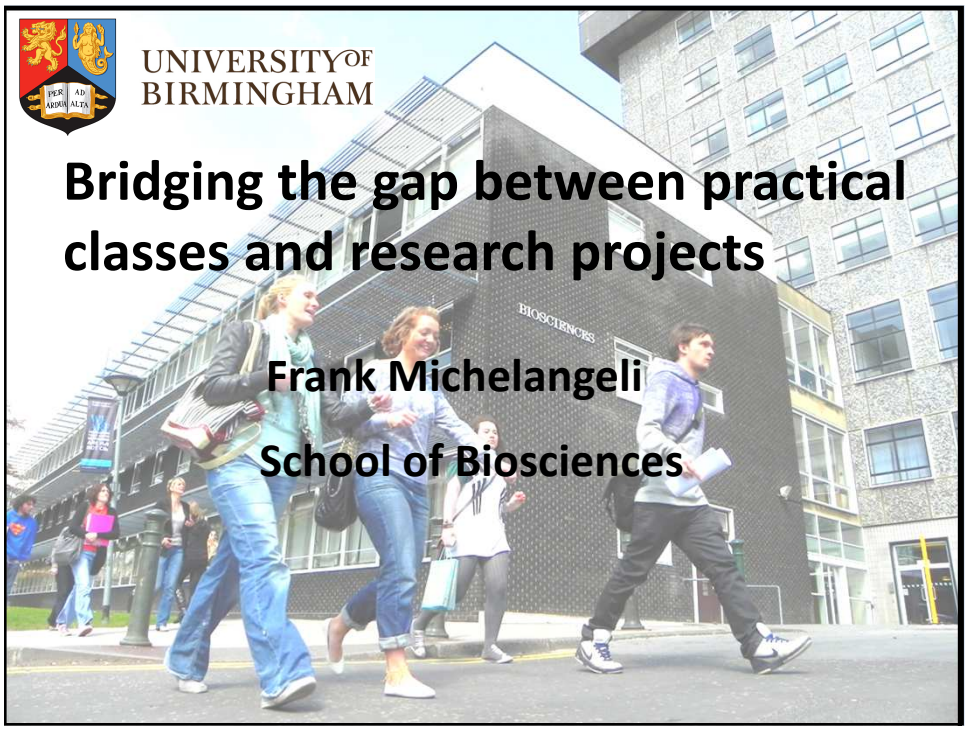

Background

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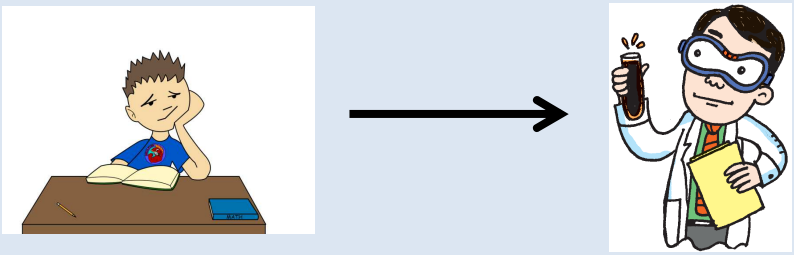
- Many students do not engage with practical classes
- Find them either boring / fomulaic or 'never work'
- Do not equip them to do 'real' research, ie poor lab skills
- They are daunted by having to undertake extensive data analysis / problem solving.
- They do not feel confident in undertaking a lab based research project & therefore opt for alternatives.



Student who lacks confidence

Confident engaged research student

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Bio340: Experimental design, Analysis & Interpretation of biochemical data

3rd year compulsory 20 credit module for all **Biochem** undergraduates

Module objectives:

- Reinforce key analysis skills ie data analysis, statistics, etc that were covered in earlier years (numeracy, critical thinking)
- Develop molecular analysis skills (high end IT skills)
- Develop data interpretation skills of both their own and published scientific data.(analytical, critical thinking, problem solving skills)
- **Develop experimental design skills (within a research setting)**
- **Reinforce lab skills** (subject-specific practical skills)
- **Develop scientific recording and scientific paper writing skills** (scientific communication skills)

Aims:

- Build lab confidence
- Develop / reinforce basic lab skills
- Think about experimental design
- Think about appropriate controls / replicates etc
- Train them to keep a detailed record of results and analysis
- Allow them to test their own hypotheses.

