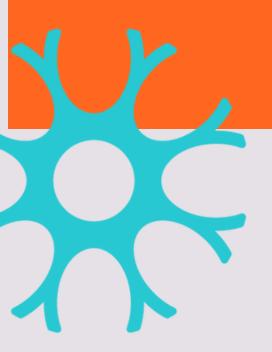
THE NEURO'S EARLY DRUG DISCOVERY UNIT





OUTREACH AND TRAINING HANDBOOK

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1.INTRODUCTION

a. What is science outreach?

Science outreach encompasses a wide range of activities that involve sharing your scientific research with others. Although the term mainly describes outreach activities, which means sharing your research with non-experts, it can also be used to describe "inreach" activities, which is when you share your research with other scientists in your field (1).

Outreach typically includes activities that can include but are not limited to (1) giving lab tours to interested parties, (2) assisting with the writing of a lay article or segment about the lab or your work in particular, and (3) making videos to explain your research more broadly. In contrast "inreach" includes activities that include the writing of manuscripts for publications in scientific journals or presenting at departmental series and conferences. However, it can also include more non-traditional activities aimed to make your science more "open" and accessible, such as making a video featuring a protocol of your chosen method or even a key scientific finding. Both "inreach" and outreach initiatives are important in making one an engaged and impactful scientist in any field.

Here are some examples of "Inreach" vs. Outreach videos from within the Neuro's Early Drug Discovery Unit (EDDU):

'In-reach' video: "Plate Coating with Matrigel"



This video is a video protocol outlining how to coat cells in Matrigel to maintain induced pluripotent stem cells (iPSCs), for researchers using iPSCs.

https://www.YouTube.com/watch? v=pxFK1OAqvUE

Outreach video: "Karyotyping at the Neuro's EDDU"



This video describes what karyotyping is, and how we use it in our lab to a more general and non-science trained audience.

https://www.YouTube.com/watch?v=JcxP-U4xCGo Here are some other examples of science outreach in video format:

'In-reach' videos (for scientists, or students)	Outreach videos (For others)
"DNA extraction protocol – Part 1" https://www.YouTube.com/watch?v=tcPgdR9_t64	"How the Immune System Really Works" https://www.YouTube.com/watch?v=IXfEK8G8CUI
" María Montiel: ALS Canada Research Forum 1 Minute to Win It Competition" https://www.YouTube.com/watch?v=M19ofxK7Pm0	"How Neural Networks Learn" https://www.YouTube.com/watch?v=McgxRxi2Jqo
"Intro to BIDS (Brain Imaging Data Structure)" https://www.YouTube.com/watch? v=OHxnwzOKqHM&t=444s	"What Is The Future of Creativity & Empathy? Jacob Collier Asks Hank Anything" https://www.YouTube.com/watch? v=Q0_W4SWHeWY

In this handbook, we will describe the steps in making a video protocol from inception-todissemination. Keep in mind, many of the skills and instructions listed in this handbook have broad applications and can be applied to help you promote and communicate your work to a wider audience.

b. What is effective science outreach?

It is important that you communicate your research well. A big difficulty in communicating science arises when the complexity of your research comes in conflict with simplifying it to make it understandable. These issues arise often when doing outreach, but they also apply when filming a video protocol.

Here are some of the questions you will be thinking about: Who is my intended audience and what is their training level? Is the information in the video comprehensive enough so that someone who is not familiar with the protocol can reproduce it in their own lab? What terms or acronyms are being used, and should they be defined? If there is a correction or an update to the protocol that needs to be incorporated to the video? And is there a way for you to change the video or add these changes in the description?

2. OBJECTIVE

In this handbook, you will learn the entire process of making a video protocol, from planning to filming and then publishing. It is important to follow these steps to make an effective video protocol.

IN PLANNING YOUR VIDEO,

you will think about the purpose of your video, you will learn about the different video formats available, and learn how to draft a plan for your video.

IN EDITING,

you will find a list of resources and free tools for editing your video, as well as what to include in the post-filming stage to make your video as comprehensive, understandable, and accessible as possible.

IN FILMING & EQUIPMENT,

you will find a list of equipment and best practices for filming your video.

