3-Point Checklist of Dermoscopy
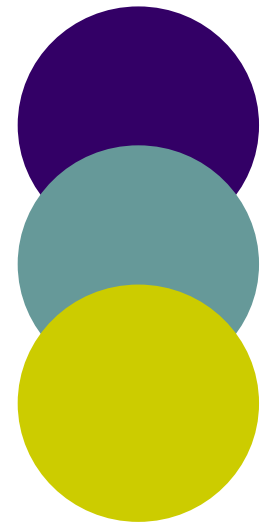
By G. Argenziano, MD

Asymmetry of color/structure
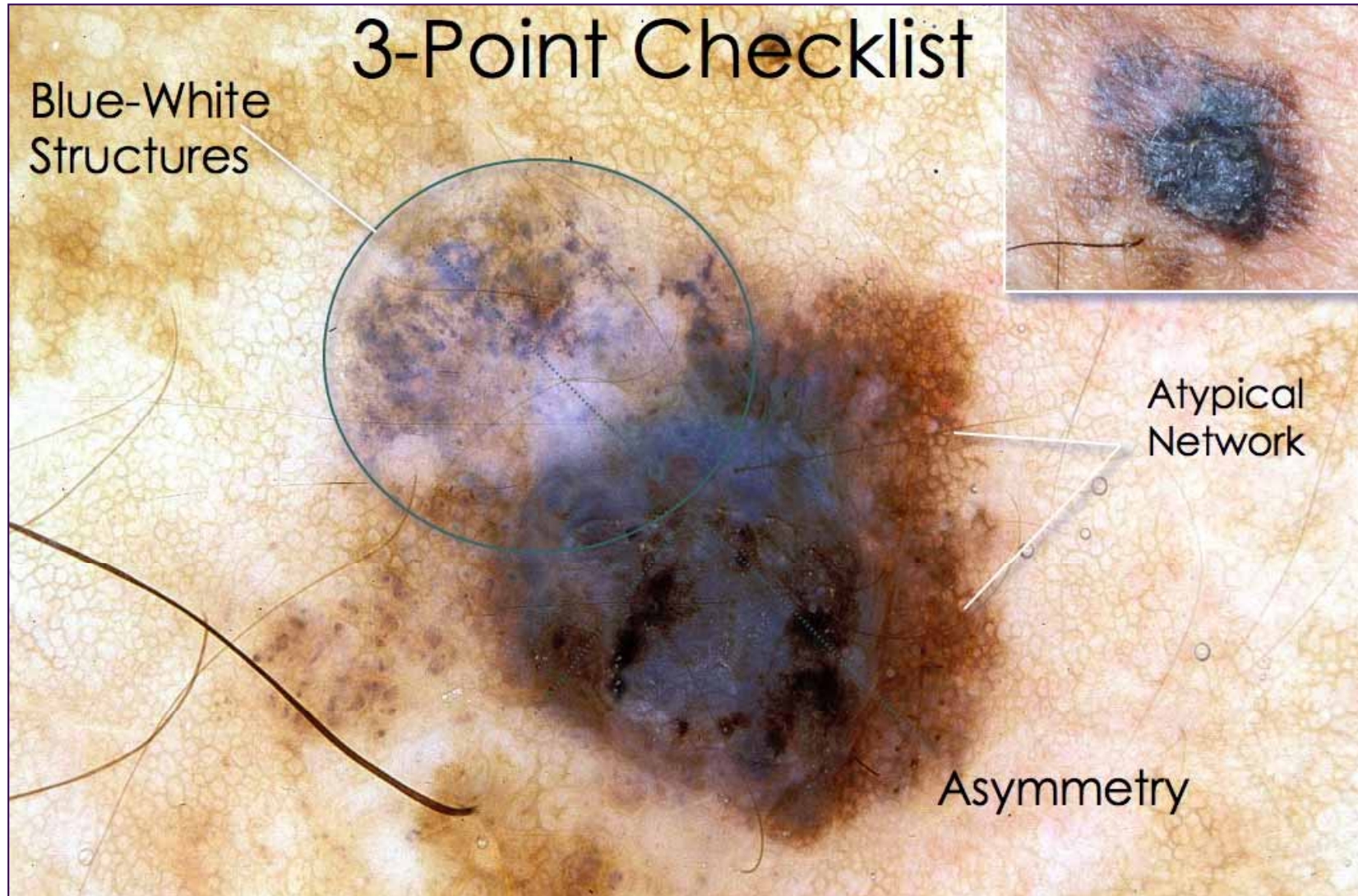
Atypical network

Blue-white structures

Suspicious lesion = at least 2 points

The criteria

3-Point Checklist

Blue-White Structures

Atypical Network

Asymmetry

Melanoma

- is a life-threatening disease that is completely cured if removed in its early stages. Therefore, removal of all lesions that clinically and/or dermoscopically might be suspicious for melanoma is warranted, while minimizing the excision of benign lesions. In the last years two systematic reviews revealed that dermoscopy, at least for experienced users, is more accurate than clinical examination for the diagnosis of melanoma. The fact that dermoscopy needs experience and that it is best used by well-trained dermatologists has already been underscored before.

- In order to spread the use of **dermoscopy** to all physicians dealing with pigmented skin lesions (PSL) various attempts have been made in the last years by developing more or less simplified methods for the dermoscopic diagnosis of melanoma. All these methods were focusing on the diagnostic value of the procedure. However, the primary purpose of dermoscopy should be to determine whether a lesion needs to undergo a biopsy procedure or, as proposed recently, a digital follow-up examination rather than the more difficult one of maximizing diagnostic accuracy. In the hands of primary care physicians the primary purpose of dermoscopy could simply be to determine whether a lesion needs to undergo a more detailed evaluation carried out by experienced dermoscopists.

The consensus net meeting on dermoscopy

- Based on the results of a recent internet-based study on dermoscopy, known also as Consensus Net Meeting on Dermoscopy (CNMD), the set of dermoscopic criteria that are relevant for making a diagnosis, particularly for distinguishing melanoma, in the evaluation of PSL has been redefined (See also www.dermoscopy.org). Results of this CNMD study showed that three criteria were especially important in distinguishing malignant from benign PSL.

- These three criteria are (i) **asymmetry**, (ii) **atypical pigment network**, and (iii) **blue-white structures** (a combination of the earlier categories of blue-whitish veil and regression structures). Moreover, these three criteria also had a good interobserver agreement, namely, a kappa value of 0.41 for asymmetry, a kappa value of 0.45 for atypical pigmented network and a kappa value of 0.51 for the newly defined blue-white structures.

