Figures and tables

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Figures and tables (display items) are often the quickest way to **communicate large amounts of complex information** that would be complicated to explain in text.

Many readers will only look at your display items without reading the main text of your manuscript. Therefore, ensure your display items can stand alone from the text and communicate clearly your most significant results.

Display items are also important for **attracting readers** to your work. Well designed and attractive display items will hold the interest of readers, compel them to take time to understand a figure and can even entice them to read your full manuscript.

Finally, high-quality display items give your work a **professional appearance**. Readers will assume that a professional-looking manuscript contains good quality science. Thus readers may be more likely to trust your results and your interpretation of those results.

When deciding which of your results to present as display items consider the following questions:

- Are there any data that readers might rather see as a display item rather than text?
- Do your figures supplement the text and not just repeat what you have already stated?
- Have you put data into a table that could easily be explained in the text such as simple statistics or p values?

Tables

Tables are a concise and effective way to present large amounts of data. You should design them carefully so that you clearly communicate your results to busy researchers.

The following is an example of a well-designed table:

- Clear and concise legend/caption
- Data divided into categories for clarity
- Sufficient spacing between columns and rows
- Units are provided
- Font type and size are legible

Table 2 Ecological footprint ledger of the energy resources in Zhifanggou watershed before and after grain for green policy

	Energy	Total consumption (t)	Convert coefficient (GJ t^{-1})	Consumption per capita (GJ cap^{-1})	Global average (GJ hm^{-2})	Ecological footprint per capita (hm^2 cap^{-1})	Biological productivity area
Before grain for green policy	Coal	0.250	20.934	0.010	55	0.0002	Energy land
	Petrol	2.050	43.124	0.169	93	0.0018	Energy land
	Diesel	9.230	42.705	0.753	93	0.0081	Energy land
	Electricity	0.002	0.004	12.000	1000	0.0120	Built-up land
After grain for green policy	Coal	0.246	20.934	0.010	55	0.0002	Energy land
	Petrol	2.705	43.124	0.227	93	0.0024	Energy land
	Diesel	7.740	42.705	0.643	93	0.0069	Energy land
	Electricity	0.002[a]	0.004[b]	12.000	1000	0.0120	Built-up land

The conversion of electricity referenced the related standard of energy conversion. 1 wh = 3,600 J

[a] The unit was kWh

[b] The unit was GJ/kWh

Source: Environmental Earth Sciences (2009) 59:529–536

Figures

Figures are ideal for presenting:

- Images
- Data plots
- Maps
- Schematics

Just like tables all figures need to have a clear and concise legend caption to accompany them.

Images

Images help readers visualize the information you are trying to convey. Often, it is difficult to be sufficiently descriptive using words. Images can help in achieving the accuracy needed for a scientific manuscript. For example, it may not be enough to say, “The surface had nanometer scale features.” In this case, it would be ideal to provide a microscope image.

For images, be sure to:

- Include scale bars
- Consider labeling important items
- Indicate the meaning of different colours and symbols used

Data plots

Data plots convey large quantities of data quickly. The goal is often to show a functional or statistical relationship between two or more items. However, details about the individual data points are often omitted to place emphasis on the relationship that is

shown by the collection of points. Here, we have examples of figures combining images and a plots in multiple panels.

For data plots, be sure to:

- Label all axes
- Specify units for quantities
- Label all curves and data sets
- Use a legible font size

Source: Nano Research (2010) 3:843–851

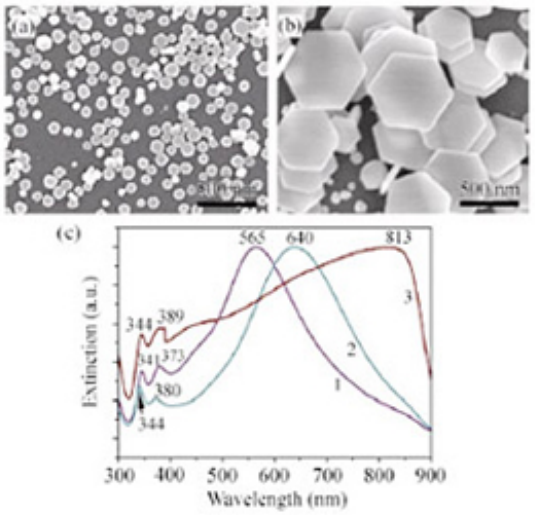

Figure 2 FESEM images of Ag HNPs with different edge lengths: (a) 40 nm; (b) 60–350 nm; (c) UV–vis spectra of Ag HNPs where curves 1, 2, and 3 correspond to nanoplates with edge lengths of 40, 60 and 60–350 nm