IN PUBLISHING & PROMOTION,

you will learn where to share your protocol, and what considerations you should take after your video is published online.

3. PLANNING YOUR VIDEO

a. Come up with an idea

Some helpful points when coming up with an idea for your video protocol: Does this video serve a need in your research field? Are there written protocols in your lab that would benefit from being rendered in a visual medium? Is this a resource you wish you had when you were starting out?

i. Is this an interesting idea or is it already out there by others!

Make sure to first look online and see if the video you'd like to make exists already! Since it requires time and effort to make a video protocol, it is a good idea to see what is out there, and if there are already pre-existing resources which you can help share.

As well, if there are similar videos, perhaps they are outdated, or lacking in some way. This research phase can help you refine your own video idea. You can get ideas of what you want to do or what to avoid, for your own video protocol.

b. Identifying your message (Who is your audience? What is the video's key takeaway?)

The first step in creating an effective video is identifying your target audience, whether they are experienced researchers, graduate students, or undergraduate trainees (For outreach, this can even be people without a scientific background!). Once you know who you're speaking to, you can tailor your script accordingly. For example, if you're addressing researchers or a more knowledgeable audience, your tone should be professional and precise. On the other hand, if your audience consists of students, a more relaxed and engaging tone may be more effective.

If you are making a video for viewers with little or no scientific background, it's important to simplify complex terms and concepts. Using everyday examples can help make your research or method more relatable and easier to understand.

You should also consider where you want to post your video. Your audience can depend greatly on the platform. For example, students may use Instagram, while researchers may lean towards using LinkedIn for scientific content. Please see **Chapter 8 "Publishing and Promotion"** for more information on the choice of platform.

Although this handbook focuses <u>primarily on video protocols</u> for the scientific community, we also want to highlight other options for creating video content.

c. Choosing the right format or style (explainer, behind-the-scenes, animation, etc.)

Video content can come in many different formats. You should explore which styles work best for your goals and audience. For example, "explainer" or "background" videos are useful for breaking down complex concepts or providing an overview of your topic. You can either film yourself presenting to the camera or use voice-over narration alongside graphics and images that illustrate your message (Click here to see an example). Another engaging format is the "behind-the-scenes" video, where you document the development of an experiment, the writing process, or other challenges in research. This style can be especially appealing to younger audiences, as it offers a more authentic and unscripted perspective. On the other hand, animation videos allow you to explain topics without appearing on camera. You can use online tools and resources or create custom animations yourself; for example Canva or Animaker.

For **video protocols,** we use **action footage** which means any shot where you are filming movement. We then narrate the steps of the protocol onto this footage. The level of technical detail will depend on your research area. At the EDDU, most of our video protocols are filmed inside a biosafety cabinet, which can present certain challenges. We must maintain sterile conditions throughout the filming process to avoid contaminating any plates or experiments. This requires careful planning and coordination to ensure both clarity in the video and integrity in the lab work.

4. SCRIPTING AND STORYTELLING BASICS

The best way to create a script is to begin with a clear, focused idea. The topic can be small, but make sure it is specific. Also be sure to leave time to write multiple drafts and make changes along the way.

When creating video protocols, the process is often easier if you already have a written protocol, typically in PDF format. If one doesn't exist, it's a good idea to start by drafting a written version before moving on to the video. This means you are halfway there.

Once you have a written protocol, break it down into individual steps and think of each step as a potential scene. A useful way to organize your video is by creating a table which can be used as a template for all your video protocols: in the left column, list the estimated time frame for each step; in the middle column, add a scene description and in the right column, outline the corresponding action from the protocol (see Table 1). This format helps align the voiceover with the lab actions more seamlessly, making the final video clearer and more coherent.

Time	Scene Description	Script (Narration/Voiceo ver)
0:00	Camera on biosafety cabinet	"Today, we'll demonstrate the aseptic handling of cell culture media"
0:15	Close-up of pipetting	"Using a sterile pipette, transfer 10 mL of media into the flask"

Table 1. Example of a video script showing the step to work in a biosafety cabinet

If your video is more dynamic and you would like a clearer idea of each scene, you can also create storyboards; many people prefer this approach because it offers a clear visual outline of each section of the video.



