is essential for scientific clarity.

Use line charts for:

- time-series data
- repeated measurements
- longitudinal follow-up

Use bar charts for:

- categorical comparisons
- group means
- proportions

Use scatter plots for:

- correlations
- dose–response relationships
- individual patient data

Use box plots for:

- distributions
- medians and IQR
- comparing variability

Avoid:

- 3D charts
- pie charts (almost always misleading)
- stacked bar charts (unless absolutely necessary)

The goal is clarity, not decoration.

Tip: If your chart uses error bars, always state in the figure legend whether they represent SD, SEM, or 95% CI. Unlabeled error bars are one of the most common reviewer queries and can stall a manuscript at revision.

3.3 Removing Excel's Default "Chart Junk"

Excel adds unnecessary elements that reduce scientific clarity. Remove these immediately:

Delete:

- background shading
- gridlines
- chart borders
- legend (if labels are directly on lines/bars)
- unnecessary decimal places
- bold or oversized fonts

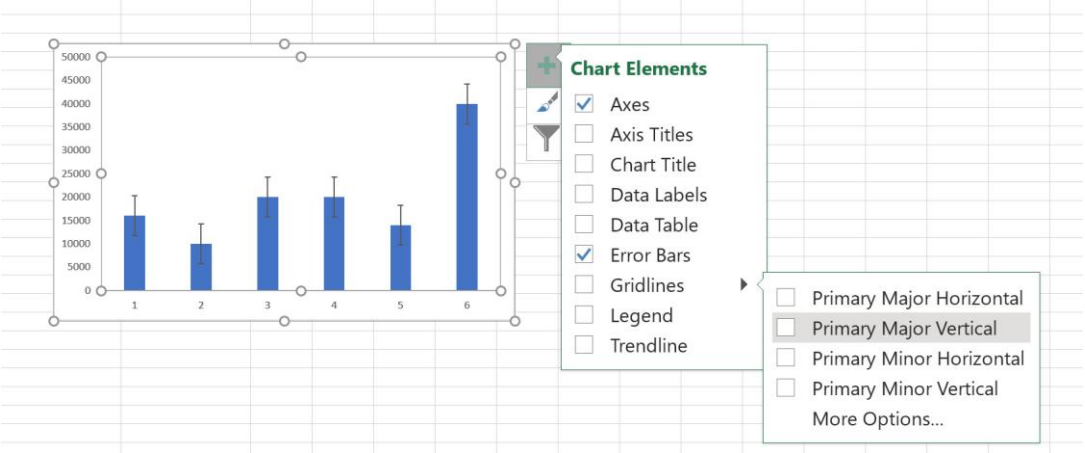
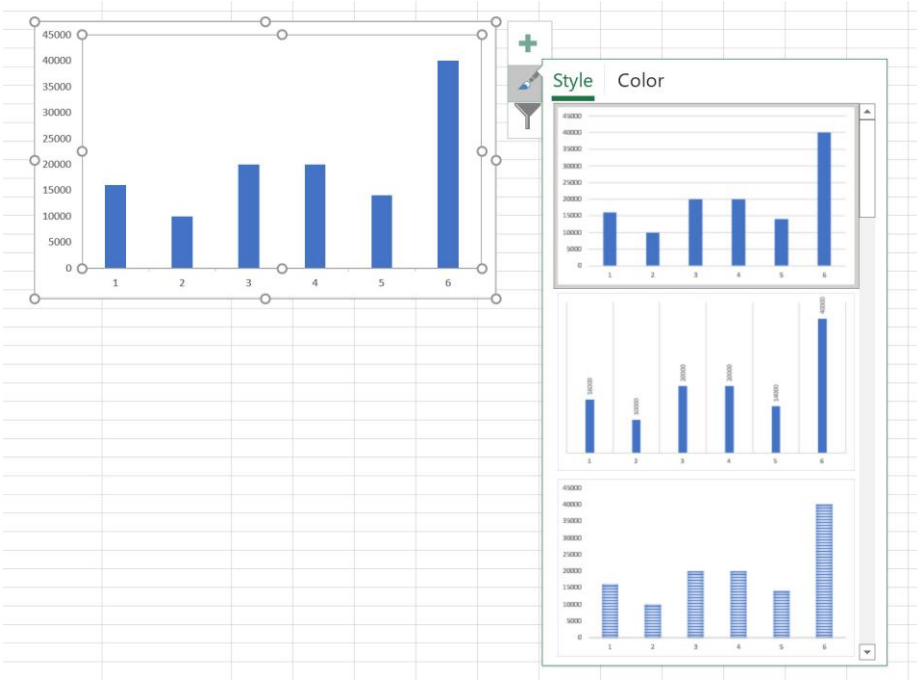