- Also, a preliminary calculation showed that presence of any two of these criteria indicates a high likelihood of melanoma as evidenced by the results of the best performer in the CNMD. Using this 3-point checklist this observer had sensitivity and specificity results comparable to those achieved by simplified algorithms.

3-Point Checklist - Definition

1. Asymmetry	Asymmetry in color and/or structures in 1 or 2 perpendicular axes
2. Atypical network	Pigmented network with thickened lines and irregular distribution
3. Blue-white structures	Any blue and/or white color within the lesion

Definition of dermoscopic criteria for the 3-point checklist.
The presence of more than 1 criterion is suggestive of suspicious lesion

The pilot study

- Based on these purely statistical findings we designed a retrospective pilot study to verify the reproducibility and validity of this new simplified dermoscopic method, called 3-point checklist, which could serve as a screening procedure for melanoma by non-experienced observers. Six non-experienced dermoscopists were gathered together and examined after a short introduction of 1-hour duration 231 clinically suspicious PSL on basis of the three dermoscopic criteria, which constitute the 3-point checklist.

- Using this method the non-experts were able to classify correctly 96.3% of melanomas with a specificity of 32.8% that was comparable to the specificity obtained by an expert using the management decision approach (lesion to be excised or not). In other words the non-experts considered suspicious 2/3 of benign lesions and a comparable number of them were decided to be excised by an expert on a face-to-face evaluation of the lesions.
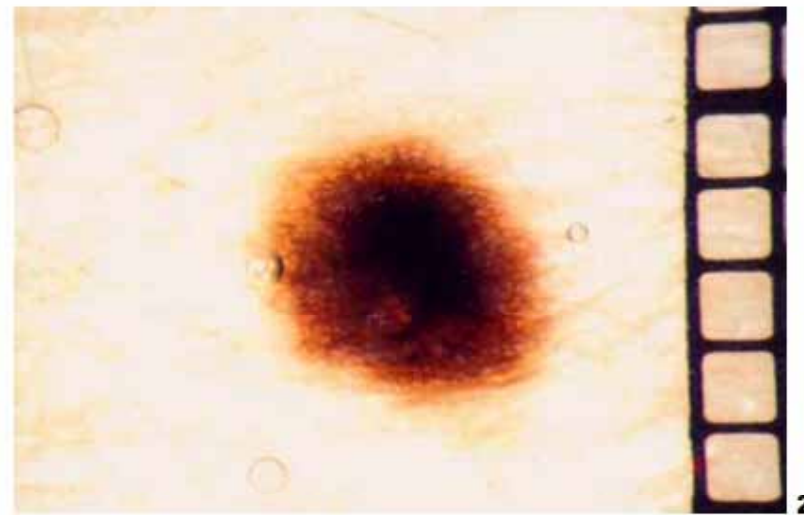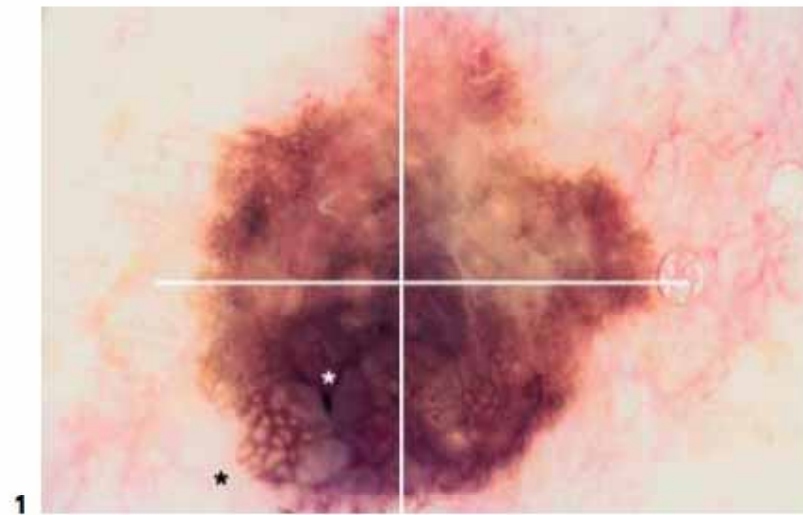
Pilot study: Figures 1-3

Fig. 1. Early invasive melanoma showing an asymmetrical distribution of colors and dermoscopic structures (in 2 perpendicular axes), atypical network (black asterisk) and blue-white structures (white asterisk). Because of the presence of all 3-point checklist dermoscopic criteria (score = 3), the lesion has to be considered suspicious. Original magnification × 10.

Fig. 2. Clark nevus (hypermelanotic type) exhibiting a dermoscopically typical network at the periphery and regular, black, structureless pigmentation in the center. For this lesion the 3-point checklist score is zero, thus it can be considered nonsuspicious by dermoscopy. Original magnification × 10.

Fig. 3. Pigmented basal cell carcinoma revealing dermoscopic asymmetry in colors and structures and blue-white structures. Since the 3-point checklist score is 2, this lesion should be considered suspicious by dermoscopic examination. Original magnification × 10.
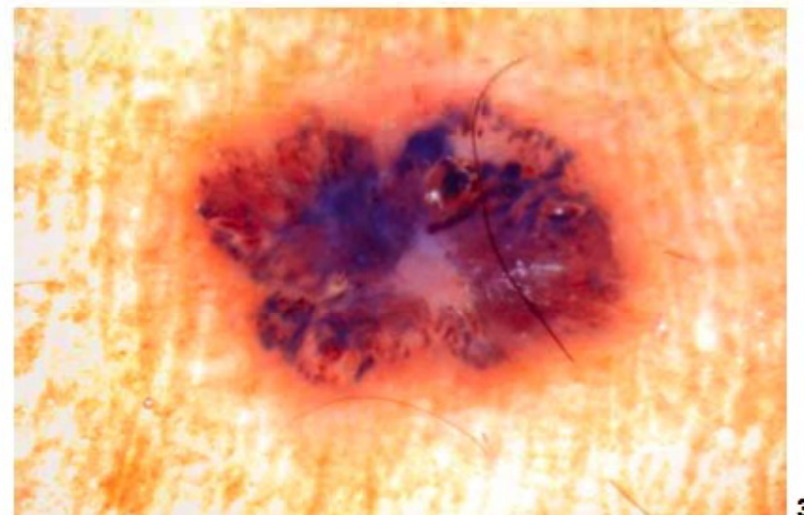
The web study

- In the pilot study, the three-point checklist of dermoscopy has thus been shown to represent a valid and reproducible tool with high sensitivity for the diagnosis of skin cancer in the hands of a small group of non-experts. In a subsequent web study, we re-evaluated these preliminary results in a large number of observers independently from their profession and expertise in dermoscopy. The study was conducted via the Internet to provide worldwide access for participants. After a short web-based tutorial, the participants evaluated dermoscopic images of 165 (116 benign and 49 malignant) skin lesions (15 training and 150 test lesions). For each lesion participants scored the presence of the three-point checklist criteria (asymmetry, atypical network and blue-white structures). Kappa values, odds ratios, sensitivity, specificity and likelihood ratios were estimated.

