What can we learn about our health using machine learning?

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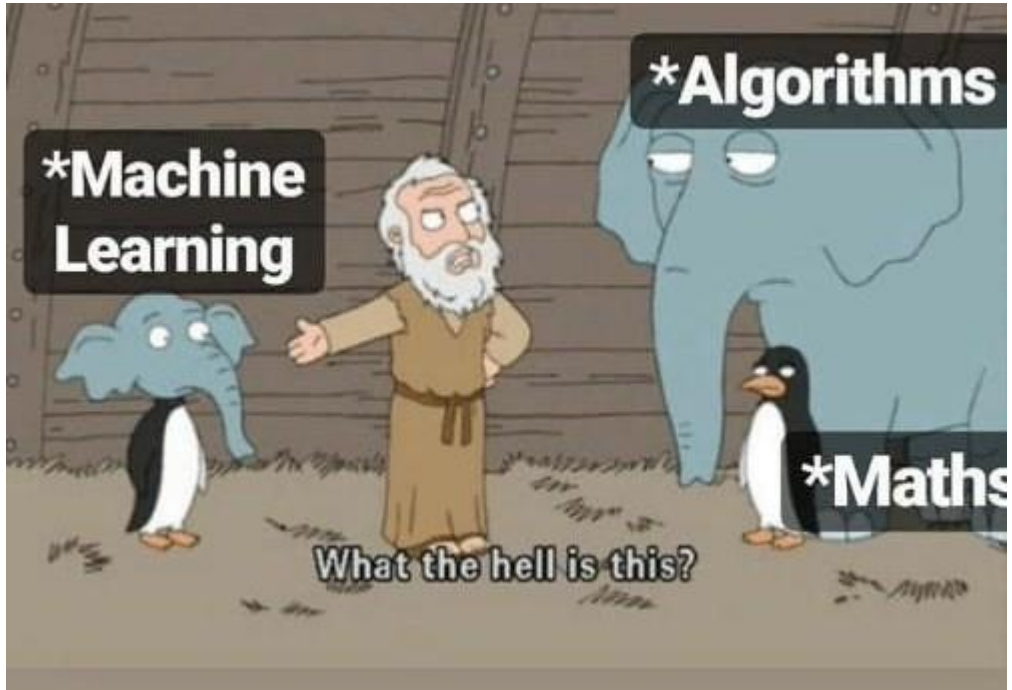
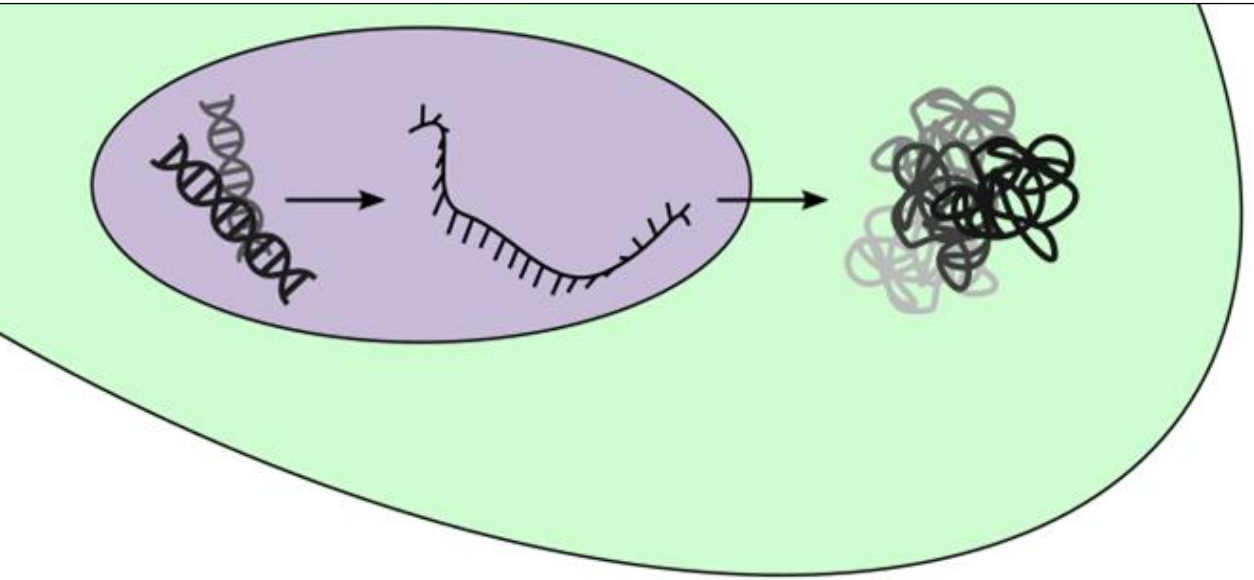
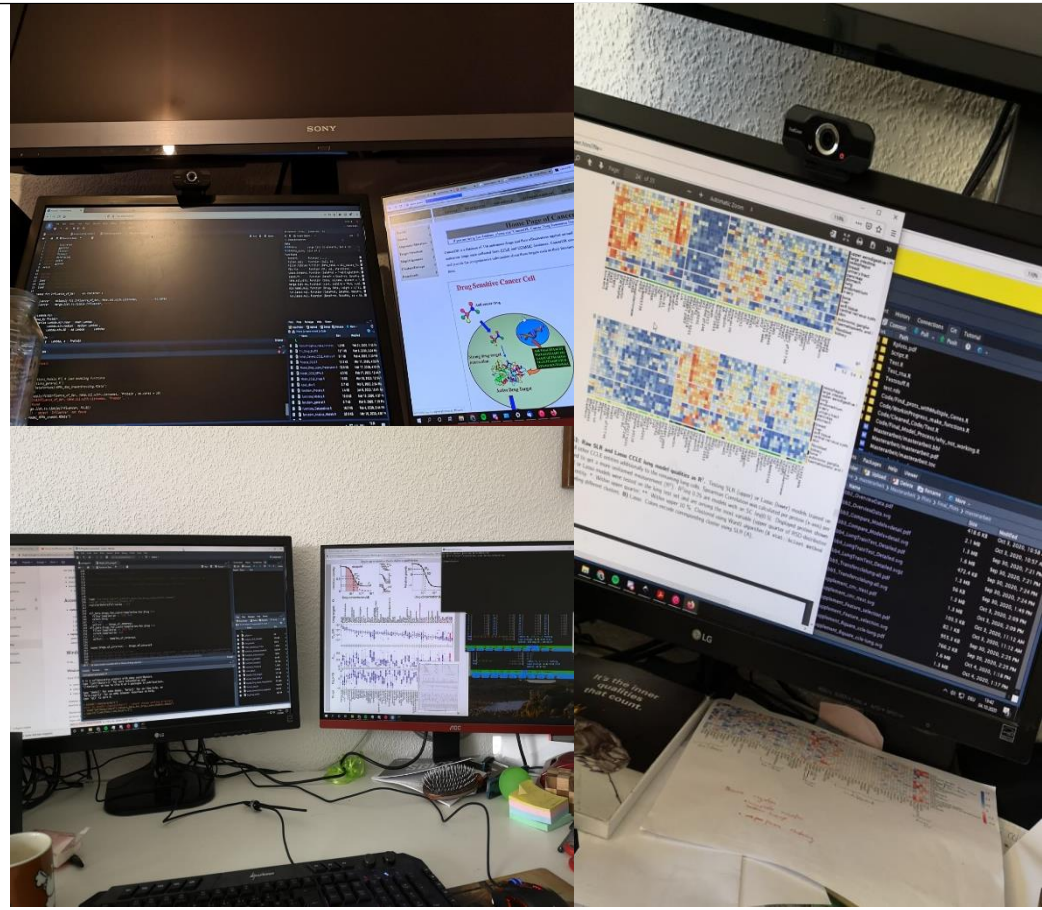