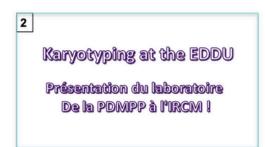
A storyboard helps you plan how your script will unfold visually, scene by scene. This not only makes it easier to communicate your vision to collaborators, but it also helps you stay organized during filming and editing. By mapping out elements like camera angles, transitions, visuals, and voice-over timing in advance, you can save time and reduce the chance of missing key content during the filming stage. It can also be helpful for those who will appear in the video to get an idea of what the plan for the video is. Here is an example of a storyboard from our lab, from an outreach video:



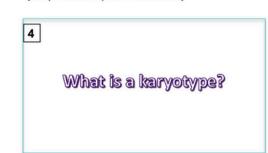


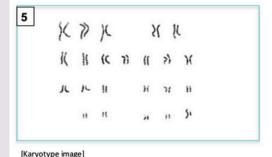




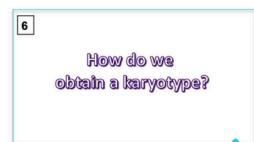


[Slow pan of the lab space with text for 5 sec]





Voiceover: A karyotype is a photographic representation of the complete set of chromosomes in a cell. From this photo we determine the number, the size, and the shape of all the chromosomes and detect any chromosomal abnormalities, if



5. FILMING AND EQUIPMENT

a. What do you need (smartphone vs. camera, lighting, audio tips)

One of the misconceptions that holds people back from creating video protocols is the idea that you need expensive or fancy equipment. In reality, you can capture high-quality video using just your smartphone. Of course, having a DSLR or HD camera will increase the quality, but to give you a sense of how we approach it:

- 25% of the time, we use our phones for quick or fun videos.
- Another 25% is spent using webcams, especially when recording protocol steps inside a biosafety cabinet.
- The remaining 50% is when we use a professional camera to film interviews, spotlight features, and other formal content meant for collaborators or conferences.

One crucial thing to keep in mind, especially for protocol videos with voiceovers, is audio quality. Investing in a good microphone system can make a huge difference. There are many excellent camera and microphone brands available, so choose whatever fits your budget and style. And because we don't gatekeep, here's the gear we use:

- Sony Alpha 6000 and tripod
- Logitech C920X PRO HD Webcam
- · Rode Wireless GO Microphone System
- Any smartphone with a good HD camera

At the end of the day, the most important thing is that your video, audio, and visuals are clear, so your viewers understand your protocol and are engaged for as long as possible.

b. Best practices when shooting lab footage

LOCATION

The location where you record your video protocol is one of the most important factors to consider. Ideally, you should choose a quiet space with natural light and enough room to set up your equipment comfortably. Acoustic conditions also matter. Try to avoid areas with echo or excessive background noise, as these can interfere with audio quality and clarity.

Filming in a laboratory can be particularly challenging due to limited space and the presence of ongoing work. In our experience, recording outside of regular working hours (either early in the morning or after hours) can significantly reduce interruptions and background noise. This not only ensures a smoother filming process but also allows you to focus fully on capturing the protocol accurately and professionally.

CAMERA SETTINGS

Video resolution matters because it determines how much detail your video can display. Technically, resolution refers to the number of pixels that make up your image. More pixels mean higher resolution (2). Recording in 1080p (Full HD) at 30, or 60 frames per second (fps) is suitable for social media platforms like YouTube, Instagram, and LinkedIn. This resolution also results in smaller file sizes, saving space on your computer or external hard drive. You can film in 4K if you prefer, but keep in mind that only YouTube supports 4K playback. Instagram and LinkedIn will compress your video down to 1080p or lower during upload.

down to 1080p or lower during upload. You also have to decide if you want to film your videos in landscape (horizontal) or in portrait (vertical). This will depend on which platforms you will upload your video to (Please see Chapter 7 for more information).

GOOD LIGHTING

Even with the best camera, lighting is critical for capturing clear, high-quality images and videos. Proper lighting enhances visibility, reduces noise, and ensures that details are accurately represented. Good lighting can also increase the quality of a video significantly, without the need to buy a new camera. Ideally, the light source should face the subject directly or be positioned at an angle that minimizes shadows and glare. When filming people or objects, front-facing or diffused lighting usually produces the most flattering and detailed results. Natural light is often the best option, especially for its balanced color temperature and softness. However, in enclosed or low-light environments, supplementary lighting, such as LED panels or ring lights, can help illuminate the subject effectively.

