Preparing your figures for…

Erika Aquino (British Society for Immunology, UK)

Taking your data and creating a figure to illustrate your findings is a key part of scientific research dissemination; images can convey complex ideas far more easily than language. But when putting your figures together, you should consider the audience you are preparing your images for – here we outline how you can prepare your figures to best address their individual needs.

Preparing informative infographics to engage with the public about the importance of vaccines

Addressing vaccine concerns and questions

With the emergence of COVID-19, the crucial role that vaccines play in protecting our health has come into sharp focus. It's important to understand and address vaccine concerns that are leading public discussion and may contribute to hesitancy to vaccination. To tackle common vaccine questions and strengthen public understanding around vaccines, the British Society for Immunology has produced a series of infographics to explore different aspects in more detail. Our aim is to provide reliable, evidence-based information on vaccines and immunity to everyone who needs it and help individuals make informed decisions about vaccines and their health. All our COVID-19 infographics are open access and free to download from the BSI website and we encourage sharing them with your networks and communities to help improve understanding of the importance of vaccination. We've seen this work successfully on social media with our immunologists posting and using the graphics to answer questions from the public, which have gained very positive responses.

The process

The first step is to identify your target audience, research what their questions are and how best to reach them. For example, if we want to reach a younger, diverse audience we'd share on Instagram (in the UK the largest share of users are between 25 and 34 years old) whereas Facebook reaches a wider age range. Infographics are a useful tool to convey complex information to the public on different platforms. They can also be used as a discussion point for starting important individual conversations about vaccines. You may also consider different formats, e.g., tiles on Instagram gain higher engagement but require different composition (see Figures 1–6). Next is to think about content and key messaging, ensuring the science is correct while using accessible language that avoids jargon. We start by drafting the full content with all the evidence-based immunology and researched information that we want to convey and then copy edit to reduce length while maintaining readability and accuracy. Our graphics try to explain and break

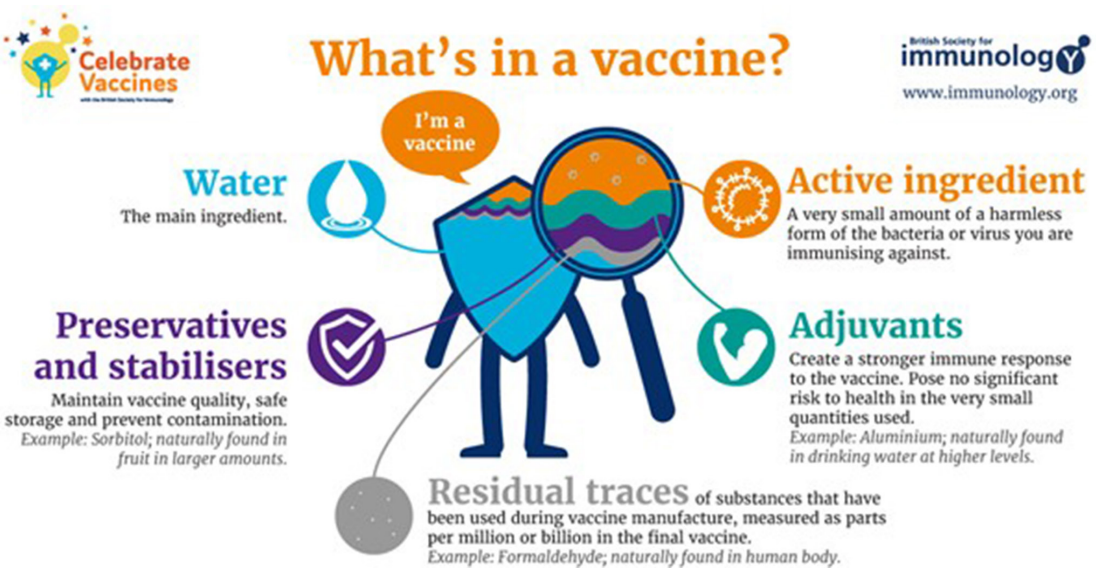

Figure 1. What's in a vaccine? Infographic explaining the different ingredients found vaccines.