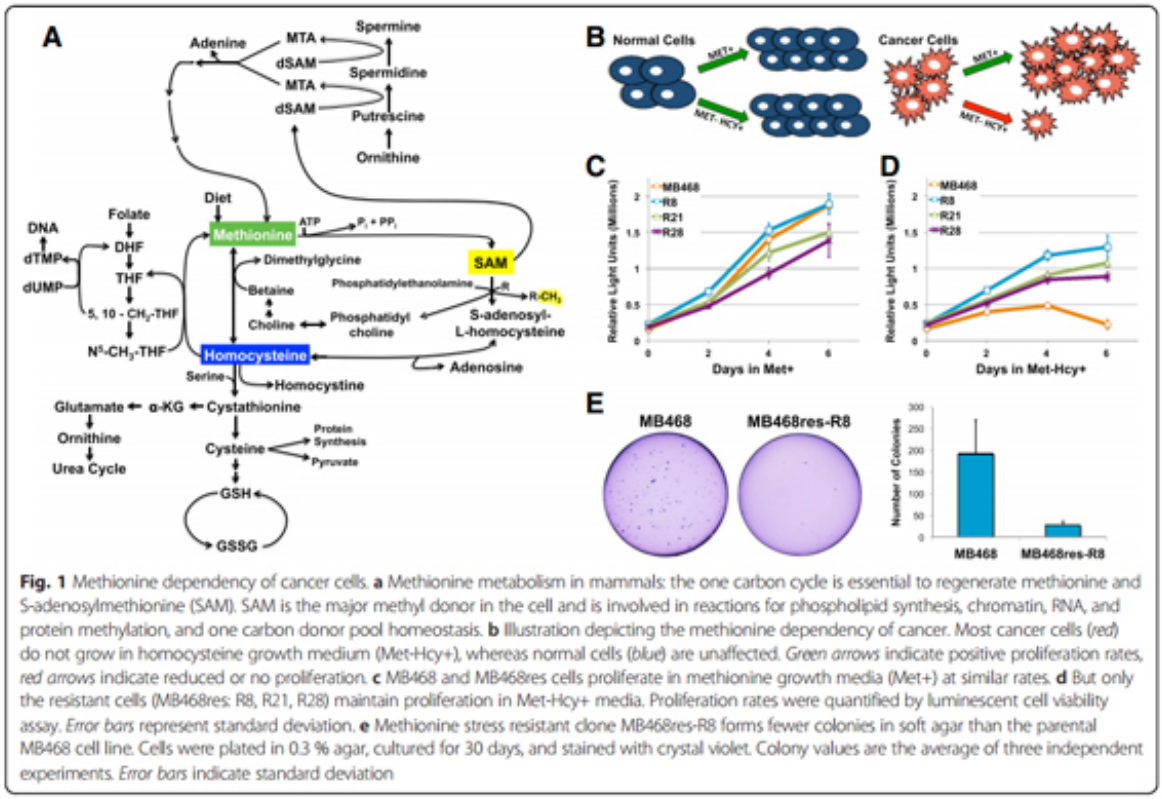

Fig. 1 Methionine dependency of cancer cells. **a** Methionine metabolism in mammals: the one carbon cycle is essential to regenerate methionine and S-adenosylmethionine (SAM). SAM is the major methyl donor in the cell and is involved in reactions for phospholipid synthesis, chromatin, RNA, and protein methylation, and one carbon donor pool homeostasis. **b** Illustration depicting the methionine dependency of cancer. Most cancer cells (*red*) do not grow in homocysteine growth medium (Met-Hcy+), whereas normal cells (*blue*) are unaffected. *Green arrows* indicate positive proliferation rates, *red arrows* indicate reduced or no proliferation. **c** MB468 and MB468res cells proliferate in methionine growth media (Met+) at similar rates. **d** But only the resistant cells (MB468res: R8, R21, R28) maintain proliferation in Met-Hcy+ media. Proliferation rates were quantified by luminescent cell viability assay. *Error bars* represent standard deviation. **e** Methionine stress resistant clone MB468res-R8 forms fewer colonies in soft agar than the parental MB468 cell line. Cells were plated in 0.3 % agar, cultured for 30 days, and stained with crystal violet. Colony values are the average of three independent experiments. *Error bars* indicate standard deviation

