Challenging the Metastatic Melanoma Protocol Through the Use of Artificial Intelligence

linkedin.com/in/victoria-rees-bms

Victoria Rees[1], Xu Xuan Lim[1], Konstantinos Vougas[2], Pedro Oliveira[1]

The Christie NHS Foundation Trust[1], DeepPath[2]

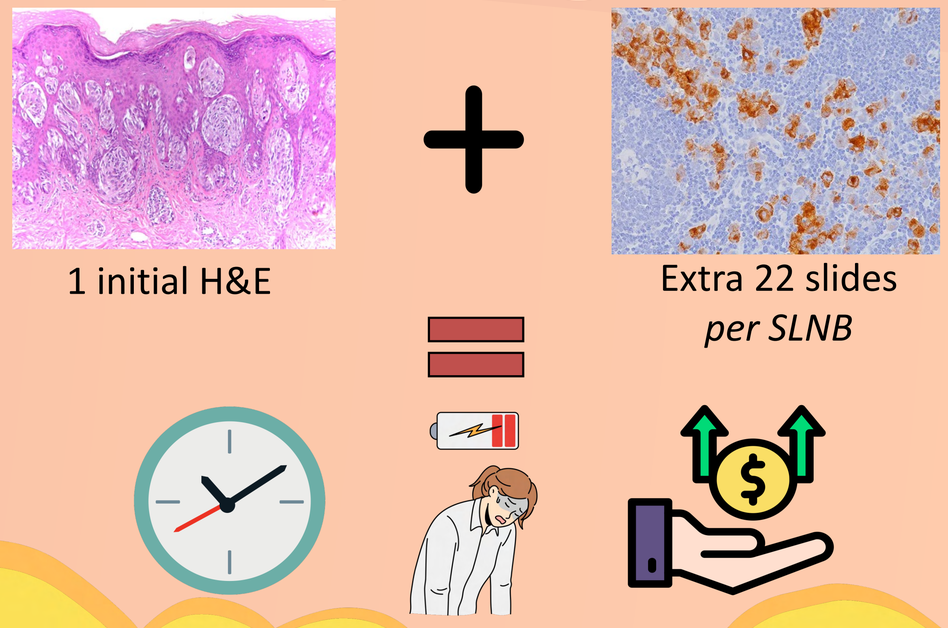
Aims

- Can AI tool, *Lydia*, provide preliminary analysis for melanoma?
- Can this save time and cost?

Background

- Melanoma represents 5% of all cancer diagnoses in the UK
- It is the most dangerous form of skin cancer
- H&E and immunohistochemistry remain the gold standard for analysis
- *Lydia* (DeepPath) algorithm trained to spot melanoma

Current Issues



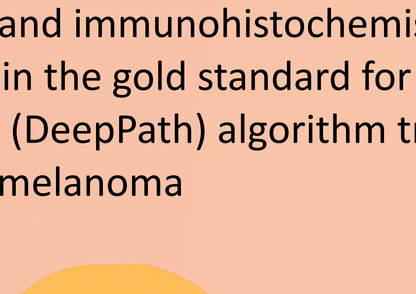
Methods

59 Confirmed Met H&E cases

Algorithm measurement output vs Pathologist

Study No	Report (mm)	AI (mm)
1	1.4	1.76

Costs and time comparison current vs proposed protocol



Current Protocol			
1	H&E	13	S100
2	S100	14	Melan-A
3	Melan-A	15	USS
4	H&E	16	H&E
5	S100	17	S100
6	Melan-A	18	Melan-A
7	USS	19	USS
8	H&E	20	H&E
9	S100	21	S100
10	Melan-A	22	Melan-A
11	USS	23	USS
12	H&E		

New Protocol			
1	H&E	13	S100
2	S100	14	Melan-A
3	Melan-A	15	USS
4	H&E	16	H&E
5	S100	17	S100
6	Melan-A	18	Melan-A
7	USS	19	USS
8	H&E	20	H&E
9	S100	21	S100
10	Melan-A	22	Melan-A
11	USS	23	USS
12	H&E		