In our experience, when working inside a biosafety cabinet, additional lighting is usually unnecessary, as these cabinets are well-lit by built-in illumination. However, in darker room conditions, or when filming outside the biosafety cabinet (e.g., highlighting a person handling a flask), we use a ring light to ensure the subject is well-lit and stands out clearly. This helps maintain visual clarity and focus, particularly when capturing fine motor tasks or detailed procedures.

i. Common mistakes

- Avoid overhead lights: this increases the chances of having shadows across the face.
- · Avoid noisy spaces or places with a lot of people.
- Avoid angles where you cannot see the subject properly
- Avoid shaky or fast movements that will create an unstable video.

C. Our setup

OBS

OBS is great software when trying to capture multiple inputs at a time. This can be helpful if you have two webcams, or if you'd like to capture your screen and face to present premade slides on your computer.

We use two Logitech C920X PRO HD webcams to capture lab bench and hood footage. We tape them in two locations: one on top to cover a bigger area and one on the side to make close-ups. Then, we connect the webcams to OBS and a laptop to capture the footage, see **Image 1**.

Image 1. Setup of Logitech webcams inside the hood and OBS software





SONY CAMERA

Finally, we use our Sony camera to capture high-quality footage when moving around outside the hood. This includes moving the cells to and from the incubator or checking the cells with a microscope. We also use a tripod and the camera when shooting interview footage, seen **Image 2.**

Image 2. Setup of tripod and ringlight for interview style footage

6. EDITING & SIMPLE TOOLS

Editing can be overwhelming at first. There are many tools and preferences out there. For instance, many people prefer to edit on their computer because it has a big screen while some others prefer to do it on their phones or tables for convenience. Whether you have a specific preference, in this section we will help you find some useful tools and apps that can make your editing journey easier and more pleasant.

a. Editing on your phone

There are many mobile apps available that make it easy to create quick, engaging videos. Some of the most popular options include CapCut, Canva, and DaVinci Resolve. These tools are especially useful for content aimed at platforms like Instagram, Facebook, TikTok, and YouTube Shorts, where short-form, visually appealing videos perform best. These apps offer drag-and-drop tools, templates, and effects that help you create polished videos without needing editing experience. Plus, they're free (with optional paid features), and have intuitive interfaces that make the creative process smooth and fast. All three apps offer an intuitive, user-friendly interfaces, making them accessible to both beginners and experienced creators.

CAPCUT

CapCut is one of the most popular mobile video editing apps, especially among creators on TikTok and Instagram Reels. We use CapCut because it allows you to create a clean, professional-looking video in just a few clicks. It's perfect for quick edits like timelapses or simple clips and makes it easy to add text, transitions, and free-to-use music without needing advanced editing skills.

Key Features:

- Drag-and-drop video editing timeline
- Free music and sound effects
- Text overlays and auto-captions
- Transitions, filters, and stickers
- Al tools (background remover, voice changer, etc.)

See resources for editing video tutorials on CapCut for more information.

CANVA

Originally known for graphic design, Canva has quickly become a go-to tool for video content as well. It's especially useful for creators who want to combine design and animation with video clips. **Canva** is also a highly convenient tool for creating quick, short-form videos. It offers a well-equipped library of images, music, and intuitive editing tools that make the process smooth and efficient. Beyond video creation, Canva is incredibly versatile, and you can use it to design **thumbnails**, **social media graphics**, and other visual aids to enhance your content across any platform of your choice.

Key Features:

- Thousands of video templates for social media
- Built-in stock video, music, and animation effects
- Add branded fonts, logos, and color palettes
- Export in various aspect ratios for every platform

DAVINCI RESOLVE

If you're looking for a more powerful editing experience, DaVinci Resolve is a professional-grade tool that's completely free on desktop (and available on select tablets and mobile devices). While it has a steeper learning curve, the features it offers are worth exploring if you're serious about content creation. We use DaVinci Resolve when you want to do a longer video, especially for YouTube videos, interviews, or content that needs more polish.