Chart Elements
Axes
Axis Titles
Chart Title
Data Labels
Data Table
Error Bars
Gridlines
Legend
Trendline
Primary Major Horizontal
Primary Major Vertical
Primary Minor Horizontal
Primary Minor Vertical
More Options...


Style
Color

Adjust:

- axis labels → use font size 8–10 pt
- tick labels → 7–9 pt
- line thickness → 1.25–1.5 pt
- marker size → 4–6 pt

Why this matters:
Reviewers often reject figures that look like “raw Excel output.” Cleaning the chart before importing it into PowerPoint saves time and improves professionalism.

3.4 Copying Charts into PowerPoint (Paste Special → EMF)

This is the most important technical step in the entire workflow.

Never copy-paste normally.
Normal pasting creates a bitmap image that becomes blurry when resized.

Instead:
Copy the chart in Excel

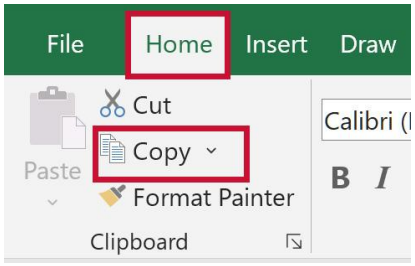
In PowerPoint, use:
Home → Paste → Paste Special → Picture (Enhanced Metafile)

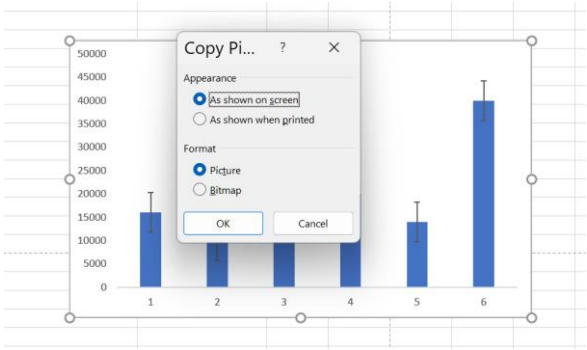
Fallback method — use only if EMF does not appear in **Paste Special.** Then **Copy as Picture** in Excel to force a vector-compatible export.

1. **In Excel,** click the *outer edge* of the chart to select the whole chart.
2. Go to **Home → Copy → Copy as Picture…**
3. In the dialog:
    - **Appearance:** As shown on screen
    - **Format:** Picture (or Vector/Metafile if available)
4. Click **OK.**
5. Go to **PowerPoint.**
6. Press **Ctrl + Alt + V** to open **Paste Special.**
7. Choose **Picture (Enhanced Metafile).**
8. Right click → **Group → Ungroup.**
9. Click **OK** when PowerPoint asks to convert it to a drawing object.

