Group Literature Review Part 1: Review Paper

1. Find the target review paper

Each member finds **ONE** review paper on your research topic

- Search academic databases (PubMed, Google Scholar, Web of Science)
- Use keywords: "[topic] + review" or "systematic review"
- Focus on recent papers (last 5 years)

Example prompts:

- *"Help me find recent systematic reviews on machine learning in pathology from 2019-2024. Can you find it or what search terms I could use Google Scholar?"*
- *"I need to find comprehensive review papers on AI in dentistry published in the last 5 years. Suggest specific keywords, author name and institutions."*

2. Skim the review paper: Read key sections of your paper

- **Abstract**: main findings and scope (*"Summarize this abstract, **CHECK** if your understanding fit the summarization"*)
- **Conclusion**: key takeaways and future directions (*"What are the main conclusions? What are the main research interests? What's the future direction? **CHECK** if those are real"*)
- **Introduction**: background context and research gaps (*"Summarize the background and the research gap in the introduction, **CHECK** if your understanding fit the summarization"*)
- **Implications**: how is this relevant for my research interest? (*"I am interested in XXXX, is there any material from this paper that may be useful? **CHECK** if those are real "*)

3. Answer the questions by each mamber:

- **Scope**: What does this review cover (technique? clinical implication? future direction?)
- **Main fidings**: Key arguments and concepts?
- **Background gaps**: What knowledge are you missing?
- **Relevance**: How does this relate to our research interest?

4. Discuss and Vote

Discuss & select the best target review paper, groups should consider comprehensiveness (does it cover the key aspects of your topic?), recency (is it current enough to reflect latest developments?), methodological rigor (is it systematic with clear selection criteria?), and alignment with research interests (does it identify gaps you want to explore?).

5. Take Home: each group member identify the original articles most relevant to your research interest from the review papers (or from other sources)

Paper title	***Artificial intelligence for natural product drug discovery* (N*ature Reviews Drug Discovery)***
Scope	• this AI in drug discovery reviews focusing on the intersection of AI with natural product drug discovery, (in contrast with synthetic drug discovery more broadly) • this review concentrates on how AI can unlock the vast biosynthetic potential encoded in genomes of natural products. • The scope across the entire natural products pipeline - genome mining - structural characterization - predicting biological activities
Main findings	**Why it matters:** ML algorithms can identify DNA sequences that code for natural product production pathways. It can also help to determine the chemical structures and predict potential biological targets. **Popular Models:** Due to limited data, simpler machine learning models often outperform complex DL approaches. Pre-trained models from larger chemical databases and combining genetic & biological may help. **Limitations:** lack of large, high-quality standardized datasets, biological activity data severely limited compared to chemical structure information. **Future outlook:** focusing resources on building sustainable data infrastructure and standardized sharing protocols, while strategically targeting specific natural product space
Background gap:	• natural product drug discovery vs synthetic drug discovery • what is Graph neural networks, Word2vec • what is genome mining, structural characterization…..
Implication to my research interest	Can generative models or data augmentation help the solve the data problem? Can pretrained model (like Alphafold) help in this? What's the most promising direction of utilizting DL?
Original articles of interest	1. Stokes et al. (2020) - "A deep learning approach to antibiotic discovery" (Cell) 2. Jumper et al. (2021) - "Highly accurate protein structure prediction with AlphaFold" (Nature) 3. Medema & Fischbach (2015) - "Computational approaches to natural product discovery" (Nature Chemical Biology)