KRISHNA KUMAR LAB · DEPARTMENT OF PHARMACOLOGY · WEILL CORNELL MEDICINE

Lab Manual

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CONTENTS

01 **Expectations & some General Points**

02 **Specific Expectations**

03 **Lab Offboarding**

First of all, welcome! We're delighted that you've joined the Krishna Kumar Lab in the Department of Pharmacology at Weill Cornell Medicine. We're glad you chose to come to our lab, and we are committed to doing everything we can to make your time here productive, rewarding, and enjoyable. We hope you will learn a great deal, enjoy the process of discovery, build lasting collaborations, and have fun along the way.

This manual was inspired by (and borrows from) several excellent lab manuals (e.g., Sanders Lab, BABlab). If you have ideas for additions or would like clarification on any points, please feel free to discuss them with me (Kaavya Krishna Kumar, PI).

You are expected to read this manual upon joining the lab (and I strongly recommend reading it while you are considering joining). The manual is intended as a starting point for building a positive mentor–mentee relationship and for cultivating a supportive and rigorous lab environment. Achieving this requires active participation and ongoing refinement by everyone in the lab. This

document outlines shared expectations and responsibilities, as well as the qualities that I believe are essential for maximizing one's potential as a scientist-in-training.

(Throughout this document, I sometimes use "I" and sometimes refer to myself as "Kaavya." This is intentional. "I" is used for direct expectations and values that I hold as your PI, while "Kaavya" is used when describing mentorship structure or lab practices. Both refer to the same person.)

01 Expectations & Some General Points

01 The lab is committed to maintaining a safe, respectful, and inclusive environment for everyone. Verbal or physical harassment, intimidation, or discrimination of any kind—based on race, religion, gender, gender identity, sexual orientation, disability, or physical appearance—will not be tolerated. If you witness or experience behaviour that is inconsistent with these values, please speak up and report it immediately to Kaavya. Creating and maintaining a healthy lab culture is a shared responsibility.

02 Research integrity is non-negotiable. We are committed to the highest standards of scientific honesty and rigor. Falsification, fabrication, or plagiarism will not be tolerated. Research misconduct not only does a disservice to you but also harms the scientific community as a whole. It undermines trust, damages the field, and puts your career at serious risk. It is never right, and it is never worth it. Don't do it!

03 Scientists must be careful. You must double- and triple-check your work and build in appropriate sanity checks and controls. If something does not look right, stop the experiment and reassess. You are expected to think critically while doing experiments, not just afterward. Continuing an experiment when results look questionable is a waste of your time, my time, and the lab's time and resources. Making mistakes is part of science; making mistakes due to rushing or carelessness is not acceptable.

04 **Aspire to be a scholar, not a highly trained technician.** Being a scholar means knowing the literature in your field while maintaining a broad curiosity about science more generally. It also means thinking relentlessly about experiments—why they are done, what they test, and what they truly show. Be Captain Ahab (you know, from Herman Melville's Mody-Dick) in your pursuit of understanding: obsessive about the question, rigorous in execution, and thorough in the conclusions you draw. Take full intellectual ownership of your work. Ultimately, developing as a scholar puts everything else in place for a successful scientific career.

05 This can be a contentious point. I don't know of anyone who is having a successful academic career (be it students, postdocs or PIs) who are not working a full week in the lab (including many weekends), plus additional time spent working or reading at home. Science does not always fit neatly into a Monday–Friday schedule. Say, if you start an experiment on a Thursday evening, which requires coming in on Saturday to complete it, that is not a reason not to start the experiment on Thursday. Avoiding important experiments simply to protect weekends is not compatible with doing rigorous, competitive science. By contrast, starting an experiment on a Friday evening that will require weekend work may warrant more thought. Commitment to your experiments, and following them through properly, is an essential part of training as a scientist. Having said all that, I do not expect you to work late (all the time) or on (all) weekends, but I do expect you to GET YOUR WORK DONE!

06 **I would like everyone to be in the lab by 10:00 am, Monday–Friday.** This is important so that you have contact time with me and the rest of the lab (you might need help or you can help). I expect everyone to be present for lab morning teatime (10:30–11:00 am). This is an important time for scientific discussion, informal troubleshooting, and getting to know your lab mates. Building a cohesive, friendly, and non-toxic lab culture depends on regular shared time together (I hope!). If these hours are not workable for you, this is a problem. Occasional lateness or absence is understandable, but if you anticipate being late or absent more than occasionally, and have a valid reason, please discuss with Kaavya.