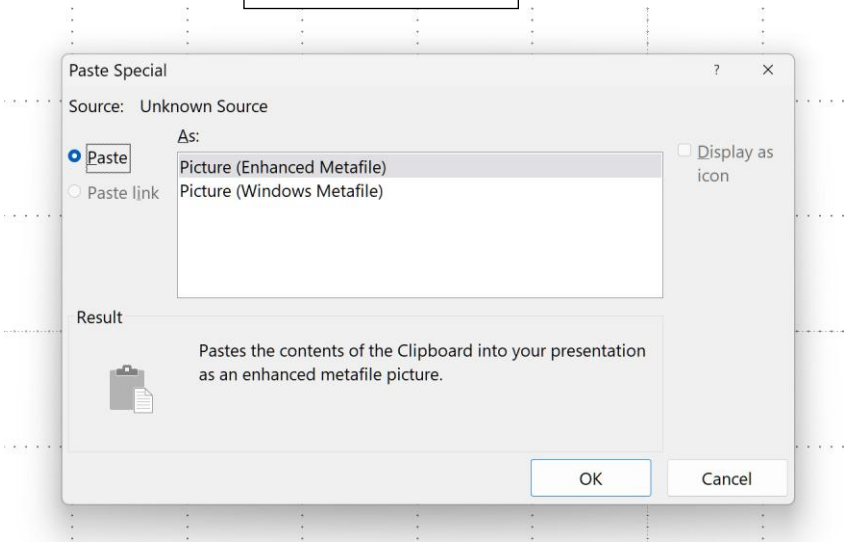
This gives you a **true EMF** that can be ungrouped into editable vector **shapes.**

EXCEL





PowerPoint



Why EMF?

- It is a vector format
- It scales without losing quality
- It allows full editing in PowerPoint
- It preserves line sharpness and text clarity

This is the gold standard for transferring charts.

Now every element is editable:

- lines
- markers
- axis labels
- tick marks
- legends
- backgrounds

Important:
Delete the invisible bounding box that appears after ungrouping. It interferes with alignment.

Why this step matters:
This is how you achieve:

- consistent colors
- consistent line weights
- consistent fonts
- perfect alignment across panels

This is the step that transforms a basic Excel chart into a publication-ready figure.

4. Editing Charts in PowerPoint

Once your chart has been imported as an EMF and converted to editable shapes, PowerPoint becomes your “figure studio.” This is where you refine every visual element — line thickness, marker size, colors, labels, and spacing — to meet journal standards. Small adjustments here dramatically improve clarity and professionalism.

4.1 Adjusting Line Thickness

Line thickness must be consistent across all panels in a figure. Inconsistent line weights are one of the first things reviewers notice.

Recommended line weights:

- **1.25–1.5 pt** for line charts
- **1.0–1.25 pt** for axes
- **0.75–1.0 pt** for tick marks

To adjust:

1. Select the line
2. Format Shape → Line → Weight
3. Apply the same weight to all lines in the figure

Tip:
Avoid very thin lines (<0.75 pt). They disappear when printed.

4.2 Adjusting Marker Size

Markers should be visible but not overwhelming.

Recommended marker sizes:

- **4–6 pt** for most datasets
- **6–8 pt** for small sample sizes
- **3–4 pt** for dense scatter plots

Avoid:

- oversized markers
- inconsistent marker sizes across groups
- mixing too many marker shapes

Consistency is more important than creativity.

4.3 Setting Consistent Colors

Color consistency across panels is essential for scientific clarity.

Recommended color palette (color-blind-safe):

- Blue (#0072B2)
- Vermillion (#D55E00)
- Sky Blue (#56B4E9)
- Bluish Green (#009E73)
- Orange (#E69F00)

Rules:

- Use the same color for the same group across all panels
- Avoid red-green combinations
- Avoid gradients and shadows
- Use solid colors only

Tip:
If your figure will be printed in grayscale, test it by converting the slide to grayscale (View → Color/Grayscale).

4.4 Removing Unnecessary Borders

Borders add visual noise and reduce clarity.

Remove borders from:

- chart area
- plot area
- legend boxes
- image panels
- shapes used for layout

Keep borders only when:

- separating microscopy images
- defining panel boundaries
- creating scale bars

Minimalism improves readability.

4.5 Adjusting Axis Labels and Tick Marks

Axis labels must be readable after resizing.

Recommended sizes:

- Axis labels: **8–10 pt**
- Tick labels: **7–9 pt**

Adjustments to make:

- Remove unnecessary decimal places
- Use consistent units
- Ensure tick spacing is logical
- Avoid diagonal or vertical text unless necessary

Tip:
If axis labels look crowded, reduce the number of ticks rather than reducing font size.