Master project – Predicting protein levels in cancer

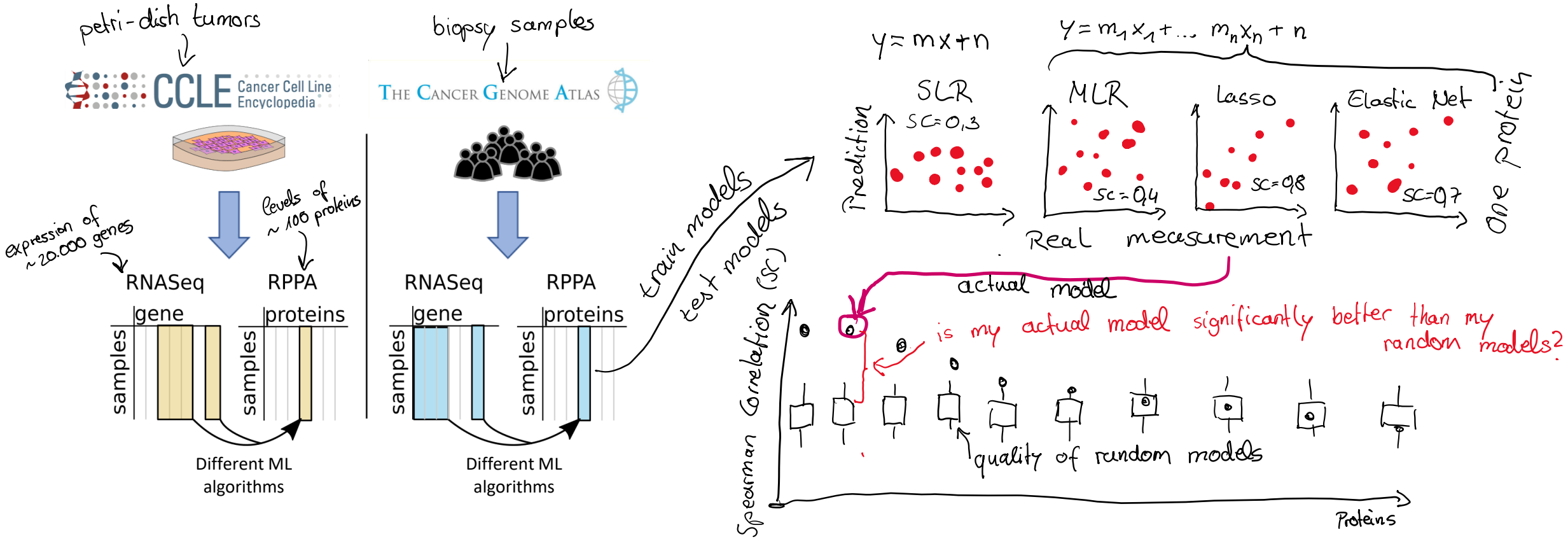




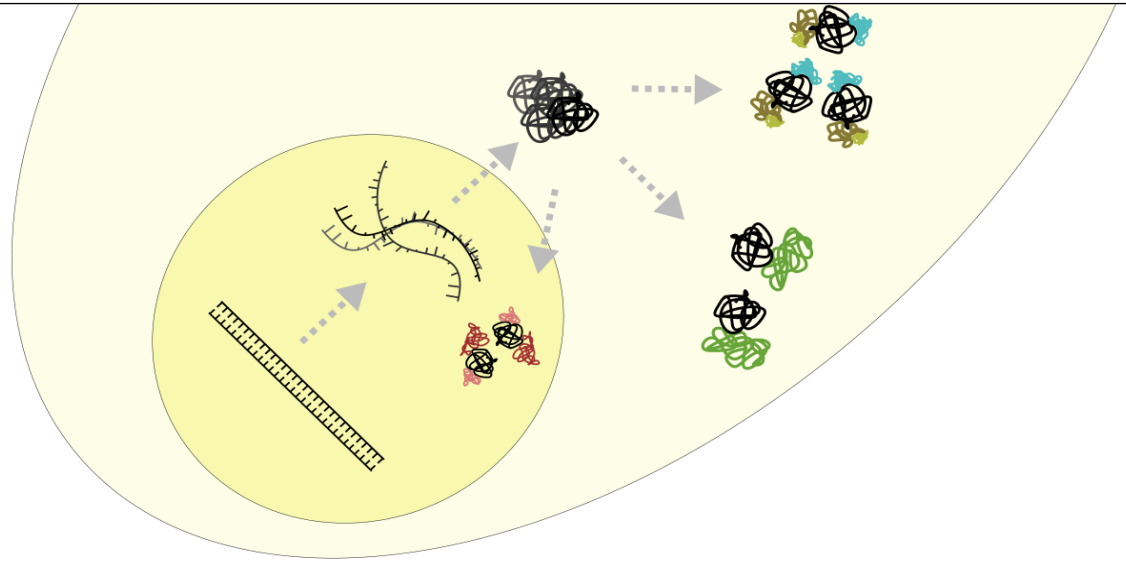
- Drugs act on (phospho)protein levels which are not measured
- Poor correlation between expression of (phospho)protein and encoding mRNA[1]

[1]Gygi et al. (1999): *Correlation between Protein and mRNA Abundance in Yeast*. Molecular and Cellular Biology;

Master project – Predicting protein levels in cancer



PhD project – Towards high-throughput analysis of protein-protein-interactions



German consortium aiming to implement MS in clinics:
MSCoreSys - Massenspektrometrie in der Systemmedizin
https://www.mscoresys.de/