Key Features:

- Multi-track timeline editing
- Advanced color correction tools
- Fusion (motion graphics) & Fairlight (sound design)
- Export in high resolution without watermarks

No matter which app you use, here are a few simple ways to elevate your content:

- Plan ahead: Write a quick script or outline to stay focused.
- Add subtitles: many viewers scroll with the sound off.
- Keep it short and engaging: Aim for 15-60 seconds for reels and shorts.

b. Editing on your computer

There is a lot of different software on your computer to edit videos.

Free platforms on the web:

- Adobe Express
- Clipchamp
- Canva

Free downloaded applications:

- Clipchamp (Windows 10/11)
- iMovie (Mac or IOS)
- Openshot (Windows, Mac, Linux)
- DaVinci Resolve

In our lab, we use Premiere Pro, since we have paid for an Adobe Creative Cloud license.

RECOMMENDED STEPS AFTER FILMING

1. Go through your footage

- a. Important: although you might want to import right to your editing program right away, resist the urge!
- b. Watch all your footage and **delete what you do not need** and even start cutting parts you don't need if it's easy to do (such as on your phone)

2. Import your footage to your computer

3. Label your footage

- a. This is a very important step!
- b. This will make your editing much easier later on
- c.Organize however it makes sense to you, if you're doing a video protocol then label it by the step in the protocol
- d. For images or other assets this is also helpful since if you want to change the image you can rename it the same way and it will replace itself automatically in certain editing programs

4. Follow your plan or storyboard to create your video

- a. Start by placing down your voiceover, or your main footage
- b.Add B-roll if applicable
- 5. Make sure the visuals are clear
- 6. Make sure the audio is clear
 - a. Transitions

7. Add subtitles to make it more accessible

a. Some platforms already have ways to include subtitles, such as on YouTube

- 8. Add music to make it more engaging
- 9. Add visuals which strongly support your protocol

ACCESSIBILITY TIPS

- Always include subtitles if there is spoken content
 - Another way to make your content more accessible to those around the world is to translate your content into different languages.
 - As an example, check out our playlist in English, French, Spanish and Portuguese: <u>https://www.YouTube.com/playlist?list=PLU1QAd55Cz_uG6hxoEdIkXRdBPA-TnGUA</u>
- Key information should be included in alternative formats
- Text should be readable
- No flashing images
- Onscreen information should also be narrated or spoken whenever possible

LICENSE INFORMATION

Tip: if you're using music or photos from the internet, make sure you have the right to use the photo.

When searching for a photo, switch the search to only "Creative Commons Licenses" under "Usage Rights", but make sure to credit it if required by the license Here are the different types of licenses (and an example of how to credit it below!):



This photo is licensed under CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0/deed.en from Wikimedia Commons.

To learn more about creative commons licensing, please visit their website: https://creativecommons.org/share-your-work/cclicenses/

7. RESOURCES

MUSIC

- Free Music Archive
 - https://freemusicarchive.org/home
- Free sound
 - https://freesound.org
 - For sound effects
 - Make sure to check the license
- YouTube's Audio library royalty-free sound effects and library for use on YouTube
 - If you would like to use it outside of YouTube, make sure to check the license to see if you need to attribute it to the author, or if you need to ask the author for permission.

VISUALS

- Biorender
 - For biological graphics
 - https://www.biorender.com
- Canva
- Wikimedia Commons
- Pixabay
- Unsplash

EDITING

For your chosen editing program, it is always a good idea to search up on Google, YouTube or even ChatGPT if you run into any problems. Here are some resources if you are interested in getting started on any of these programs:

- 1. Learning how to edit on CapCut
 - CapCut's YouTube
- 2. Learning how to edit on Davinci Resolve
 - Motion Array Introduction Guide
 - o Introduction to Davinci Resolve (video)
- 3. Learning how to edit on Adobe Express
 - Adobe Express guide
 - Introduction to Adobe Express
- 4. Learning how to edit on Canva
 - o Introduction to edit in Canva (video)
- 5. Learning how to edit on Premiere Pro
 - Introduction to editing in Premiere Pro (video)
 - Adobe Handbook
 - Premiere Gal