4.6 Ensuring Consistent Font Sizes Across Panels

In multi-panel figures, inconsistent font sizes are a common reason for revision requests.

Set all fonts to:

- **8–10 pt** for labels
- **7–9 pt** for ticks
- **12–14 pt** for panel labels (**A, B, C**)

To ensure consistency:

1. Select all text elements
2. Set the font and size in one action
3. Use the Format Painter to replicate formatting

Important:

- Never mix fonts within a figure.
- Arial, Helvetica, or Calibri are safest.

5. Creating Multi-Panel Figures

Multi-panel figures allow you to present related results in a single, coherent visual story. Journals expect these figures to be clean, symmetrical, and easy to interpret. PowerPoint is ideal for this because it provides precise alignment tools and a flexible workspace.

This section teaches you how to design professional multi-panel layouts that meet international publication standards.

5.1 Deciding on Panel Layout (2×2, 1×3, 3×1, etc.)

Choose a layout that supports the scientific message.

Common layouts:

- **1×2** — before/after, control vs treatment
- **1×3** — dose escalation, time points
- **2×2** — four related outcomes or modalities
- **3×1** — microscopy at different magnifications
- **2×3** — complex datasets or multiple subgroups

Principles:

- Panels should follow a logical reading order (left → right, top → bottom)
- Panels should be visually balanced
- Avoid overcrowding — if it feels tight, split into two figures

A multi-panel figure should feel like a single story, not a collage.

5.2 Using Alignment Tools (Mandatory)

Perfect alignment is the hallmark of a professional figure.

Use:

- **Align Left**
- **Align Center**
- **Align Top**
- **Distribute Horizontally**
- **Distribute Vertically**

Workflow:

1. Select all panels
2. Align them to the top or left
3. Use “Distribute” to create equal spacing
4. Group panels once alignment is perfect

Tip:
Never align panels manually by eye. Reviewers notice misalignment immediately.

5.3 Creating Panel Labels (A, B, C, D)

Panel labels are mandatory in almost all journals.

Rules:

- Use **A, B, C, D** (uppercase)
- Place in the **upper-left corner** of each panel
- Use **bold**, **12–14 pt**
- Use a simple font (Arial, Helvetica, Calibri)
- Keep labels outside the data area

Avoid:

- placing labels inside the chart
- using lowercase letters
- using decorative fonts
- inconsistent label positions

Tip:
Create one label, format it perfectly, then copy-paste it to all panels.

5.4 Ensuring Equal Spacing Between Panels

Uneven spacing is one of the most common reasons figures look unprofessional.

To ensure equal spacing:

1. Select all panels
2. Use **Align → Distribute Horizontally** or **Distribute Vertically**
3. Use guides to check spacing visually
4. Avoid manual dragging

Recommended spacing:

- **0.3–0.5 cm** between panels
- **0.5–1.0 cm** between rows

Tip:
If spacing looks uneven, check for invisible bounding boxes left behind after ungrouping EMF files.

5.5 Grouping and Locking Elements

Once your layout is perfect, protect it.

Group elements when:

- a panel contains multiple shapes
- you have aligned several charts
- you have added annotations

To group: Select all elements → **Group**

Why grouping matters:

- prevents accidental movement
- keeps spacing intact
- simplifies exporting
- ensures consistent resizing

Locking (optional): PowerPoint does not have a native “lock” feature, but grouping acts as a functional lock.

Tip:
Group panels only after all edits are complete.

6. Adding Images (Microscopy, Radiology, Clinical Photos)

Images are central to biomedical research. Whether you are presenting microscopy, radiology, pathology, or clinical photographs, journals expect images to be high-resolution, ethically edited, and scientifically honest. PowerPoint provides a controlled environment for arranging and annotating images without altering the underlying data.

This section teaches you how to import, crop, adjust, and annotate images while maintaining scientific integrity.

6.1 Importing High-Resolution Images

Always start with the highest-quality version of the image.