07 If you are sick, please stay at home and take care of yourself. Because you need to get well and others don't have to be sick.

08 Attend useful seminars (and, definitely, Dept. of Pharmacology seminars). However, don't go to so many talks that it compromises your momentum in the lab.

09 **Attending scientific conferences is an important part of your training.** Many aspects of both the science and the culture of your chosen subfield can only be learned through conference participation. Trainees are encouraged to attend one to two relevant conferences per year. Plan ahead and apply early so that you can submit an abstract and present your work. Early planning also increases your chances of securing travel fellowships and other funding opportunities. If you are keen to attend a particular conference or workshop but are unable to secure funding (after making a genuine effort!) please talk to me, and we can explore funding options.

10 Don't be afraid to ask for help. You should feel comfortable politely approaching others in the lab who may have the expertise or experience needed to address a specific question related to your research. Always be sure to say thank you, and to appropriately acknowledge their contributions in presentations and publications. In many cases, including helpful colleagues as co-authors is appropriate and represents a genuine win–win outcome. Collaborations with other labs can also be highly beneficial, but not always. Before initiating a collaboration with another lab, or if you are approached by an outside lab, please consult with me first so we can ensure expectations, scope, and credit are clear for everyone involved.

11 When asking for help, always respect the value of your colleagues' time. Do not assume that your time is more valuable than theirs. Come prepared with specific questions, do your own homework first, and be mindful of how much time you are requesting. Professional courtesy and mutual respect go a long way in maintaining a healthy, collaborative lab environment — and I intend to keep my lab that way.

12 Things break and that's just life. What is critical is that when you break something you report it immediately to the appropriate person so that we can repair/replace the item promptly.

13 Watch out for the safety of your colleagues- don't let them do things that are unsafe. Safety is everybody's problem!

14 Help to identify common reagents that are getting low and need to be ordered. Help identify commonly used reagents that are running low and need to be reordered. Everyone is expected to take turns assisting the lab technician with preparing competent cells, buffers, and other common lab reagents. A core expectation of training in the Krishna Kumar Lab is that everyone knows how to make standard reagents and maintain common lab stocks, rather than relying on others to do this work. This shared responsibility is essential for smooth lab operation and for developing strong experimental independence.

15 Develop efficient organizational skills including:

- a Maintain a detailed laboratory notebook using the lab's Benchling account. You are expected to prepare thorough, high-quality protocols for important and commonly used methods. These protocols must be written so that a new person in the lab can successfully perform the experiment even if the original developer is not present. All relevant details must be included. If you believe that performing the experiment at exactly 1:23 pm while praying to the Sun goddess is essential for success, then state this explicitly—include the precise wording of the invocation and the number of times the chant should be repeated. When I ask you to prepare a detailed protocol, I expect you to take this very seriously. Put yourself in the mindset of a complete novice who must execute the procedure without you standing next to them. Clear, complete documentation is essential for rigor, reproducibility, and the long-term success of the lab.
- b All files and folders on lab computers must be clearly organized and named so they can be identified and retrieved by others, even years later. Do not leave files scattered across system folders or personal desktops.
- c The lab should be kept clean and organized at all times. The first Friday of every month will be designated as "Lab Clean-Up Day," and lunch will be provided in appreciation of your efforts. You are also expected to clean and maintain your own bench space regularly.

d Order or prepare reagents and equipment well in advance so experiments are never delayed due to preventable shortages. Note: We are fundamentally a biochemistry lab; any self-respecting biochemistry lab should not be ordering basic proteins (e.g., Belt protein, 3C, TEV) or competent cells.

e All samples and reagents must be clearly labeled and stored appropriately. Obsolete reagents and samples should be discarded in a timely manner, and all chemicals must be disposed of according to appropriate safety and environmental guidelines.