Source: Borrego et al. Cancer & Metabolism 2016 4:9

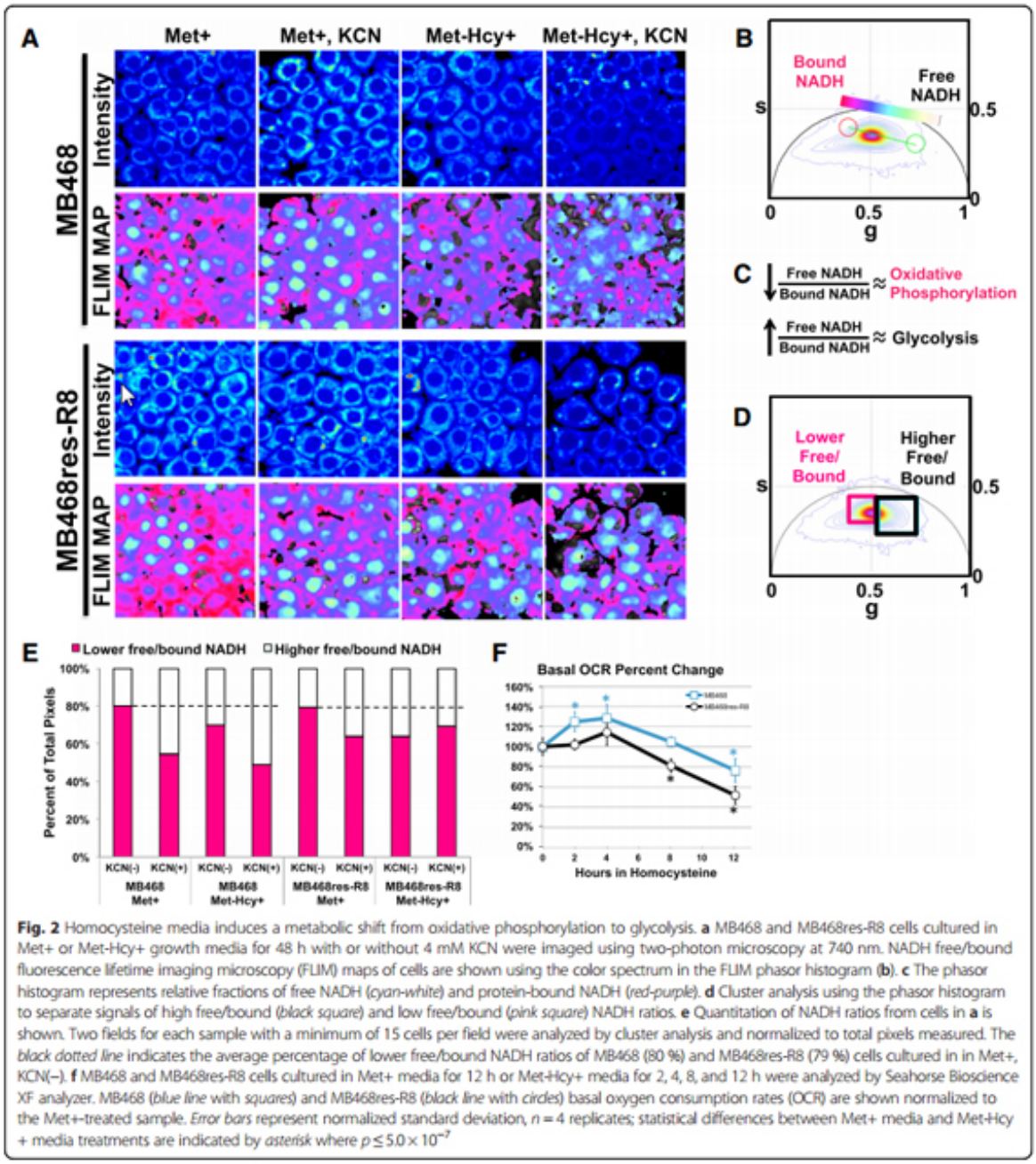

Fig. 2 Homocysteine media induces a metabolic shift from oxidative phosphorylation to glycolysis. **a** MB468 and MB468res-R8 cells cultured in Met+ or Met-Hcy+ growth media for 48 h with or without 4 mM KCN were imaged using two-photon microscopy at 740 nm. NADH free/bound fluorescence lifetime imaging microscopy (FLIM) maps of cells are shown using the color spectrum in the FLIM phasor histogram (**b**). **c** The phasor histogram represents relative fractions of free NADH (*cyan-white*) and protein-bound NADH (*red-purple*). **d** Cluster analysis using the phasor histogram to separate signals of high free/bound (*black square*) and low free/bound (*pink square*) NADH ratios. **e** Quantitation of NADH ratios from cells in **a** is shown. Two fields for each sample with a minimum of 15 cells per field were analyzed by cluster analysis and normalized to total pixels measured. The *black dotted line* indicates the average percentage of lower free/bound NADH ratios of MB468 (80 %) and MB468res-R8 (79 %) cells cultured in in Met+, KCN(−). **f** MB468 and MB468res-R8 cells cultured in Met+ media for 12 h or Met-Hcy+ media for 2, 4, 8, and 12 h were analyzed by Seahorse Bioscience XF analyzer. MB468 (*blue line* with *squares*) and MB468res-R8 (*black line* with *circles*) basal oxygen consumption rates (OCR) are shown normalized to the Met+-treated sample. *Error bars* represent normalized standard deviation, $n = 4$ replicates; statistical differences between Met+ media and Met-Hcy + media treatments are indicated by *asterisk* where $p \leq 5.0 \times 10^{-7}$