Recommended minimum resolutions:

- **Microscopy:** 300–600 dpi
- **Radiology:** original DICOM exported as PNG/TIFF
- **Clinical photos:** 300 dpi
- **Pathology slides:** whole-slide images exported at high resolution

Avoid:

- screenshots
- JPEGs downloaded from PACS
- images copied from Word or PowerPoint
- compressed email attachments

Importing correctly:

1. Insert → Pictures → This Device
2. Select the original high-resolution file
3. Avoid dragging images directly from a browser or email

Tip:
If the image looks blurry when zoomed in, it is not suitable for publication.

Clinical Photographs and Radiology

- **Clinical photographs:** Ensure written patient consent for publication is obtained and documented *before* any cropping, anonymization, or editing. Retain consent documentation per ICMJE requirements.
- **Radiology images:** Export from PACS as original DICOM or high-resolution PNG. Never use screenshots from PACS viewers — these are low-resolution and may contain on-screen annotations or metadata overlays.
- **Pathology slides:** Use whole-slide image exports at maximum resolution. Downsample only after all annotations and scale bars are added.

6.2 Cropping Without Distortion

Cropping should improve clarity, not misrepresent the data.

Rules for cropping:

- Maintain the original aspect ratio
- Avoid stretching or squeezing
- Crop only to remove irrelevant background
- Keep scale bars visible
- Avoid cropping too tightly around lesions or cells

To crop safely:

1. Select the image
2. Picture Format → Crop
3. Adjust the frame, not the image itself

Tip:
If you accidentally distort the image, reset it using “Reset Picture.”

6.3 Adjusting Brightness/Contrast Safely

Journals allow *global* adjustments but prohibit *selective* editing.

Allowed:

- global brightness
- global contrast
- global color balance
- global sharpening

Not allowed:

- altering only part of the image
- removing artefacts
- adding or removing features
- smoothing or blurring specific regions

Best practice:

- Apply minimal adjustments
- Keep a copy of the original image
- Document any adjustments in the Methods section

Tip:
If an adjustment changes the scientific interpretation, it is unethical.

6.4 Adding Scale Bars

Scale bars are mandatory for microscopy and often required for radiology.

Rules for scale bars:

- Use a simple rectangle (no outline)
- Place in a corner with minimal obstruction
- Use a contrasting color (white or black)
- Label clearly (e.g., “50 μm”)
- Keep consistent size across panels

To create a scale bar:

1. Insert → Shapes → Rectangle
2. Calculate the bar’s true length from the image’s known scale (pixels- or micrometers-per-unit, taken from the acquisition software or microscope calibration) — never estimate this by eye

3. Draw the bar to that exact physical length using PowerPoint's ruler and guides; set line/bar thickness to **1.0–1.5 pt** for visibility
4. Add a text label below or beside it

Tip:
Never resize the image after adding the scale bar — it becomes inaccurate.

6.5 Avoiding Over-Editing (Ethics and Journal Rules)

Image manipulation is a major reason for manuscript rejection.

Prohibited practices:

- removing blemishes or artefacts
- altering colors to exaggerate differences
- cloning or duplicating structures
- selective enhancement of regions
- smoothing noise in only part of the image

Allowed practices:

- cropping
- global brightness/contrast
- global color balance
- adding arrows or labels
- adding scale bars

Ethical rule:
If an edit changes the scientific meaning, it is misconduct.

Patient consent:
For any identifiable clinical photograph, obtain and retain written patient consent for publication, per ICMJE requirements — even when the face or identifying features have been cropped or obscured.

Tip:
When in doubt, keep the image as close to the original as possible.

7. Adding Annotations and Callouts

Annotations help readers understand what to focus on — but only when used sparingly and consistently. PowerPoint provides excellent tools for adding arrows, circles, highlights, and text labels without obscuring the underlying data. This section teaches you how to annotate figures clearly, ethically, and professionally.

7.1 Arrows, Circles, and Highlights

Annotations should guide the reader’s eye, not dominate the figure.