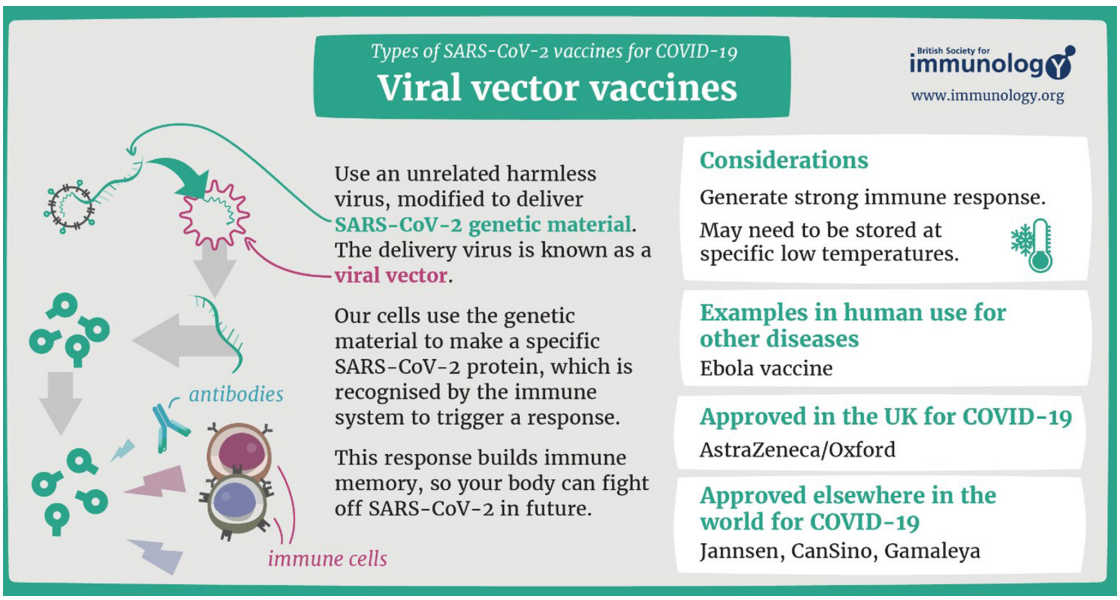

Figure 2. Viral vector vaccines: infographic explaining how viral vector vaccines for COVID-19, including the AstraZeneca/Oxford vaccine, work.

down complicated concepts using clear terminology and bite-sized information. Critically, we focus on the use of visuals to simplify the topic, using icons and graphic representations. We always consider if an image can replace a sentence or if using colour to bring ideas together can enhance understanding. Bringing text and visuals together requires experimenting with layout to ensure a final eye-catching product.