Source: Borrego et al. Cancer & Metabolism 2016 4:9

Maps

Maps are important for putting field work in the context of the location where it was performed. A good map will help your reader understand how the site affects your study. Moreover, it will help other researchers reproduce your work or find other locations with similar properties. Here, we have a map used in a study about salmon.

For maps, be sure to:

- Include latitude and longitude
- Include scale bars
- Label important items

- Consider adding a map legend

Source: Environmental Biology of Fishes (2011) DOI: 10.1007/s10641-011-9783-5

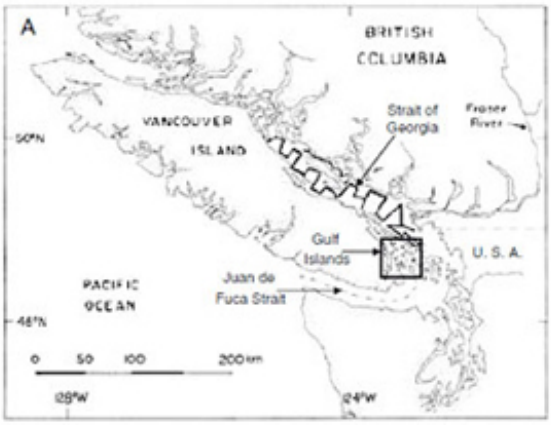

Fig. 1 Standard track lines (*solid lines*) for trawl surveys in the Strait of Georgia. Sets were evenly spaced along the track lines. *Black box* shows location of the Gulf Islands

Schematics

Schematics help identify the key parts to a system or process. They should highlight only the key elements because adding unimportant items may clutter the image. A schematic only includes the drawings the author chooses, offering a degree of flexibility not offered by images. They can also be used in situations where it is difficult or impossible to capture an image. Below is a schematic explaining how nanotubes could be used to harvest energy from a fluid.

For schematics, be sure to:

- Label key items
- Provide complementary explanations in the caption and main text

Source: Nano Research (2011) 4:284–289

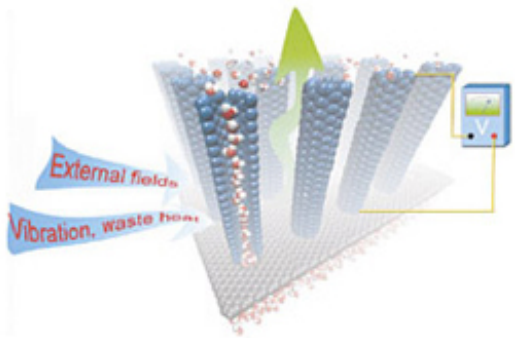

Figure 5 Schematic illustration showing energy harvesting and conversion of the pumping system. The green arrow indicates the direction of water flow through the vibrating nanotubes

TIP: it's important to consider how your figures will look in print as well as online. A resolution of 72 ppi is sufficient for online publication whilst in print 100 ppi is recommended. You can adjust the resolution of your figure within the original program you used to create it at the time you save the file.

TIP: There are two main colour models; RGB which stands for red, green, blue and CMYK or cyan, magenta, yellow and black. Most microscopes will take images using the RGB however CMYK is the standard used for printing so it is important to check that your figures will display well in this format.

Avoiding image manipulation

You should never knowingly manipulate your images to change or improve you results. To avoid inadvertent manipulation you should only minimally process your figures before submitting them to the journal, your submitted images should faithfully represent the original image files.

- Adjusting the brightness or contrast of an image, in fluorescent microscopy for example, is only acceptable if applied equally across all images including the controls
- The cropping of images in the creation of figures should be avoided unless it significantly improves the clarity of conciseness of presentation. Be sure that the cropping does not exclude any necessary information for the understanding of the figure, such as molecular markers in electrophoresis gels.
- Any adjustments or processing software used should be stated.

TIP: keep copies of the original images, files and metadata used to create your figures as these can be requested by the journal during the review process.