16 The development of strong communication during PhD and postdoctoral training is essential.

FIGURES

Coming from the Kobilka school of illustrations, I put a lot of emphases on making clear and high-quality figures. Figures are often the first, and sometimes the only part of a paper that people look at, so they must convey the scientific message accurately and efficiently. Spend real time thinking about what you want the figure to communicate before you start assembling it. Be deliberate about layout, labeling, and color choices, and always keep color-blind accessibility in mind. Not only is this important so that you can present your science clearly, but the quality of figures are often used as the basis for making a first impression. I personally spend an obscene amount of time making figures, and you should expect to do the same. All publication-quality figures must be made using Adobe Illustrator. Do not use PowerPoint (.ppt) for figures. Figures should be reproducible, editable, and suitable for direct submission to journals. Kaavya is always happy to help with figures, also she has friends (Prof. Danny Hilger, who is absolutely the best figure maker on this planet!) who can give good critic.

WRITING

Developing good writing skills is essential. I am happy to work closely with you to help hone your scientific writing. When drafting a new manuscript, a good strategy is to work independently on the first few drafts. Once you have a version that is reasonably well developed—conceptually organized, scientifically accurate, and written in your own voice—that is the optimal point to share it with me. Subsequent rounds of editing and refinement will then be done together. A note on the use of AI tools such as ChatGPT:

these can be valuable resources and are appropriate to use for brainstorming, outlining, or clarifying ideas. However, any text that is clearly generated by ChatGPT and submitted without substantial intellectual input, rewriting, and ownership from you will not be acceptable. If a draft reads like unedited AI-generated text, it will be trashed. Your writing must reflect your own thinking, understanding, and scientific judgment. Learning to write clearly and rigorously is a core part of your training and cannot be outsourced.

PRESENTATION

The development of strong public speaking skills is critical, and this training begins with lab meetings. Our lab is scientifically diverse, so you should never assume that everyone already knows the background of your project. Just as you would for any seminar aimed at a broad audience, your lab meeting presentation should include a clear introduction to the scientific context of your work and to the techniques you are using. I take lab meetings very seriously and expects you to present ongoing work, especially work that is incomplete. Lab meetings are not just for polished results. You should present challenges you are currently facing (or have faced), how you attempted to resolve them, what worked, what did not, and how you envision the project moving forward. Be prepared for questions and discussion throughout your presentation—the more questions you are asked, the better your lab meeting went. After each lab meeting presentation, you are required to provide me with your presentation file. This allows her to track your progress over time and provide more effective mentorship. When preparing a talk for an important venue (conference, seminar, or interview), always give a practice talk in advance of the scheduled presentation. Your advisor, lab mates, and colleagues are generally happy to help. Be mindful of the allotted time for your talk—do not undermine yourself by exceeding it. During the question period, answer questions concisely; avoid giving a five-minute answer to a one-minute question.

17 The modern research landscape (and certainly the culture of the Krishna Kumar Lab) does not look like science 100 years ago, when scientists could publish work based on other people's data without properly naming or acknowledging them and still go on to win a Nobel Prize. That is not how science works today. Modern science is almost always a team effort. Projects move forward because of the combined intellectual and

experimental contributions of many people, and every piece of work matters. We take authorship and credit very seriously. Authorship in this lab will follow established guidelines (e.g., APA/ICMJE principles) and will be based on contribution, not seniority or job title. In general, students or postdocs who initiate and drive a project will be first authors, but authorship order will always depend on the actual work performed. Expectations around authorship will be discussed openly and early, and revisited as projects evolve. Clear, honest conversations about credit are essential for maintaining trust, fairness, and a healthy lab culture.

18 Plasmid inventory: On each lab clean-up day (the first Friday of every month), you are expected to provide the lab technician with any new plasmids you generated during the previous month for inclusion in the lab inventory. Maintaining an up-to-date plasmid database is essential for reproducibility, continuity of projects, and efficient sharing of resources within the lab.

19 Make sure you have access to the following resources during your first week in the lab:

Benchling	Lab Calendar	Microsoft Teams

If you are missing access to any of these, please ask me or another lab member for help getting set up.