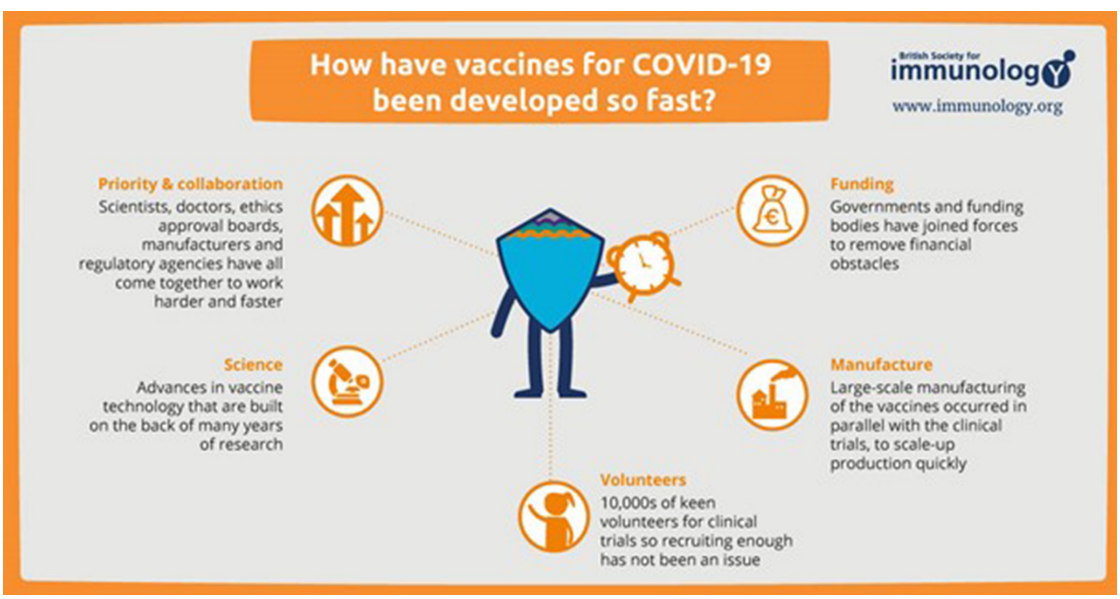

Figure 3. How have vaccines for COVID-19 been developed so fast? Infographic explaining how scientists were able to develop vaccines for COVID-19 at a much faster pace during the pandemic.

Figure 4. How have vaccines for COVID-19 been developed so fast? Instagram tiles explaining how scientists were able to develop vaccines for COVID-19 at a much faster pace during the pandemic.

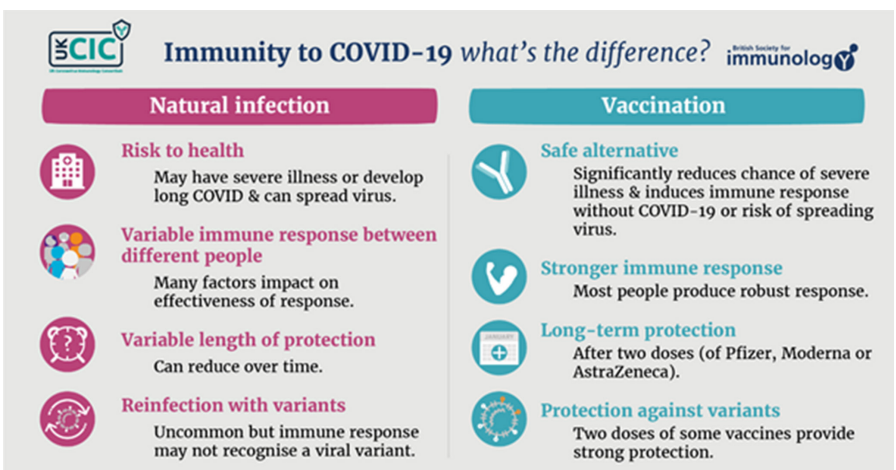

Figure 5. Title of figure: Natural infection compared to vaccination: Twitter banner explaining the difference in immunity against COVID-19 gained through natural infection with SARS-CoV-2 compared to vaccination.