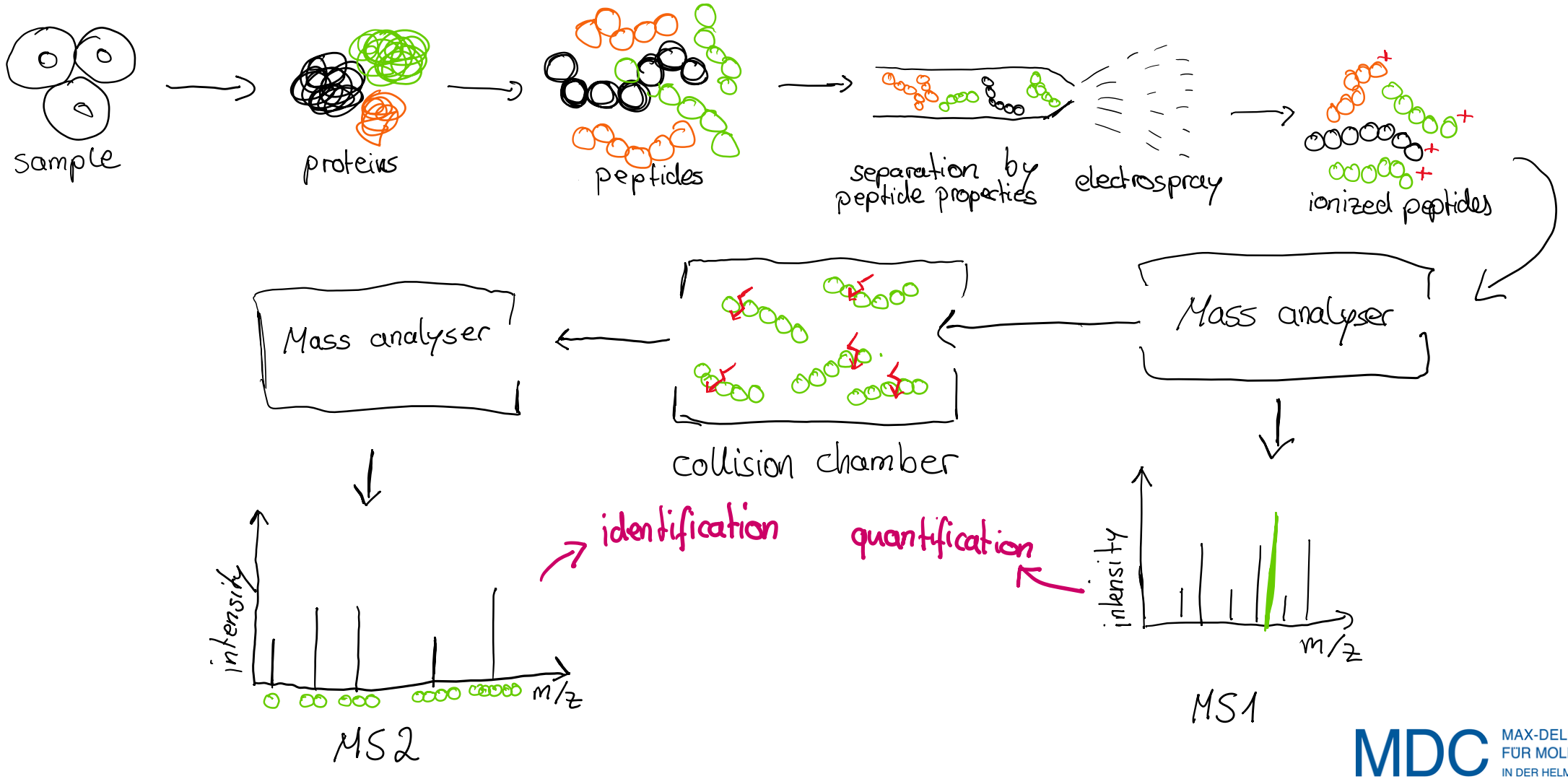
MSCORESYS
SMARTCARE MSTARS CLINSPECT-M DIASYM

- Protein-Protein-Interactions regulate cellular signaling and are abberant in many cancers
- Understanding change in PPI might lead to discovery of new drug targets[1,2]
- Implementing a screening in clinical settings might allow better treatments
- Understanding disease needs high amounts of data of different levels so we aim to implement mass spectrometry (MS)