Arrows

Use arrows to indicate:

- lesions
- regions of interest
- direction of movement
- specific data points

Recommended arrow style:

- Solid line
- Weight: **1.0–1.5 pt**
- Arrowhead: simple, filled
- Color: white or black (depending on background)

Avoid decorative arrows or thick, cartoon-like styles.

Circles and Ellipses

Use circles to highlight:

- cells
- nodules
- focal abnormalities

Rules:

- Use **No Fill**
- Use a thin outline (**1.0–1.25 pt**)
- Avoid bright colors
- Avoid covering important structures

Highlights

Use semi-transparent shapes to draw attention without obscuring data.

Recommended:

- Rectangle or oval
- Fill: **20–30% transparency**
- Color: yellow or light blue
- No outline

Tip:
If the annotation draws more attention than the data, it is too strong.

7.2 Using Semi-Transparent Overlays

Semi-transparent overlays are useful for:

- grouping related regions
- highlighting areas in pathology slides
- showing zones of interest in radiology

How to create:

1. Insert → Shapes → Rectangle
2. Fill → choose color
3. Transparency → set to **20–40%**
4. No outline

Rules:

- Never hide underlying data
- Keep overlays subtle
- Use the same transparency level across all panels

Tip:
If the overlay changes the interpretation of the image, remove it.

7.3 Ensuring Annotations Do Not Obscure Data

Annotations must never interfere with scientific interpretation.

Avoid placing annotations over:

- lesions
- cell boundaries
- radiological findings
- data points
- axes or tick labels

Best practice:

- Place arrows *near* the feature, not on top of it
- Use curved arrows if needed
- Move labels outside the data area
- Use callout lines to connect labels to features

Tip:
Zoom in to 200–300% to check for accidental overlap.

7.4 Color-Blind-Safe Annotation Choices

Annotations must remain visible to all readers, including those with color-vision deficiencies.

Recommended colors:

- White
- Black
- Blue (#0072B2)
- Orange (#E69F00)

Avoid:

- red-green combinations
- neon colors
- low-contrast colors on microscopy images

Tip:
Test your figure in grayscale (View → Color/Grayscale).
If the annotation disappears, change the color. For a more direct check, run the exported figure through a free color-vision-deficiency simulator such as Coblis or Color Oracle before submission.

8. Finalizing the Figure

Before exporting your figure, perform a systematic final check. Journals expect figures to be clean, consistent, and visually balanced. Even small inconsistencies — misaligned panels, uneven spacing, mismatched fonts — can make a figure look unprofessional and may lead to revision requests. (If you just want the condensed checklist without the explanations below, jump to the Quick Reference Sheet in Section 11.)

This section provides a step-by-step checklist to ensure your figure is polished and ready for submission.

8.1 Checking Alignment and Spacing

Perfect alignment is one of the strongest indicators of a professionally prepared figure.

Checklist:

- All panels align perfectly along the top or left edge
- Horizontal spacing between panels is equal
- Vertical spacing between rows is equal

- Panel labels (A, B, C) align consistently across the figure
- No panel is slightly higher or lower than the others

Tools to use:

- Align Left / Align Top
- Distribute Horizontally / Distribute Vertically
- Guides and Gridlines

Tip:
Zoom in to 200–300% to check for subtle misalignment.

8.2 Ensuring Consistent Font Sizes

Inconsistent font sizes are one of the most common reasons figures look amateurish.

Recommended sizes:

- Axis labels: **8–10 pt**
- Tick labels: **7–9 pt**
- Panel labels: **12–14 pt**, bold
- Annotation text: **8–10 pt**

Checklist:

- All axis labels use the same size
- All tick labels use the same size
- All panel labels use the same size and position
- No text is accidentally resized during editing

Tip:
Select all text elements at once and set the font size in a single action.

8.3 Ensuring Consistent Line Weights

Line weights must be uniform across all panels.

Recommended weights:

- Data lines: **1.25–1.5 pt**
- Axes: **1.0–1.25 pt**
- Tick marks: **0.75–1.0 pt**
- Scale bars: **1.0–1.25 pt**

Checklist:

- All lines in multi-panel figures match
- No panel has thicker or thinner axes
- No marker outlines are inconsistent

Tip:
Use Format Painter to replicate line formatting across panels.