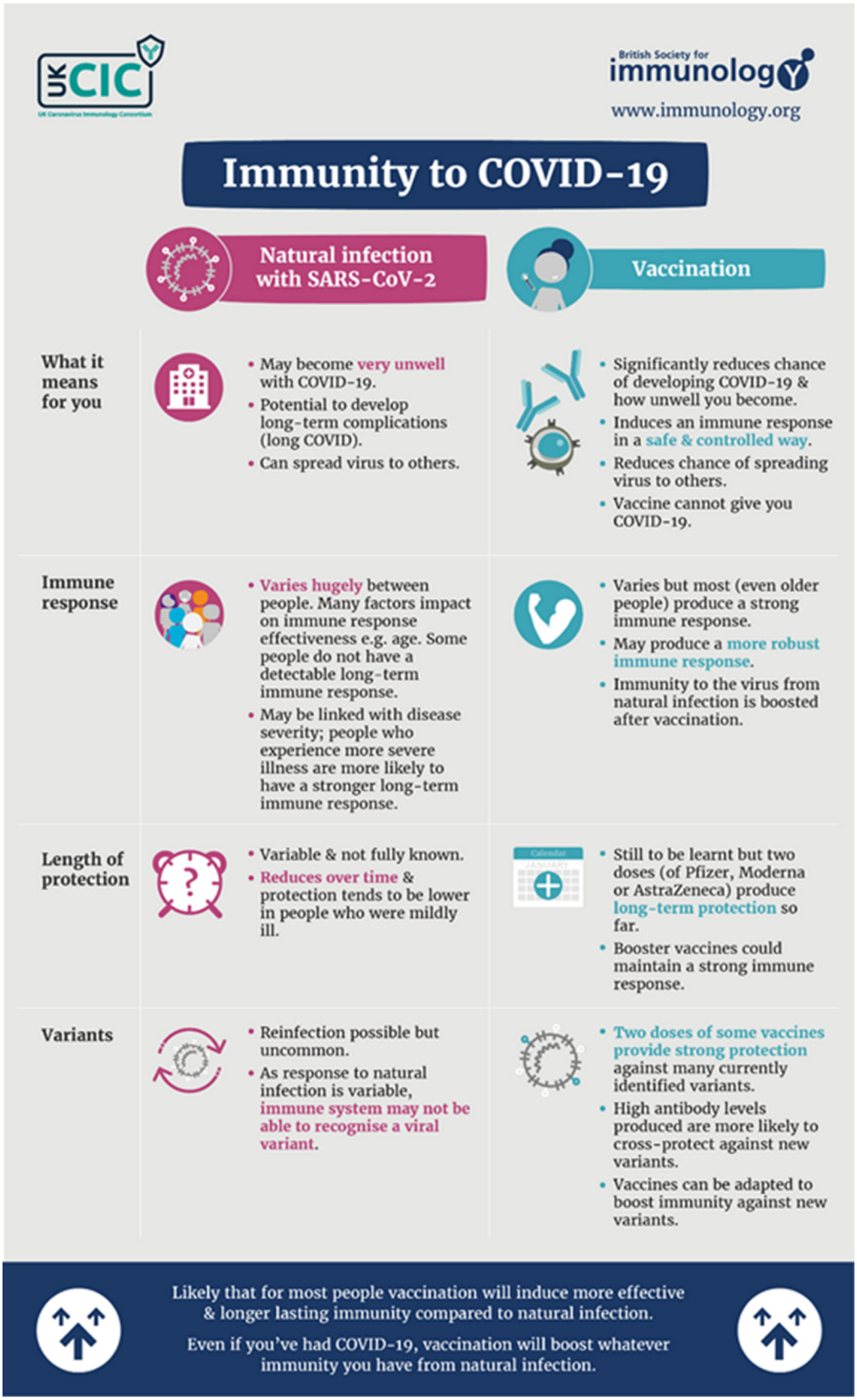

Figure 6. Natural infection compared to vaccination: Facebook infographic explaining the difference in immunity against COVID-19 gained through natural infection with SARS-CoV-2 compared to vaccination.

Involving experts

We work closely with our members through the whole process of producing new materials, from concept development, fact checking, copy editing and proofreading. Their immunologists' perspective and science communicator input are incredibly valuable to make sure the science is accurate and understandable when addressing complex topics. Additionally, we work with expert graphic designers who can take a brief to develop a concept, explore visuals and turn it into an exciting final product. Clear communication is key to ensure everyone is on the same page when refining the infographic through detailed feedback to make revisions until there's a perfect product and everyone is happy with it! ■

Further reading

- All the BSI COVID-19 infographics are free to download from the BSI website (https://www.immunology.org/) and we encourage you to share them with your networks and communities to help improve understanding of the importance of vaccination.

Dr Erika Aquino is the Public Engagement Manager at the British Society for Immunology, where she leads on implementing the BSI's public engagement strategy and works to spark interest in and strengthen understanding of immunology. Erika is responsible for the development and delivery of all public engagement activities, supporting BSI members' involvement in this area and creating materials and resources. The current focus of Erika's work is developing activities to engage with the public about COVID-19 immunology and vaccines to ensure that the expert scientific voice is heard and reaches a diverse audience.