- Overall, 150 participants joined the study. The three-point checklist showed good interobserver reproducibility (kappa value: 0.53). Sensitivity for skin cancer (melanoma and basal cell carcinoma) was 91.0% and this value remained basically uninfluenced by the observers' professional profile. Only 20 participants lacking any experience in dermoscopy performed significantly more poorly, but the sensitivity was still remarkably high (86.7%) when considering that they were untrained novices in dermoscopy. The specificity was 71.9% and was significantly influenced by the profession, with dermatologists performing best. In conclusion, our study confirmed that the three-point checklist is a feasible, simple, accurate and reproducible skin cancer screening tool.

Web study results

Three-point checklist of dermoscopy: an open internet study

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Observer profile	Sensitivity				Specificity			
	%	95% CI	Overall P-value	Level P-value	%	95% CI	Overall P-value	Level P-value
Profession								
Dermatologist	91·6	87·0–94·7			74·5	69·8–78·7		
General physician	92·7	87·5–95·8		0·390	69·1	63·4–74·5		0·001
Other professional⁰	92·6	87·9–95·6		0·441	59·8	53·6–65·7		< 0·0001
Other medical specialty	88·9	83·3–92·8	0·102	0·041	72·8	67·8–77·3	< 0·0001	0·187
Experience in dermoscopy								
Yes	92·0	87·7–94·9			72·8	68·0–77·2		
No	86·7	80·3–91·3		< 0·0001	71·9	66·8–76·5		0·530
Years of dermoscopy experience								
> 5	91·3	86·5–94·5			76·1	71·3–80·4		
3–5	92·8	88·3–95·6		0·201	69·4	63·8–74·5		< 0·0001
1–2	92·4	87·9–95·3		0·204	71·0	66·1–75·4		< 0·0001
None	86·7	80·3–91·3	< 0·0001	< 0·0001	71·9	66·8–76·5	< 0·0001	0·008
No. of patients seen by dermoscopy per year								
> 100	91·9	87·2–95·0			75·9	71·1–80·1		
21–100	92·8	88·5–95·5		0·316	70·8	65·8–75·3		< 0·0001
1–20	91·3	86·6–94·5		0·549	71·0	65·8–75·7		< 0·0001
None	86·7	80·3–91·3	< 0·0001	< 0·0001	71·9	66·8–76·5	< 0·0001	0·009

Web study

Fig 1. Dermoscopy of a melanoma in situ exhibiting asymmetry of colour and structure, atypical network and blue-white structures in the centre of the lesion (original magnification × 10).

3 Point Checklist of Dermoscopy

The randomized study

- Since primary care physicians (PCPs) constitute an appropriate target for new interventions and educational campaigns designed to increase skin cancer screening and prevention, we designed a randomized study to determine whether the adjunct of dermoscopy to the standard clinical examination improves the accuracy of PCPs to triage lesions suggestive of skin cancer. PCPs in Barcelona, Spain, and Naples, Italy, were given a 1-day training course in skin cancer detection and dermoscopic evaluation, and were randomly assigned to the dermoscopy evaluation arm or naked-eye evaluation arm. During a 16-month period, 73 physicians evaluated 2,522 patients with skin lesions who attended their clinics and scored individual lesions as benign or suggestive of skin cancer. All patients were re-evaluated by expert dermatologists at clinics for pigmented lesions. Referral accuracy of both PCP groups was calculated by their scores, which were compared to those tabulated for dermatologists.

- Referral sensitivity, specificity, and positive and negative predictive values were 54.1%, 71.3%, 11.3%, and 95.8%, respectively, in the naked-eye arm, and 79.2%, 71.8%, 16.1%, and 98.1%, respectively, in the dermoscopy arm. Significant differences were found in terms of sensitivity and negative predictive value (P .002 and P .004, respectively). Histopathologic examination of equivocal lesions revealed 23 malignant skin tumors missed by PCPs performing naked-eye observation and only six by PCPs using dermoscopy (P .002). In conclusion, the use of dermoscopy improved the ability of PCPs to triage lesions suggestive of skin cancer without increasing the number of unnecessary expert consultations.

The randomized study

Dermoscopy Improves Accuracy of Primary Care Physicians to Triage Lesions Suggestive of Skin Cancer

Giuseppe Argenziano, Susana Puig, Iris Zalaudek, Francesco Sera, Rosamaria Corona, Mercè Alsina, Filomena Barbato, Cristina Carrera, Gerardo Ferrara, Antonio Guilabert, Daniela Massi, Juan A. Moreno-Romero, Carlos Muñoz-Santos, Gianluca Petrillo, Sonia Segura, H. Peter Soyer, Renato Zanchini, and Josep Malvehy

PCPs using dermoscopy had 25% better triage of skin lesions suggestive of skin cancer compared with naked-eye examination alone (P.002)

