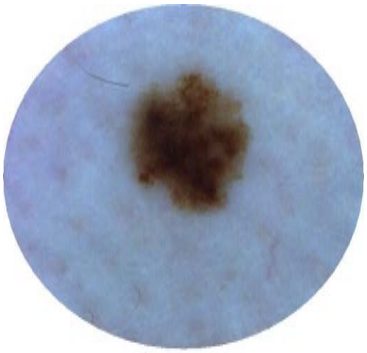
Appendix B: Example SIAgraphs

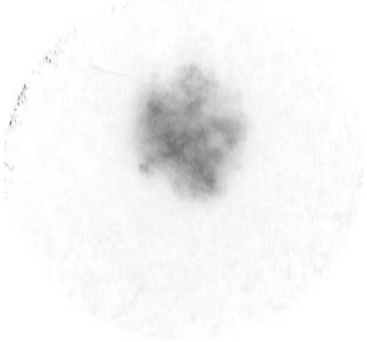
The SIAgraphs of seven lesions are included in this appendix. The first two (fig's B.1 & B.2) are superficial spreading melanomas and are correctly classified by all methods despite the non-specific clinical findings in the latter of the two. This demonstrates the ability for SIAscopy to detect early melanomas. The next two are benign naevi (compound (figB.3) and intradermal (fig B.4) respectively). The compound naevus is correctly classified as a non-melanoma by all methods. The QUEST classification tree misclassifies the latter example despite it being obvious clinically that this lesion is benign and the low probability for melanoma using the SIAscopy and Combined models. This example illustrates the need for clinical supervision when using any didactic or heuristic diagnostic system.

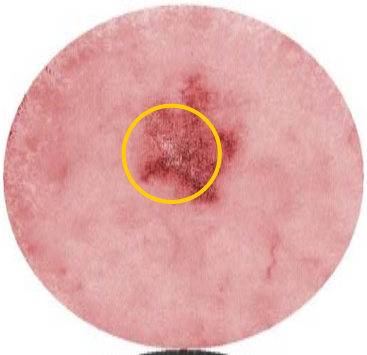
The next three lesions are an *in situ* superficial spreading melanoma (figure B.5), a blue naevus (figure B.6) and a seborrheic keratosis (figure B.7). The melanoma is presented to demonstrate how the scoring methods detect this very early lesion. Key to this is the presence of dermal melanin that would appear to be paradoxical given that the melanoma, by definition, is epidermal. There are several possiblilites for this including the SIAscope detecting the melanophages that were noted in the histopathology report, the presence of pigmentary incontinence or the detection of invasive melanoma that was not seen at microscopy. The blue naevus is presented to demonstrate the fallibilty of a rigid, heuristic approach to diagnosis. This lesion is clearly a blue naevus but is classified as a melanoma by the predictive models. Most noticeable is the abrupt cut-off of the blood displacement with no erythematous blush and the smooth distribution of dermal melanin. Future diagnostic techniques akin to dermatoscopic 'Pattern Analysis' [Perhamberger *et al.,* 1987; Soyer *et al.,* 2001] that will be developed for SIAScopy are likely to correct this problem. The final lesion is presented to demonstrate how SIAscopy might help in the differentiation of macular seborrheic keratosis with early melanoma. Especially noticeable is the absence of dermal melanin, and the lack of disruption to the haemoglobin and collagen distribution when compared to the esurrounding normal skin.

The QUEST classification tree and the logistic regression scoring methods are detailed in Appendix A. The probabilities are derived from the logistic regression equations described in chapter 5.

FIGURE B.1 **Clinical Details**	**Patient:** 43 years old male **Lesion:** 9mm lesion from back **Symptoms:** Change in Size, Shape & Colour & Itching
Diagnosis	**SUPERFICIAL SPREADING MELANOMA**
Histopathological Details	**Breslow Thickness:** 0.8mm **Clark's Level:** IV **Invasion:** Vertical Growth Phase
SIAgraphs (in order from top to bottom)	
Colour SIAgraph	Asymmetrical lesion with evidence of branched streaks at 11 o'clock
Total Melanin SIAgraph	Asymmetric lesion in both border & pigment distribution
Dermal Melanin SIAgraph	Dermal Melanin Present
Blood SIAgraph	Central Blood Displacement & Peripheral Erythematous Blush
Collagen SIAgraph	Collagen Holes (circled)
Scoring & Probabilities	
SIAscopy Model	**Probability:** 0.60 **DIAGNOSIS: MELANOMA**
SIAscopy Scoring Method	**Score:** 5+3+3+1 = **12** **DIAGNOSIS: MELANOMA**
Combined Model	**Probability:** 0.522 **DIAGNOSIS: MELANOMA**
Combined Scoring Method	**Score:** 3+1+1+2= **7** **DIAGNOSIS: MELANOMA**
QUEST Analysis	**DIAGNOSIS: MELANOMA**