8.4 Checking Color Contrast

Figures must remain readable in print, grayscale, and for color-blind readers.

Checklist:

- Colors are consistent across panels
- No red-green combinations
- Annotations remain visible in grayscale
- Backgrounds do not reduce contrast
- Overlays are subtle and do not obscure data

Tip:
Test your figure in grayscale (View → Color/Grayscale).
If something disappears, adjust the color.

8.5 Figure Numbering and Author Identification (Optional — check target journal)

Some journals (particularly in certain Asian markets or institutional repositories) request figure numbering and first-author identification **in the figure file itself** for internal tracking. However, most international biomedical journals **do not** want author names embedded in figure files — these are added during typesetting by the publisher.
Before adding: Check your target journal's Instructions for Authors. If in doubt, **omit author names from figure files** and rely on the manuscript submission system's metadata.
If your target journal *does* require it:

- Use 12–14 pt, same font as the rest of the figure
- Place above the figure
- Format: *Figure 2. Ito A, et al.*
- If two authors, include both names in the order they appear on the manuscript title page

8.6 Adding Panel Labels (Mandatory)

Panel labels (A, B, C, D) are required by almost all journals.

Checklist:

- Upper-left corner of each panel

- Bold, **12–14 pt**
- Same font across all panels
- Same distance from the top and left edges
- Not overlapping data or images

Tip:
Create one perfect label, then duplicate it for all panels.

9. Exporting the Figure

Exporting is the final and most delicate step in figure preparation. Journals require high-resolution, non-compressed images that preserve clarity in both online and print formats. PowerPoint can produce excellent outputs — but only when exported correctly.

This section explains how to export figures as **PNG**, **TIFF**, and **PDF**, and how to ensure the correct resolution (300–600 dpi) without losing quality.

9.1 Exporting as PNG (High Resolution)

PNG is ideal for:

- clinical photos
- microscopy images
- radiology images
- mixed-content figures (charts + images)

To export:

1. File → Save As
2. Choose **PNG**
3. When prompted, select **High Resolution**

Advantages:

- lossless compression
- excellent for images
- widely accepted by journals

Limitations:

- not ideal for line art (can appear slightly soft)

Tip:
Use PNG for figures containing photographs or microscopy.

9.2 Exporting as TIFF (Journal-Ready)

TIFF is the gold standard for most journals, especially for print.

To export:

1. File → Save As
2. Choose **TIFF**
3. Select **High Resolution**

Advantages:

- lossless
- ideal for print
- required by many journals

Limitations:

- larger file size
- not always necessary for online-only journals

Tip:
Use TIFF for figures with fine details or when the journal explicitly requires it.

9.3 Exporting as PDF (Vector-Safe)

PDF preserves vector elements such as:

- line charts
- scatter plots
- axis labels
- annotations

To export:

1. File → Save As
2. Choose **PDF**
3. Ensure “High Quality Printing” is selected

Advantages:

- perfect for line art
- text remains crisp
- scalable without loss of quality

Limitations:

- some journals do not accept PDF figures
- embedded images remain raster

Tip:
Use PDF when the figure is mostly charts and text.

9.4 Checking Resolution (300–600 dpi)

Most journals require:

- **300 dpi** for photos
- **600 dpi** for line art
- **1200 dpi** for black-and-white line drawings

To ensure correct resolution:

- Set slide size *before* designing the figure
- Export using High Resolution
- Avoid resizing exported images

Tip:
If the exported figure looks blurry when zoomed to 200%, the resolution is too low.

9.5 Avoiding Compression Artefacts

Compression artefacts occur when:

- exporting as JPEG
- resizing images after export
- copying figures into Word before submission
- using screenshots

Avoid JPEG entirely.
JPEG introduces irreversible compression and is unsuitable for scientific figures.