Triage of suspicious lesions
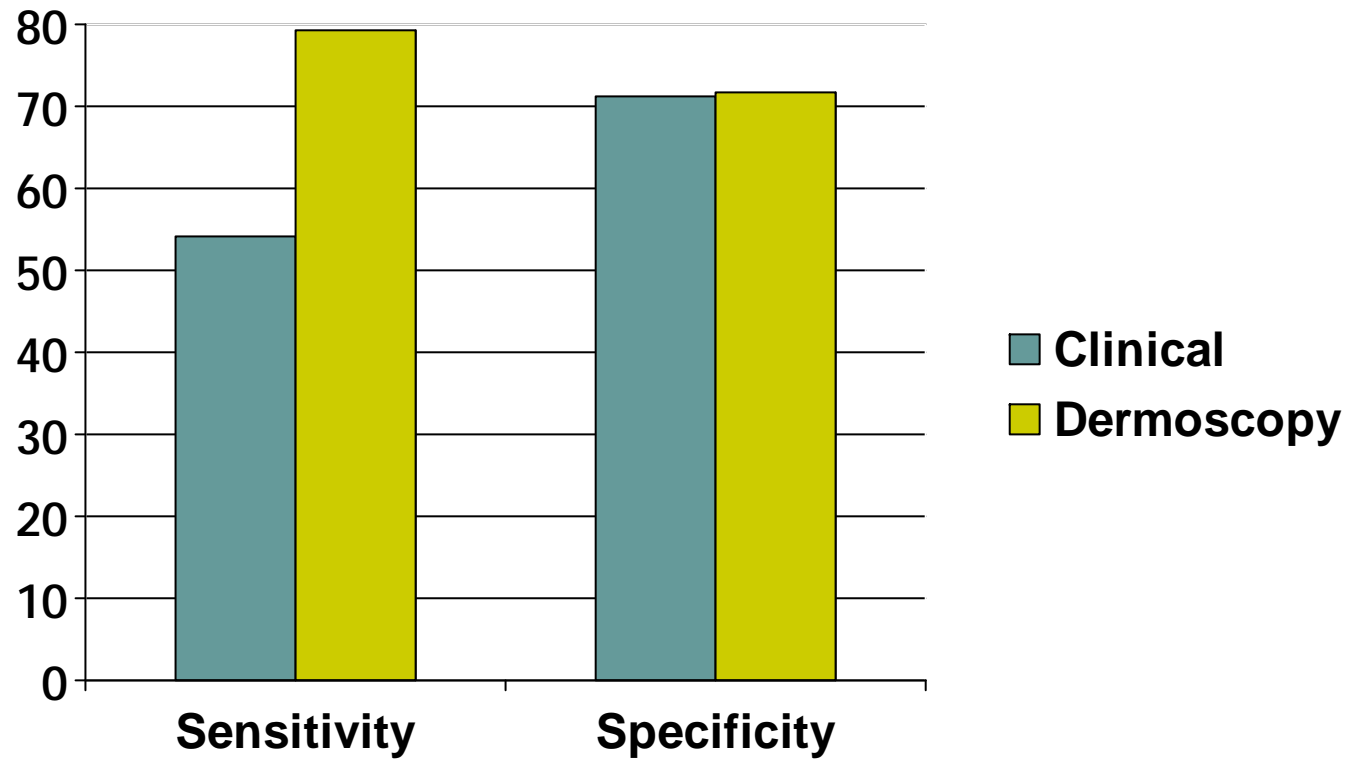
Argenziano et al. JCO 2006

- GPs using dermoscopy performed significantly better also in terms of negative predictive value (P.004), resulting in a low risk (1.9%) for patients with lesions suggestive of skin cancer not to be referred by GPs for a second expert opinion.

Argenziano et al. JCO 2006

How can dermoscopy help clinicians? As a first-level screening tool, dermoscopy may help PCPs in performing better detection of skin tumors suggestive of skin cancer (increased referral sensitivity), as demonstrated in this study. As a second-level procedure for clinically equivocal lesions, dermoscopy performed by expert clinicians can reduce the number of unnecessary excisions of benign lesions (better specificity than naked-eye examination), as previously demonstrated.[9,10]

Malignant/Benign Ratio of Biopsied Lesions
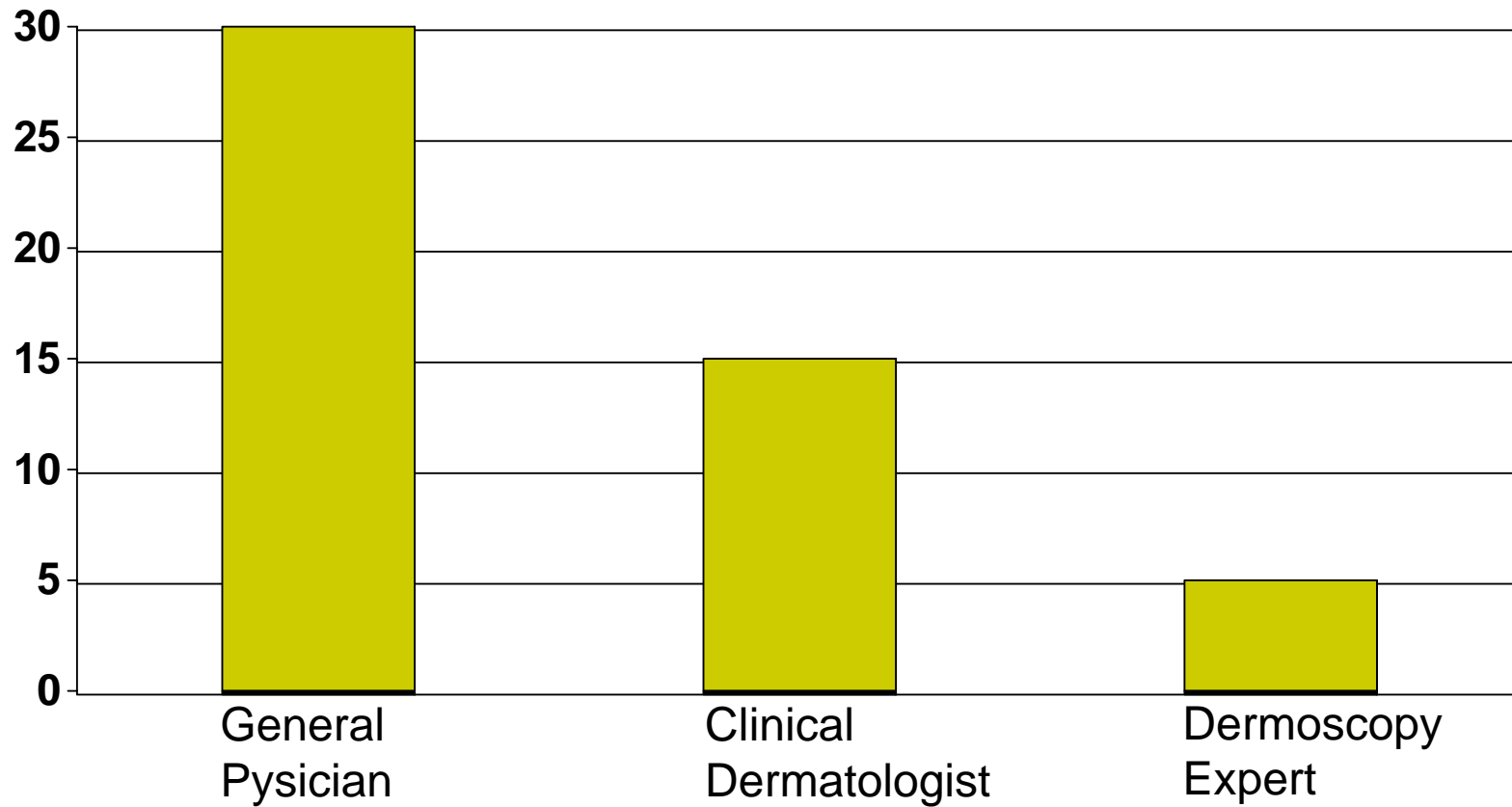
Early melanoma

Fig 2. Early melanoma (0.7 mm in thickness) exhibiting only slight asymmetry by naked eye examination (inset). Dermoscopic observation reveals striking asymmetry in color and structure, atypical pigment network (left side of the lesion), and blue-white structures (in the center and right side). The lesion was thus scored suggestive of skin cancer by the primary care physician.