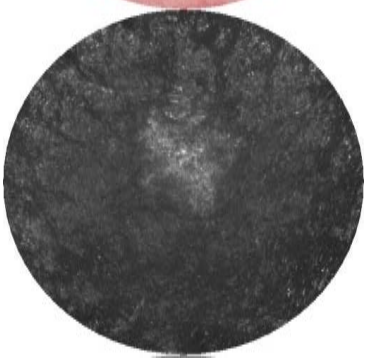


FIGURE B.2 **Clinical Details**	**Patient:** 47 years old female **Lesion:** 9mm lesion from lower leg **Symptoms:** Change in Size, Shape & Colour & Itching
Diagnosis	**SUPERFICIAL SPREADING MELANOMA**
Histopathological Details	**Breslow Thickness:** 0.4mm **Clark's Level:** II **Invasion:** Radial Growth Phase
SIAgraphs (in order from top to bottom)	
Colour SIAgraph	Non-Specific Dermatoscopic Findings
Total Melanin SIAgraph	Asymmetric lesion in both border & pigment distribution
Dermal Melanin SIAgraph	Dermal Melanin Present
Blood SIAgraph	Central Blood Displacement (circled) & Peripheral Erythematous Blush
Collagen SIAgraph	Collagen Holes Absent (Note increased collagen in arranged haphazardly consistent with fibrosis)
Scoring & Probabilities	
SIAscopy Model	**Probability:** 0.375 **DIAGNOSIS: MELANOMA**
SIAscopy Scoring Method	**Score:** 5+3+3+0 = **11** **DIAGNOSIS: MELANOMA**
Combined Model	**Probability:** 0.558 **DIAGNOSIS: MELANOMA**
Combined Scoring Method	**Score:** 3+1+1+3= **8** **DIAGNOSIS: MELANOMA**
QUEST Analysis	**DIAGNOSIS: MELANOMA**

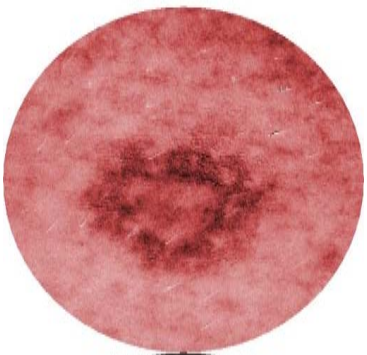


FIGURE B.3 **Clinical Details**	**Patient:** 42 years old male **Lesion:** 6mm lesion from abdomen **Symptoms:** Change in Size
Diagnosis	**COMPOUND NAEVUS**
Histopathological Details	No Atypia
SIAgraphs (in order from top to bottom)	
Colour SIAgraph	Symmetrical lesion regular pigment network
Total Melanin SIAgraph	Symmetric lesion in both border & pigment distribution
Dermal Melanin SIAgraph	Dermal Melanin Absent
Blood SIAgraph	Peripheral Erythematous Blush Central but *NO* Blood Displacement
Collagen SIAgraph	Collagen Holes Absent
Scoring & Probabilities	
SIAscopy Model	**Probability:** 0.017 **DIAGNOSIS: NON-MELANOMA**
SIAscopy Scoring Method	**Score:** 0+0+0+0 = **0** **DIAGNOSIS: NON-MELANOMA**
Combined Model	**Probability:** 0.002 **DIAGNOSIS: NON-MELANOMA**
Combined Scoring Method	**Score:** 0+0+0+2= **2** **DIAGNOSIS: NON-MELANOMA**
QUEST Analysis	**DIAGNOSIS: NON-MELANOMA**

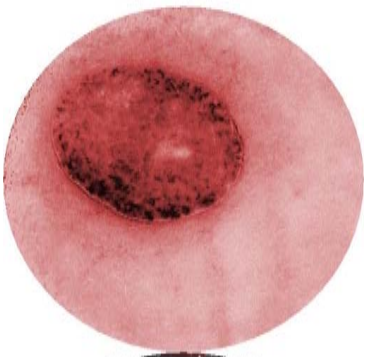
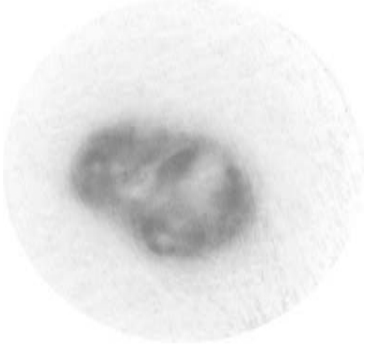
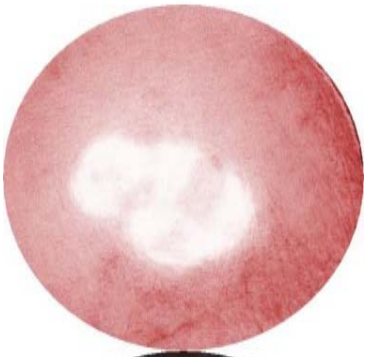