02 Specific Expectations

PI (Kaavya Krishna Kumar)

- I will support you scientifically, professionally, and financially to the best of my ability.
- I will provide timely, constructive feedback on project ideas, posters, talks, manuscripts, figures, and grant applications.
- I am accessible in person, by Zoom, and by email (and by phone for urgent matters) to discuss your research and any other issues you wish to raise.
- I will actively support your career development by promoting your work, introducing you to colleagues in the field, writing strong (and honest) letters of recommendation, and supporting conference attendance as finances allow.
- I will help you prepare for the next stage of your career, whether that is a postdoctoral position, faculty role, or a position outside academia.
- I am committed to your well-being as a whole person and will prioritize your emotional and mental health alongside your scientific training.
- Just want to reiterate this: If you are struggling—scientifically, professionally, or personally—please come talk to me early. Problems are almost always easier to address before they become crises. You do not need to have solved the problem or know exactly what you need before starting the conversation. Open and timely communication allows me to support you more effectively.

At the same time, for scientific questions, spend some time trying to answer it yourself. Read the relevant paper, review the protocol, examine your data, and think through the possible explanations. Come prepared to explain what you have already considered and what you think the next step might be. I am always happy to discuss science and help troubleshoot, but these conversations are much more productive—and much better for your development—when you have already done the first round of thinking.

Postdoc

- I expect you to focus on the research direction we agreed upon when you joined the lab, while recognizing that projects naturally evolve as new discoveries are made. I welcome discussions about new ideas and directions, but when projects are supported by my funding, I expect to be actively involved in decisions regarding their scope and direction.
- I strongly encourage you to apply for fellowships and grants to support your research, even when your work aligns with ongoing projects in the lab. Developing the ability to communicate and secure support for your scientific ideas is one of the most valuable aspects of postdoctoral training and an important component of future academic or research careers. While I am committed to supporting your research financially, I also expect you to make a genuine effort to pursue external funding opportunities.
- I encourage every postdoctoral fellow to mentor junior members of the laboratory, including graduate and undergraduate students. Effective mentorship is an essential part of scientific training and provides valuable experience for future leadership roles.
- I will respect your time, and I ask that you respect mine. Please be punctual for scheduled meetings or let me know in advance if you are running late or need to reschedule.
- Remind Kaavya that different scientific opinions can co-exist in the same lab!

Students

- Your primary responsibility is to make steady progress toward your dissertation. It is easy to become absorbed in coursework, teaching, or other responsibilities, but by the end of your PhD your goal is to have completed a high-quality dissertation.
- Develop increasing scientific independence. While I will provide guidance and mentorship, I expect you to take an increasingly active role in designing experiments, interpreting results, troubleshooting challenges, and identifying the next steps in your research.
- Communicate openly and regularly. Keep me informed of your progress, experimental challenges, and career goals. Open communication helps us solve problems early and ensures you continue making steady progress toward your degree.
- Take ownership of your training. It is your responsibility to prepare for qualifying exams, committee meetings, fellowship applications, and dissertation milestones in a timely manner. I will help you every step of the way, but ultimately you are responsible for staying on track. Welcome to being an Adult!

Technicians

- Maintain accurate and organized laboratory documentation. You are the go-to person for many day-to-day laboratory operations, so I expect protocols, inventories, records, and other shared documents to be well organized, up to date, and easy for everyone in the lab to use. Good documentation is essential because the entire lab relies on it.
- Support the laboratory's research activities. You will typically be assigned to specific projects, but I also expect you to assist other lab members with experimental materials, data collection, and data analysis when needed. You will also help ensure that common reagents, supplies, and laboratory stocks are maintained so experiments can run smoothly.

03 Lab Offboarding

All good things must come to an end. Before leaving the lab, please ensure that the following have been completed:

01 **Organize and transfer your research data.** Ensure that all raw data, processed data, analysis scripts, code, notebooks, and protocols are organized and stored in a shared location (e.g., Box or an approved public repository, where appropriate). Please make sure I know where everything is located.

02 **Transfer research materials.** Return all plasmids, constructs, cell lines, and other reagents to their appropriate storage locations, and ensure that they are clearly labeled and documented so others can readily use them.

03 **Update project documentation.** Leave clear documentation describing the status of your projects, ongoing experiments, and any important protocols, troubleshooting notes, or future directions to facilitate a smooth transition.

04 **Return laboratory property.** Return any laboratory equipment and materials, including books, computers, computer accessories, keys, ID cards, field equipment, or other items belonging to the lab or institution.

05 **Complete an exit meeting.** Schedule an exit meeting with me before your departure to review your projects, discuss transition plans, and provide feedback on your experience in the lab.

Science is hard! You come into the lab everyday to fail. BUT Science is fun! And that's why you are here!