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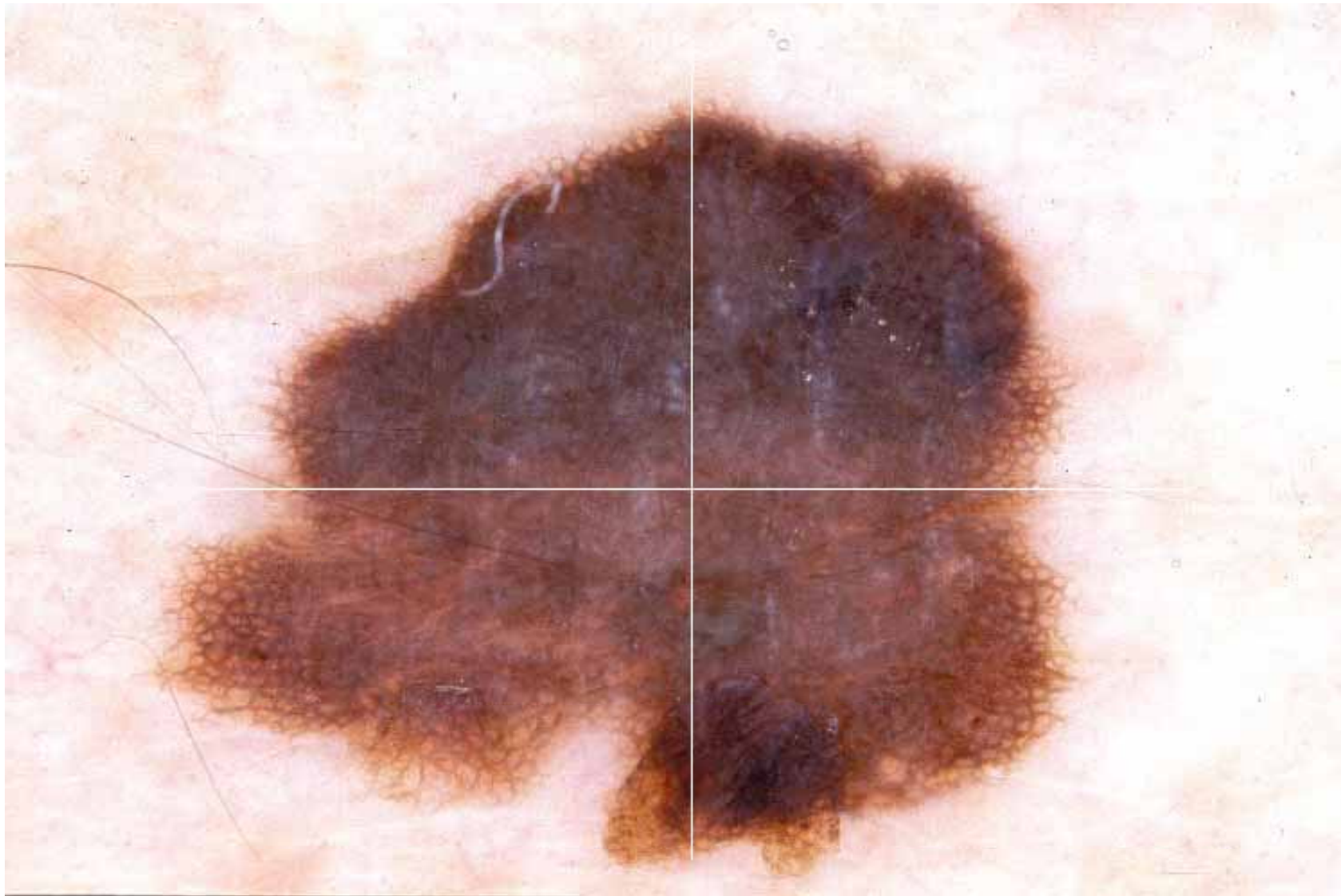
3-Point Checklist
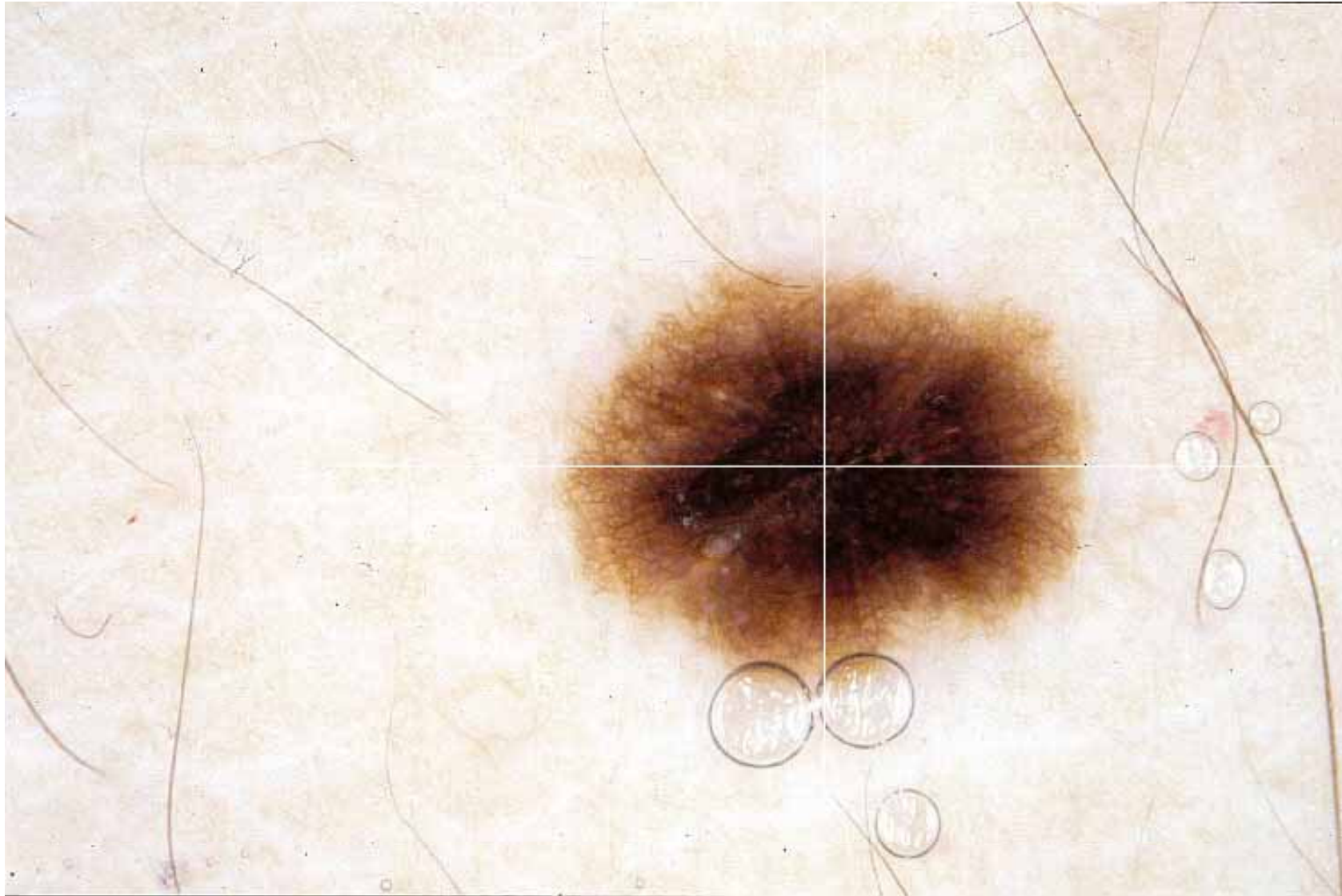# of Dermoscopy