Checklist to avoid artefacts:

- Export directly from PowerPoint
- Use PNG, TIFF, or PDF
- Do not compress images in PowerPoint
- Do not email figures through apps that compress attachments

Tip:
Always upload the original exported file to the journal submission system.

Tip: Many journals also cap individual figure file size (commonly 10–20 MB). High-resolution TIFF exports can exceed this quickly, so check the Instructions for Authors before final upload.

10. Common Mistakes to Avoid

Even well-designed figures can fail if they contain avoidable errors. Journals and reviewers are quick to notice inconsistencies, poor formatting, or technical flaws. This section highlights the most frequent mistakes made and how to avoid them.

10.1 Using Screenshots Instead of Real Charts

Screenshots produce:

- blurry text
- pixelated lines
- inconsistent scaling

Always use EMF (Enhanced Metafile) imports, not screenshots.

10.2 Using Excel Defaults (“Chart Junk”)

Excel’s default settings include:

- grey backgrounds
- thick borders
- unnecessary gridlines
- oversized markers
- inconsistent colors

These make figures look unprofessional.

Always clean the chart before importing it into PowerPoint.

10.3 Inconsistent Font Sizes

Nothing reveals inexperience faster than:

- axis labels in different sizes
- tick labels mismatched across panels
- panel labels (A, B, C) in inconsistent positions

Set all fonts at the end using a single selection.

10.4 Inconsistent Colors Across Panels

If “Group A” is blue in Panel A but green in Panel B, reviewers will notice.

Use the same color palette across the entire figure.

10.5 Misaligned Panels

Misalignment makes a figure look rushed.

Common causes:

- invisible bounding boxes
- manual dragging
- inconsistent spacing

Use Align and Distribute tools — never align by eye.

10.6 Over-Edited Clinical or Microscopy Images

Unethical or excessive editing includes:

- selective brightening
- removing artefacts
- altering colors
- smoothing noise in only part of the image

Only global adjustments are allowed.

10.7 Low-Resolution Exports

Low-resolution figures:

- appear blurry
- fail journal checks
- require resubmission

Always export at 300–600 dpi using PNG, TIFF, or PDF.

10.8 Using JPEG for Line Art

JPEG introduces compression artefacts that destroy:

- thin lines
- text clarity
- scatter plot markers

Never use JPEG for scientific figures.

10.9 Overcrowded Figures

Trying to fit too much into one figure leads to:

- unreadable text
- cramped panels
- reviewer frustration

If it feels crowded, split it into two figures.

10.10 Inconsistent Line Weights

Line thickness must match across:

- axes
- data lines
- tick marks
- annotations

Set line weights manually after ungrouping EMF files.

10.11 The Law of Diminishing Returns in Figure Preparation

A figure can always be improved. But at some point, further refinement consumes time that would be better spent strengthening your Discussion or responding to reviewer comments.

Signs you have reached "good enough":

- All checklist items in Section 11 are satisfied
- The figure communicates one clear idea
- A colleague can interpret it without reading the caption
- It meets your target journal's stated requirements

Signs you are over-editing:

- You have changed the color palette three times
- You are adjusting spacing by pixels
- You are adding decorative elements "to make it look nicer"

Remember: reviewers judge figures on clarity and accuracy, not aesthetic perfection.

11. Quick Reference Sheet

Word-Medex has prepared a one-page PDF file of a condensed, one-page fully formatted checklist with checkboxes for rapid pre-submission verification of figures. Print and keep at your desk, Download here

Resources

Color-Blind Simulators:

- Coblis (Color Blindness Simulator): coblis.com
- Color Oracle: colororacle.org

Journal Guidelines:

- ICMJE Recommendations: icmje.org
- Council of Science Editors: councilscienceeditors.org
- CONSORT Statement: consort-statement.org
- STROBE Statement: strobe-statement.org
- PRISMA Statement: prisma-statement.org

PowerPoint Tutorials:

- Microsoft Support: support.microsoft.com

Word-Medex Services:

- Pre-submission manuscript audit: Manuscript Auditing

- Diagnostic Audit (2-page rejection risk report): Manuscript Diagnostic Audit