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Publication: mastering the show in Scientific 'Show and Tells'

"A picture is worth a thousand words": This is particularly useful when faced with a tight word count for a manuscript. Carefully constructed figures are an effective way of communicating complex ideas and results. They tend to be the first thing you notice when skimming through a paper and can even be what draws you towards reading it carefully or moving on (to another paper). They are, therefore, a critical part to consider when preparing a scientific report.

The initial stage of creating figures can be the most difficult as you try to decide the type of plot to use or the structure of your illustration. While this can be a trial-and-error process, taking the time to determine the key message you want the reader to take out away from your figure can make this process significantly easier. Figures can include a multitude of different messages; however, an indicator of a good figure is that you can identify the central message.

Given the importance of figures for communication and for 'marketing' your work, it is easy to get excited about new 'cool' plots that may look impressive but are challenging to read or do not convey much information. It is, therefore, important to remember that simple and clean figures are often more effective. A good assessment of this is showing your figure and caption to a colleague working on a different project and asking them what they think your takeaway message is. If they struggle to understand it, then that is your cue to edit it. A figure, along with its caption, should convey the message without relying on the main text.

Much time can be spent on sorting data and editing plots, making it easy to make mistakes such as mislabelling the axes or units when reusing codes to create the plots. Other pitfalls to avoid include using small fonts that are illegible in print or saving the image file in low resolution, resulting in pixelated plots when zooming in. Before finalizing the plot, it is important to double-check the choice of colours, keeping contrast and clarity in mind. It is often preferred if your plots are readable in greyscale.

In addition to plots, illustrations can be used to explain processes or structures. This can be either an illustration of the method followed, the mechanism in which a reaction occurs, or a molecule's shape. The time

Tips for postgraduate students

- It can be useful to pick a colour scheme at the beginning of your studies and use it in figures and illustrations throughout. This saves you time in the end when trying to have a common theme throughout your thesis or dissertation.
- Think about how others might see your work (e.g., individuals with colour vision). There are some online tools that can help with that such as http://www.colororacle.org/ and https://michelf.ca/projects/sim-daltonism/
- When creating figures, either have a script saved to recreate it or save them in an editable format in case you need to edit them or use them for a slightly different purpose.

and effort required to create such illustrations can vary depending on the level of detail desired and the tool used. The simplest option is to use Microsoft PowerPoint. Still, some may opt to use more specialist software such as ChemDraw, BioRender or Adobe Illustrator.

Just as any other skill, creating plots and illustrations develops with time, practice and constructive feedback. Figure 7 can be used as a guide. The more you produce, the easier it becomes and the more templates you have to modify and reuse! ■