Some Examples …
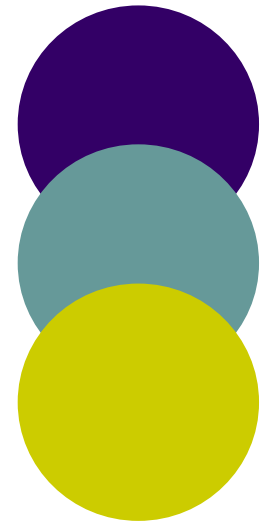
Melanoma

Stereotypical example of early invasive melanoma exhibiting all melanoma-specific dermoscopic criteria of the 3-point checklist. Remarkably, **asymmetry** in color and structure is particularly visible on the dermoscopic image.

Melanocytic nevus

Example of melanocytic nevus, hypermelanotic type. Dermoscopically, this nevus is **symmetric** and exhibits regular network and no blue-white structures; therefore, it is regarded as a non-suspicious lesion.

Melanocytic nevus
Although slightly asymmetric in shape, this lesion **does not exhibit asymmetry** in the distribution of color and structure. Therefore, it should be regarded as benign due to the lack of the 3-point criteria.
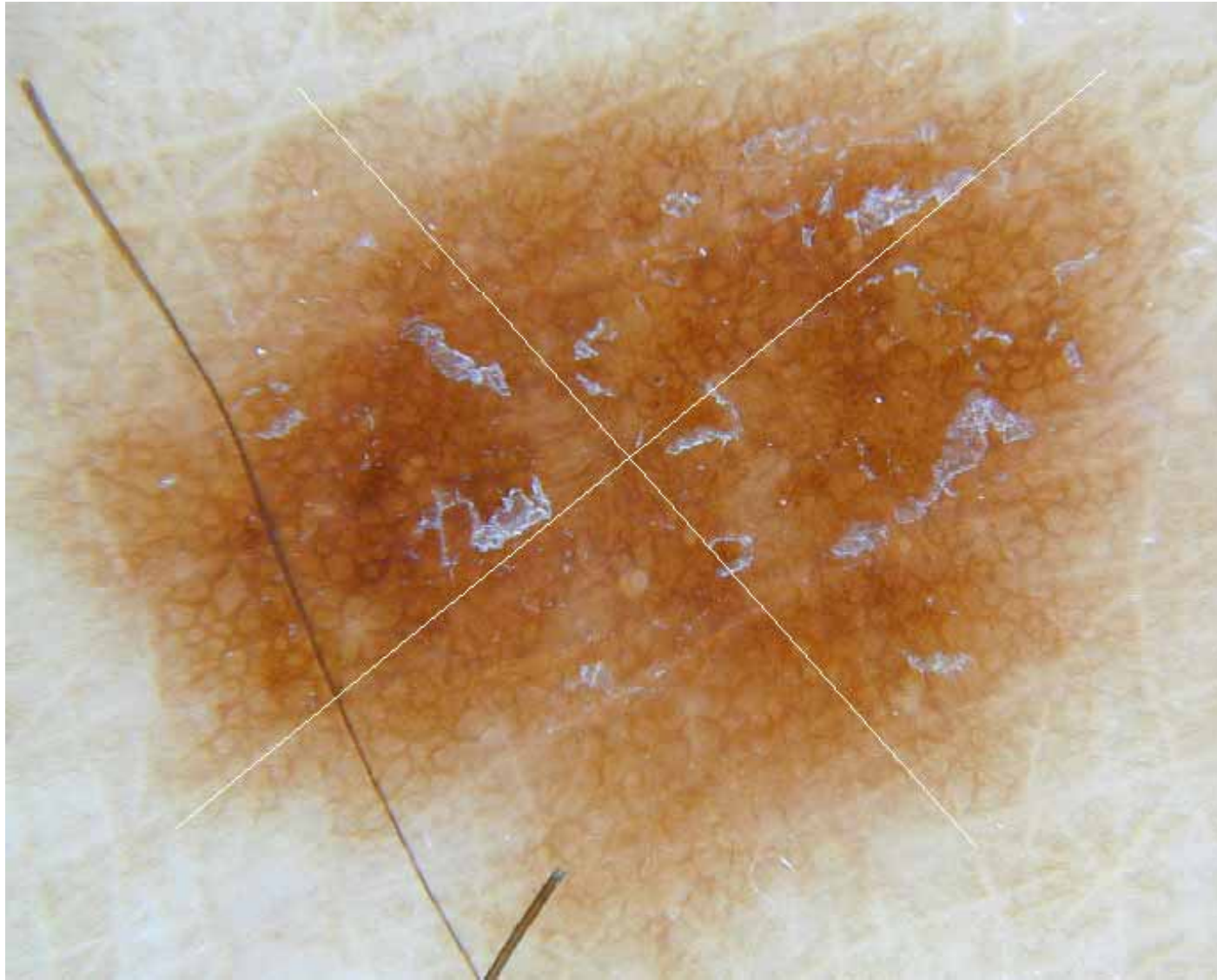
Melanoma