FIGURE B.4 **Clinical Details**	**Patient:** 40 years old female **Lesion:** 10mm lesion from back **Symptoms:** Change in Size
Diagnosis	**INTRADERMAL NAEVUS**
Histopathological Details	No Atypia
SIAgraphs (in order from top to bottom)	
Colour SIAgraph	Symmetrical lesion
Total Melanin SIAgraph	Symmetric lesion in both border & pigment distribution
Dermal Melanin SIAgraph	Dermal Melanin Absent
Blood SIAgraph	Central Blood Displacement & Peripheral Erythematous Blush
Collagen SIAgraph	Collagen Holes Absent
Scoring & Probabilities	
SIAscopy Model	**Probability:** 0.006 **DIAGNOSIS: NON-MELANOMA**
SIAscopy Scoring Method	**Score:** 0+3+0+0 = **3** **DIAGNOSIS: NON-MELANOMA**
Combined Model	**Probability:** 0.005 **DIAGNOSIS: NON- MELANOMA**
Combined Scoring Method	**Score:** 0+1+1+2= **4** **DIAGNOSIS: NON-MELANOMA**
QUEST Analysis	**DIAGNOSIS: MELANOMA** (Lesion Misclassified)

FIGURE B.5 **Clinical Details**	**Patient:** 49 years old male **Lesion:** 8mm lesion from back **Symptoms:** Change in Size & Colour
Diagnosis	**SUPERFICIAL SPREADING MELANOMA**
Histopathological Details	**Breslow Thickness:** In situ **Clark's Level:** I **Invasion:** Radial Growth Phase, Melanophages ++
SIAgraphs (in order from top to bottom)	
Colour SIAgraph	Asymmetrical lesion with evidence of branched streaks at 12 o'clock
Total Melanin SIAgraph	Asymmetric lesion in both border & pigment distribution
Dermal Melanin SIAgraph	Dermal Melanin Present (circled)
Blood SIAgraph	Central Blood Displacement & Peripheral Erythematous Blush
Collagen SIAgraph	Collagen Holes Absent
Scoring & Probabilities	
SIAscopy Model	**Probability:** 0.375 **DIAGNOSIS: MELANOMA**
SIAscopy Scoring Method	**Score:** 5+3+3+0 = **11** **DIAGNOSIS: MELANOMA**
Combined Model	**Probability:** 0.576 **DIAGNOSIS: MELANOMA**
Combined Scoring Method	**Score:** 3+1+1+3= **8** **DIAGNOSIS: MELANOMA**
QUEST Analysis	**DIAGNOSIS: MELANOMA**





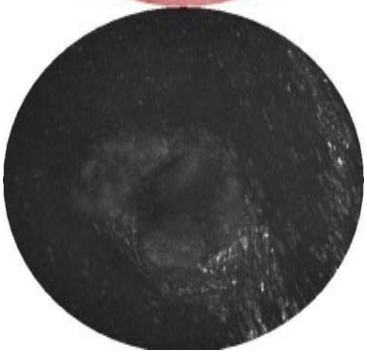


FIGURE B.6 **Clinical Details**	**Patient:** 62 years old female **Lesion:** 11mm lesion from left foot **Symptoms:** Asymptomatic
Diagnosis	**BLUE NAEVUS**
Histopathological Details	Cellular Blue Naevus
SIAgraphs (in order from top to bottom)	
Colour SIAgraph	Clinically obvious blue naevus
Total Melanin SIAgraph	Asymmetric lesion in pigment distribution
Dermal Melanin SIAgraph	Dermal Melanin Present
Blood SIAgraph	Central Blood Displacement & *No* Peripheral Erythematous Blush.
Collagen SIAgraph	Collagen Holes Absent (Note smooth collagen within the lesion)
Scoring & Probabilities	
SIAscopy Model	**Probability:** 0.160 **DIAGNOSIS: MELANOMA**
SIAscopy Scoring Method	**Score:** 5+0+3+0 = **8** **DIAGNOSIS: MELANOMA**
Combined Model	**Probability:** 0.328 **DIAGNOSIS: MELANOMA**
Combined Scoring Method	**Score:** 3+0+1+4= **8** **DIAGNOSIS: MELANOMA**
QUEST Analysis	**DIAGNOSIS: MELANOMA**

FIGURE B.7 **Clinical Details**	**Patient:** 46 years old female **Lesion:** 12mm lesion from abdomen **Symptoms:** Asymptomatic
Diagnosis	**SEBORRHEIC KERATOSIS**
Histopathological Details	No Additional information
SIAgraphs (in order from top to bottom)	
Colour SIAgraph	Symmetrical lesion with no pigment network
Total Melanin SIAgraph	Symmetric lesion in both border & pigment distribution
Dermal Melanin SIAgraph	Dermal Melanin Absent
Blood SIAgraph	Blood Displacement with Peripheral Erythematous Blush Absent
Collagen SIAgraph	Collagen Holes Absent (Note Collagen no different from surrounding skin)
Scoring & Probabilities	
SIAscopy Model	**Probability:** 0.017 **DIAGNOSIS: NON-MELANOMA**
SIAscopy Scoring Method	**Score:** 0+0+0+0 = **0** **DIAGNOSIS: NON-MELANOMA**
Combined Model	**Probability:** 0.006 **DIAGNOSIS: NON-MELANOMA**
Combined Scoring Method	**Score:** 0+0+0+3= **3** **DIAGNOSIS: NON-MELANOMA**
QUEST Analysis	**DIAGNOSIS: NON-MELANOMA**