Open-ended 'research' practical

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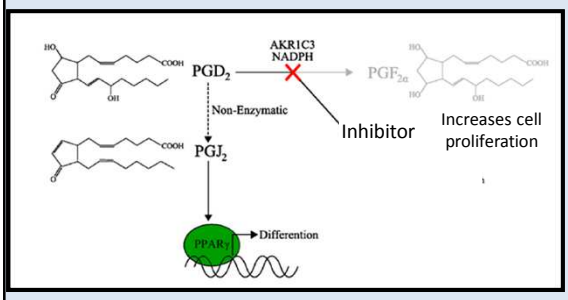
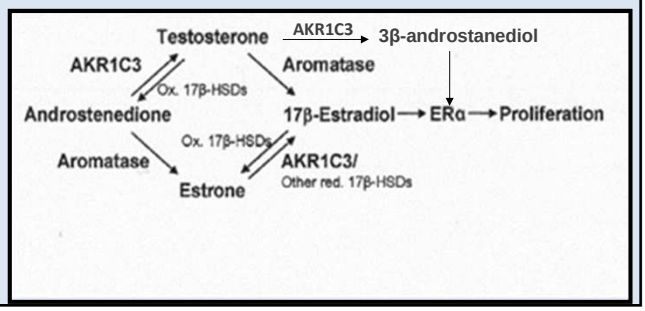
Aldo-keto reducatase 1C3 (AKR1C3) is potential drug target for treating cancers.



- AKR1C3 is an oxido-reducatase that uses NADPH.
- It is promiscuous and utilises a range of substrates including steroid hormones and prostaglandins in cells.
- The products formed cause cell proliferation.
- Highly abundant in some cancers.



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Outline of the practical component

Aim: To Identify novel substrates or inhibitors (ie drug discovery)

Purify AKR 1C3-His tagged from *E coli*	**Day 1**
Check concentration	**Day 2**
Check purity and MW	**Day 2/3**
Set up and check activity & kinetic parameters	**Day 3**
Assess a range of potential 'novel' compounds for substrate or inhibitor activity	**Day 4**

Approx 20 lab hours

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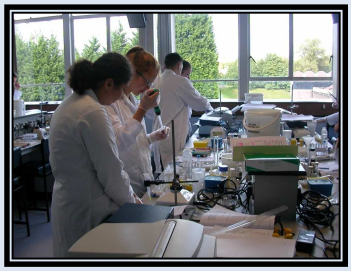
Planning

Team work



Making their own buffers

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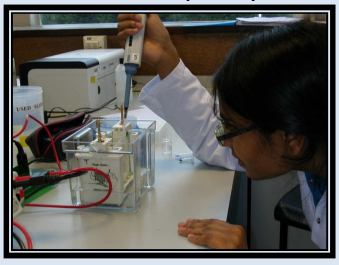
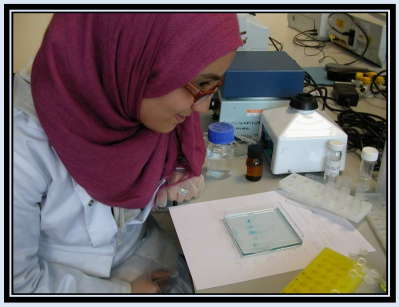
Protein purification of His-tagged AKR 1C3

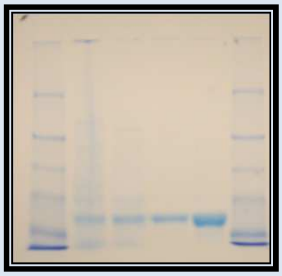
[Protein] Determination

Protein purity



Protein Analysis





Lots & lots of enzyme assays to optimize rate measurements & test a range of potential substrates or inhibitors

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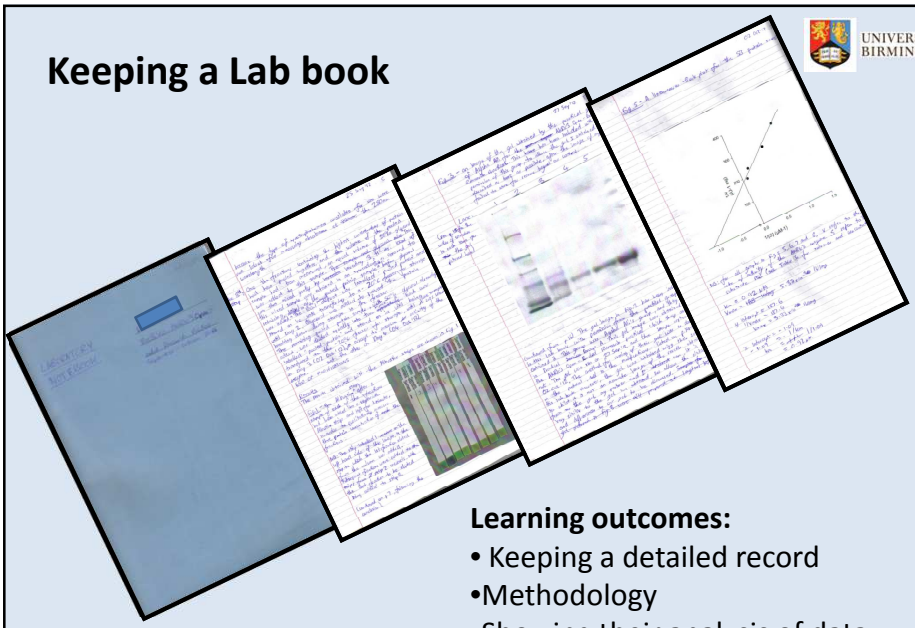
Keeping a Lab book