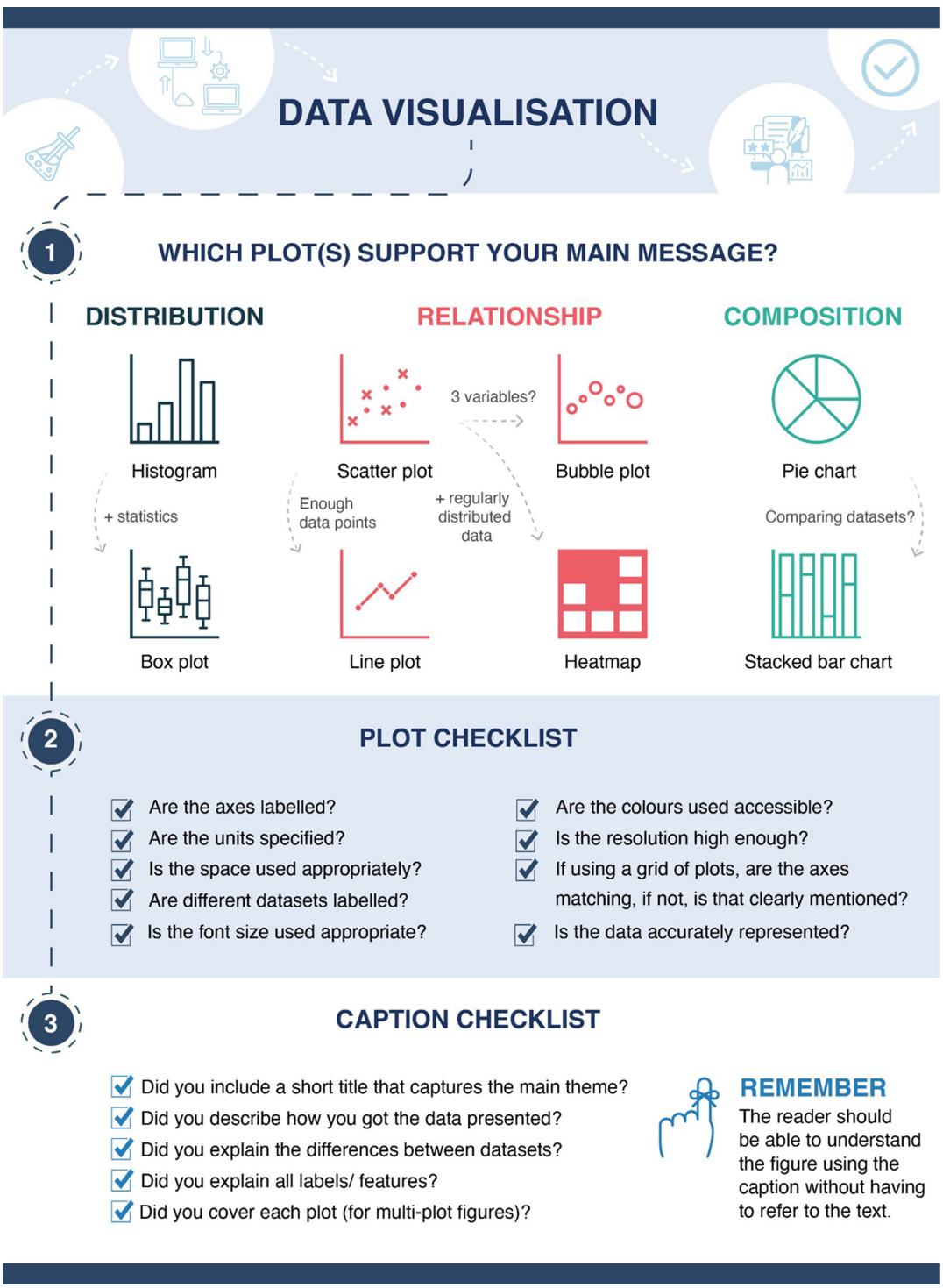

Figure 7. A guide for producing plots for publication: This infographic provides tips on 1) choosing the most suitable plot to support the main message, 2) checking the plot for common errors and 3) ensuring the caption enables the user to understand the plot without referring to the text.

Further reading

- Rougier, N.P., Droettboom, M. and Bourne, P.E. (2014) Ten simple rules for better figures. *PLoS Comput Biol*. **10**, e1003833. DOI: 10.1371/journal.pcbi.1003833
- O'Donoghue, S.I., Baldi, B.F., Clark, S.J. et al. (2018) Visualization of biomedical data. *Annu. Rev. Biomed. Data Sci.* **1**, 275–304. DOI: 10.1146/annurev-biodatasci-080917-013424
- Franzblau, L.E. and Chung, K.C. (2012) Graphs, tables, and figures in scientific publications: the good, the bad, and how not to be the latter. *J. Hand Surg. Am*. **37**, 591–596. DOI: 10.1016/j.jhsa.2011.12.041

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Hannah Leese is assistant professor in the Department of Chemical Engineering at the University of Bath and leading the Materials for Health Lab. She received her PhD in chemical engineering from the University of Bath and was post-doctoral research associate at Imperial College London (2013–2017) and the University of Manchester (2017–2018). Hannah's current research focus includes responsive hydrogel microneedle biosensors, molecularly imprinted polymers and therapeutic textiles.