ANIMATION

- PowerPoint (Windows or Mac)
 - Import your own images and diagrams and use the animation tools on PowerPoint. You can also add audio and other video clips and at the end, export as a video.
- Canva (web)
 - Use the free animation tools and assets on Canva to create your own animated videos.
- Vyond
 - However, it isn't free. It includes Al help that makes any idea to life in minutes.
 - https://www.vyond.com/product/ani mated-video-maker/

8. PUBLISHING & PROMOTION

A. BEST PLATFORMS

There are many platforms to share your videos. However, once you have in mind who you are talking to it is easier to choose one, two or three places to upload it. Here we are only going to talk about the ones we use, such as YouTube, LinkedIn and Instagram. But feel to try other platforms if you want to explore more.

YouTube is one of the most used digital platforms; it has 2.53 billion active users worldwide. It is free and works well when others search for the topic of your video protocol. For these reasons, it is the best platform for long-form or short video content. You can create a community here, as people can also ask you questions that you can reply to after. There are also many features like link-sharing that will make it easier to promote. It is also a widely integrated video player, so it will be possible to add websites and other places to direct easily to your video protocol.

In the other hand, **LinkedIn** and Instagram work best for shorter form of video content. LinkedIn is known for being a professional networking platform. You can look for jobs, make professional connections, and learn new skills. This makes the perfect place to share your protocols with people that already have a scientific background or are starting to get involved in your subject.

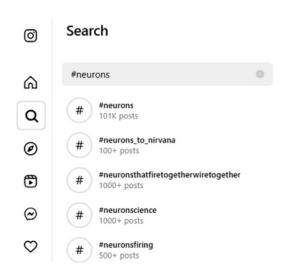
Finally, **Instagram** is a great platform to reach younger people with or without a scientific background. The content that works well here must be very eye-catching and fast. Its search function does not work as well, and so content is pushed by an algorithm that often favors content that is recently released. We mainly use this platform to reach out to students or to create awareness of our research in general but not for video protocols.

Other places to push video protocols?

<u>https://www.jove.com/</u> is a well-recognized video protocol platform, but it costs to publish there and is partially open access.

B. HASHTAGS AND STRATEGIES TO REACH A BROADER AUDIENCE

As the algorithm changes rapidly, it's important to experiment with different hashtags and strategies to reach your desired audience. One strategy that we've been using successfully to increase engagement on our Instagram and LinkedIn posts is to search for one popular hashtag relevant to your topic (e.g., we work with iPSCs, so #StemCells is a very popular hashtag), and pair it with at least three less popular hashtags specific to your niche. You can check the popularity of hashtags by searching for them in the Instagram app, as shown in the following image:



Likes, comments, and shares on your videos signal to the algorithm that your content is engaging and relevant, which can help boost its visibility. To encourage this interaction, actively invite your followers to engage (you can do this in your captions).

For example, include a clear call to action at the end of your videos, ask questions, and prompt viewers to share their answers in the comments. You can also encourage them to share personal experiences, such as what happened when they tried a particular experiment. Be creative and specific with your prompts to spark meaningful conversations and increase viewer participation.

Another effective strategy is to determine when your followers are most active, specifically, which days they are more likely to be online and what times they spend the most time on the app. You can find all this information in the Insights tool available on various social media platforms.

Sometimes, even if you follow all these suggestions, the algorithm may still not favor your video for reasons beyond your control. Don't get discouraged, experiment with different video formats, music, fonts, and styles until you find what works best for your topic and audience.

C. AFTER PUBLICATION

Make sure to back up your video file and footage in one place so you can reedit the video or re-use the footage later if needed.

Make sure to maintain your video. Ensure the information contained in the video is up to date, and to answer questions if there are any on your video. This is also a great opportunity to see if there is any information that you missed or any common confusions that can be cleared up in the comments of your video.



References:

- (1) Illingworth, Sam; Allen, Grant (2020) [2016]. "Introduction". Effective science communication: a practical guide to surviving as a scientist (2nd ed.).
- (2) University of York's "A practical guide to media editing". https://subjectguides.york.ac.uk/media/video

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