Early invasive melanoma exhibiting all melanoma-specific dermoscopic criteria of the 3-point checklist. Remarkably, **atypical network** is particularly visible on the dermoscopic image.
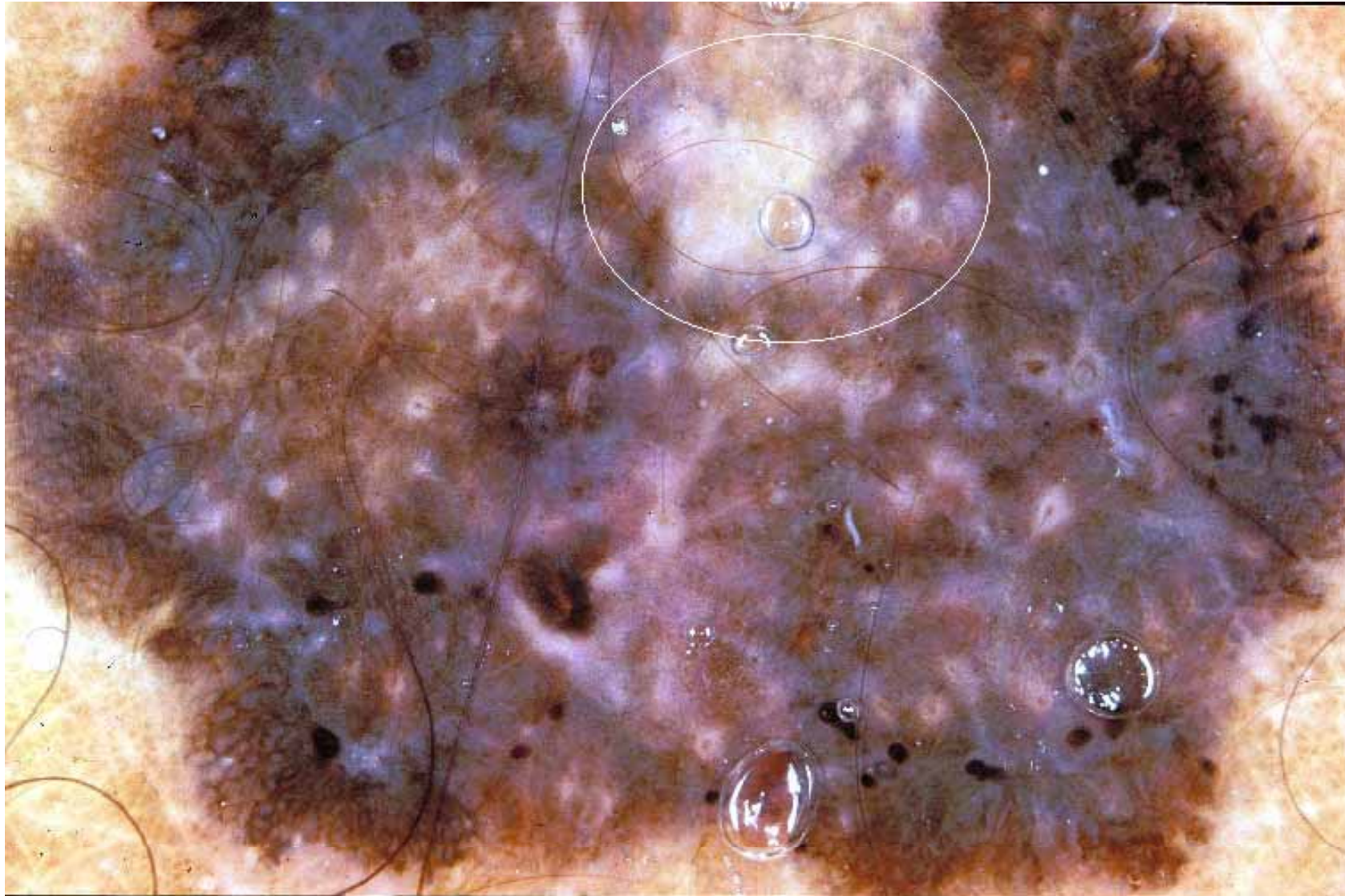