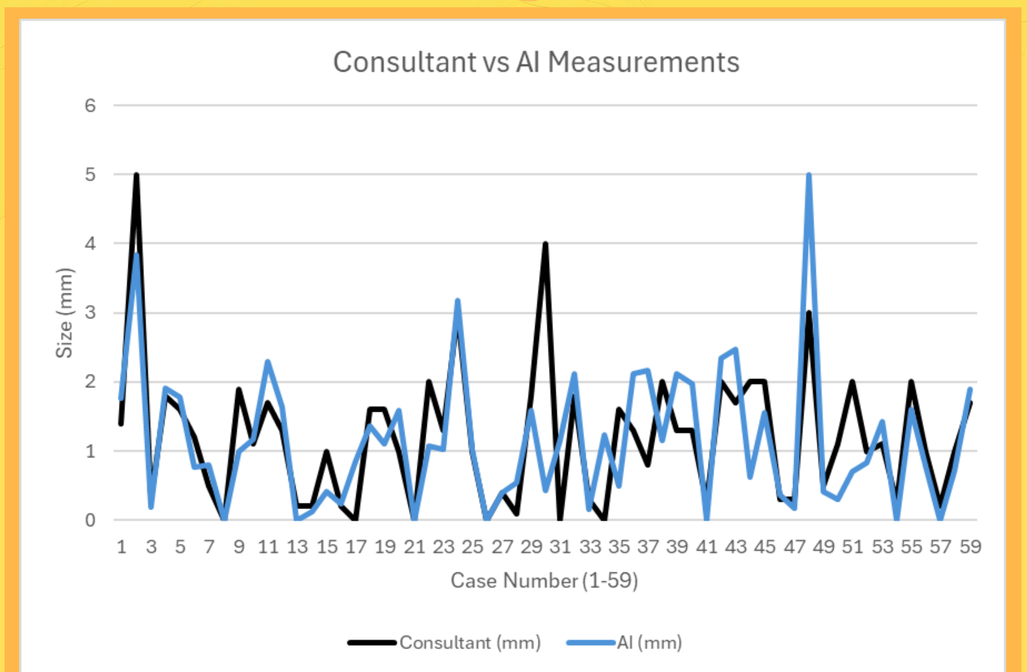
Current:

- Cut 1st H&E, send for analysis
- Cut 22 other slides, stain all except USS

Proposed:

- Cut all slides (1-23), stain 1, 4, 8, 12, 16, 20 H&E initially
- Scan & pre-analyse with *Lydia*

Results



- AI Sensitivity: 88.3% (52/59 cases correctly identified)
- Detected 100% of cases above 0.25mm
- Average size difference between pathologist and AI: 0.19mm
- Smallest difference: 0.01mm (Case 27)
- Largest difference: 1.99mm (case 48)
- Missed cases: 7

Results

Current

Total Slides: 2875

Slides only H&E (1, 4, 8, 12, 16, 20) : 983

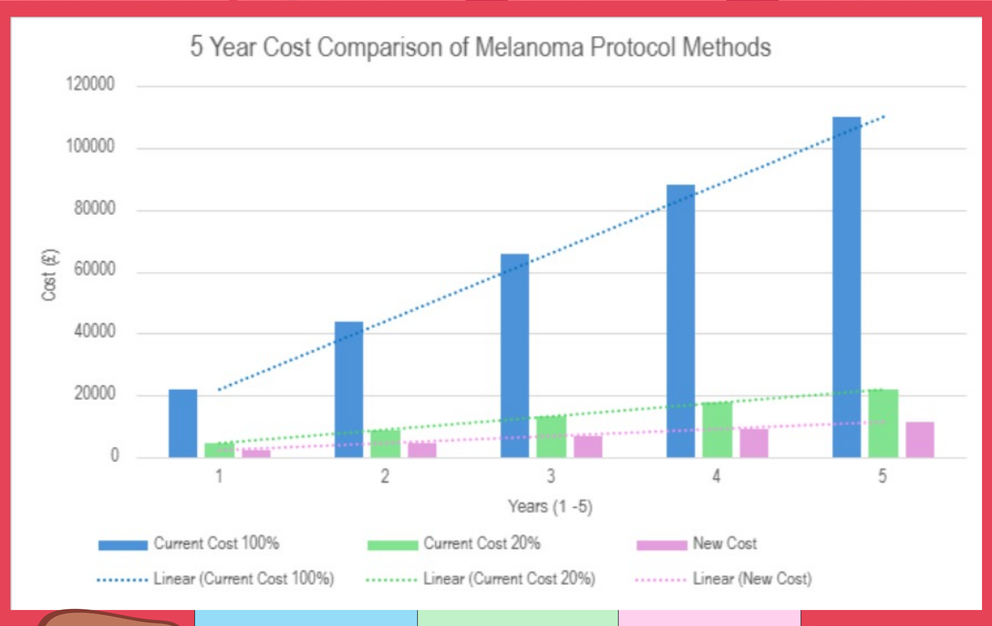
Total Price (all slides): £3865.14

Cost Only H&E: £393.20

Total Days (receipt to IHC report): 1316

Days only performing H&E: 213

Proposed



1 year projection

Current (100%)	Current (20%)	New Cost
£22002.3	4400.46	£3580.92

Conclusion

***Lydia* has a sensitivity in metastatic melanoma detection of 88.3 %**

Up to 90% in cost savings can be achieved using AI methods in current pathology workflows

Possible 84% in time savings from specimen receipt to diagnostic report