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Learning outcomes:

- Keeping a detailed record
- Methodology
- Showing their analysis of data
- Conclusions to each experiment

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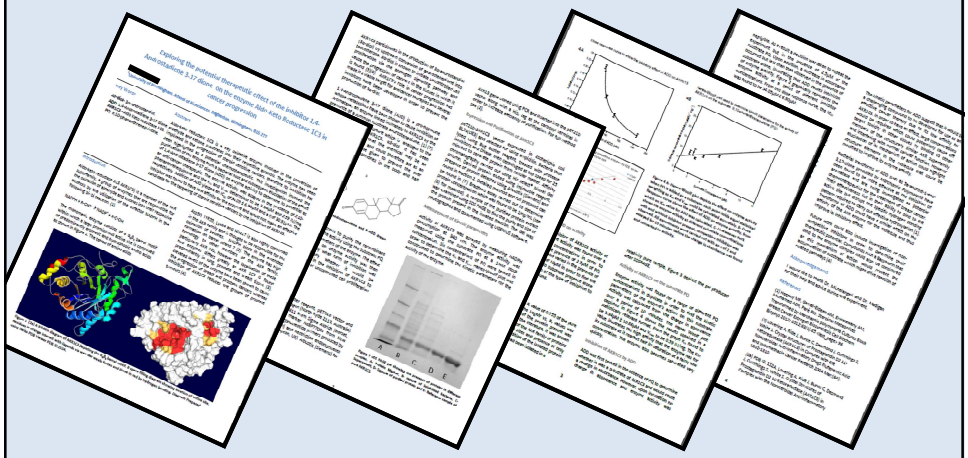
Writing and preparing a paper

Guidance:
Instruction to authors
FEBS Letts



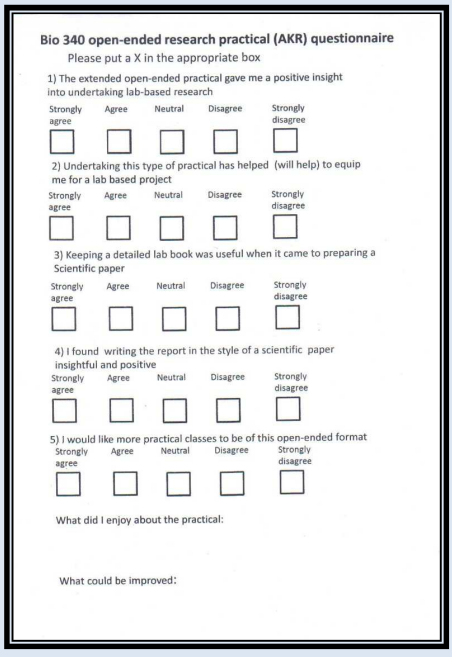
Learning Outcomes :

Telling a story!
Being concise
Using references accordingly

Identifying key information for abstract
Presenting data appropriately
Putting findings into context with literature

Student Questionnaire:

1. Positive insight into scientific research
2. Equip them better for a lab-based project
3. Good practice at keeping a lab book
4. Writing a scientific paper
5. Do more of this type of practical
6. The Bio340 module helped to develop key skills I will need in the future (numeracy, problem solving, practical skills, writing skills, presentation, group work, etc)



Bio 340 open-ended research practical (AKR) questionnaire

Please put a X in the appropriate box

1) The extended open-ended practical gave me a positive insight into undertaking lab-based research

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

2) Undertaking this type of practical has helped (will help) to equip me for a lab based project

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

3) Keeping a detailed lab book was useful when it came to preparing a Scientific paper

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

4) I found writing the report in the style of a scientific paper insightful and positive

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

5) I would like more practical classes to be of this open-ended format

Strongly agree | Agree | Neutral | Disagree | Strongly disagree

What did I enjoy about the practical:

What could be improved:

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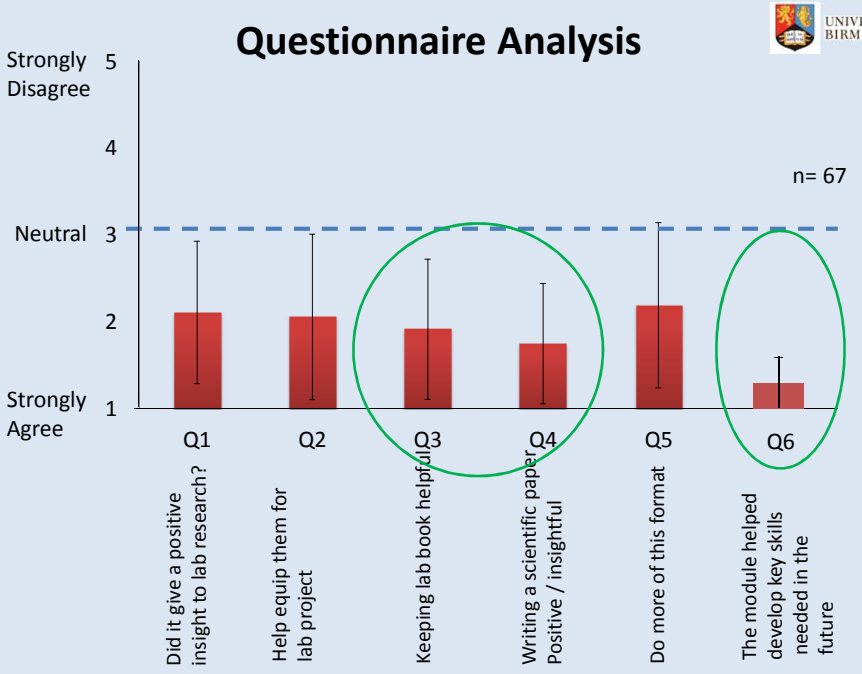
Questionnaire Analysis



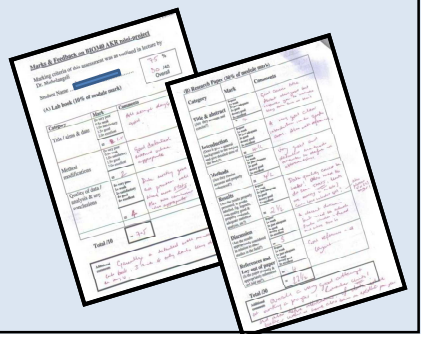
Conclusions

Good points

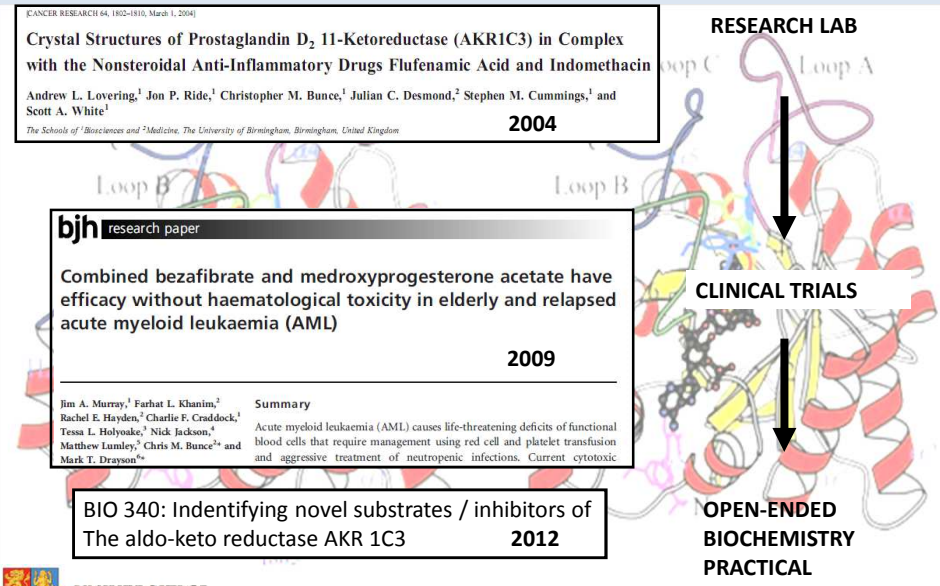
- **Students feel more confident in taking a lab research project**
- **Students feel better equipped to undertake a lab research project**
- Found keeping a detailed lab book helpful
- Found it insightful to write up results in a paper format
- The module helped develop both key generic & specific skills

Bad Points

- Students expect detailed feedback
- Time consuming



A novel approach of integrating research and teaching



BIO 340: Indentifying novel substrates / inhibitors of The aldo-keto reductase AKR 1C3 **2012**

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