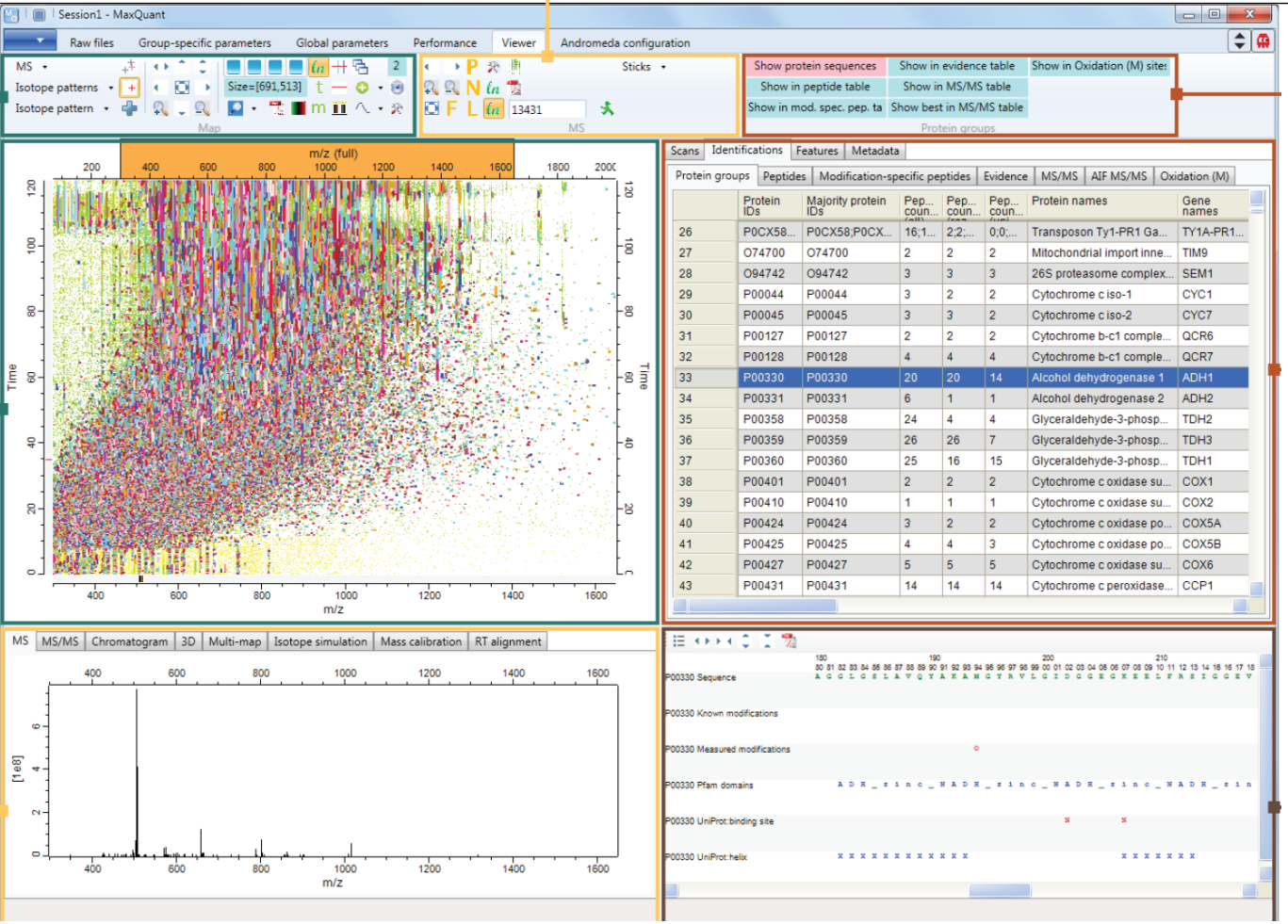
[1]Lu et al. (2020): Recent advances in the development of protein–protein interactions modulators: mechanisms and clinical trials.
[2]Socinski et al. (2018): Atezolizumab for First-Line Treatment of Metastatic Nonsquamous NSCLC.

MSTARS MDC MAX-DELBRÜCK-CENTRUM FÜR MOLEKULARE MEDIZIN IN DER HELMHOLTZ-GEMEINSCHAFT

Using Mass Spectrometry to analyse proteins



Using Bioinformatics to deal with large amounts of data



- Powerful tools to identify the ~ 20.000 peptides and deduct the proteins they build
- Even more effort to quantify the proteins (peak intensity isn't directly correlated to amount of protein)
- Use statistics and ML to analyze and integrate the data

Picture from MaxQuant Website: https://www.maxquant.org/

Take Home Messages

- You don’t need to know what you want to do after finishing school.
- Use every opportunity you have to check out different fields!
- It’s never too late to learn programming.