Blue-white structures
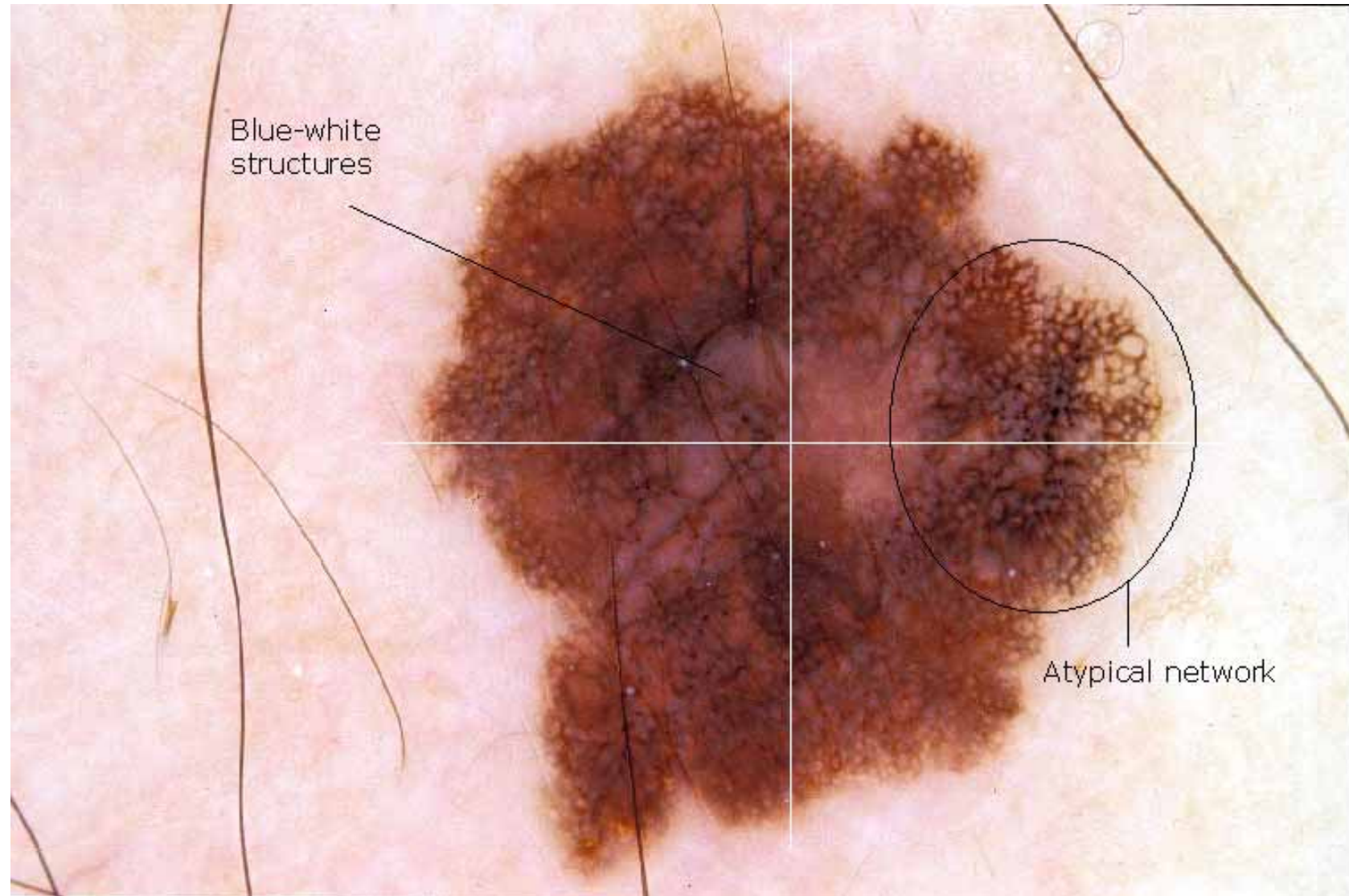
Atypical network

Melanocytic nevus
Melanocytic nevus dermoscopically typified by **typical network**. This lesion is symmetric and no blue-white structures are detectable; therefore, it is regarded as a non-suspicious lesion.

Melanoma
Both **white** scar-like areas (circle) and **blue** structureless areas are seen in this melanoma with regression. Note the atypical network at the periphery and the asymmetry in color and structure.

Melanocytic nevus
Blue pepper-like areas (left side of the lesion) are clearly seen corresponding to the presence of melanophages.
This lesion is regarded as suspicious due to the **blue-white structures** and the asymmetry.
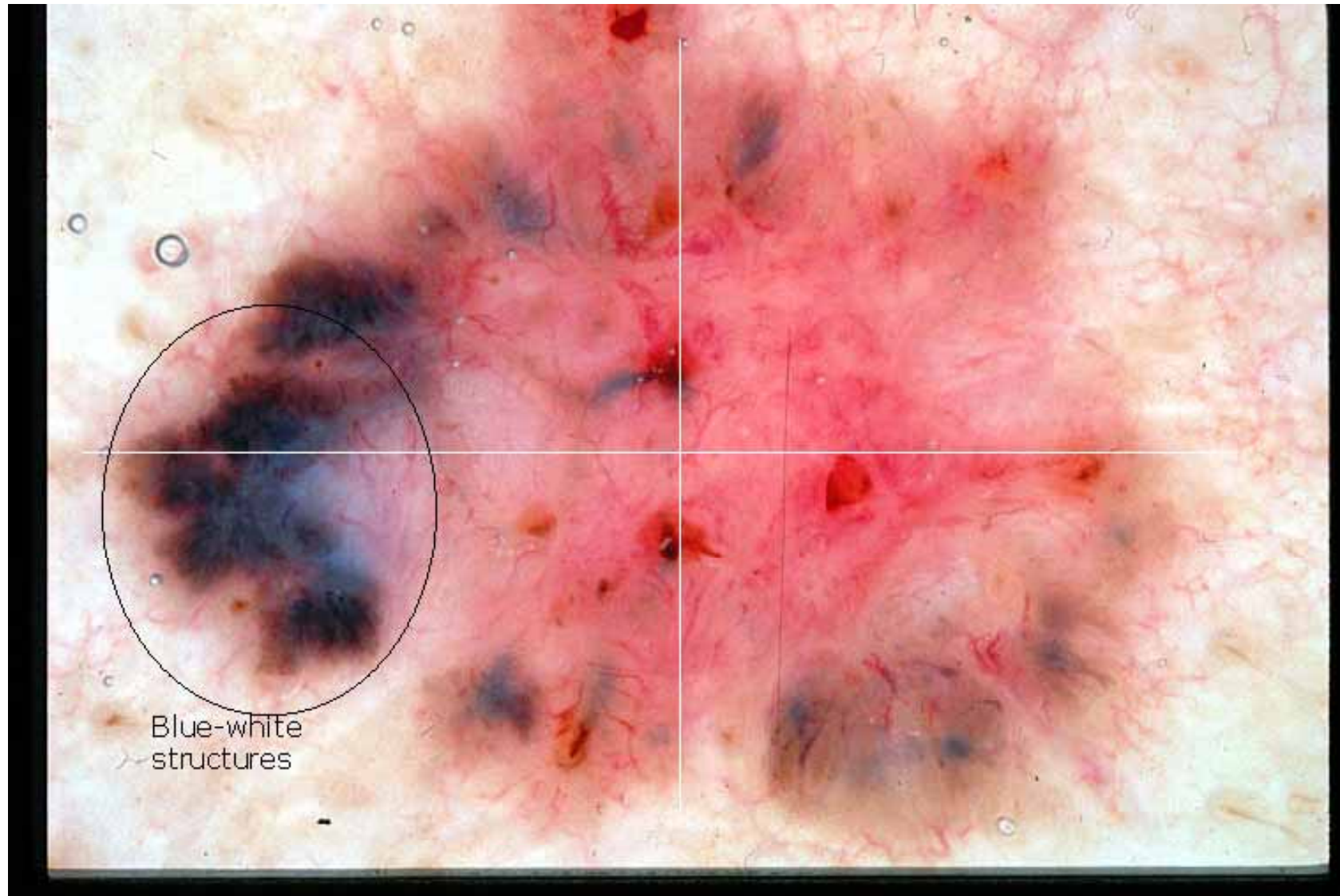
Melanoma
This lesion is dermoscopically asymmetric and typified by **blue-white structures**. Remnants of atypical network are seen at one side of the lesion (bottom right).


Blue-white structures
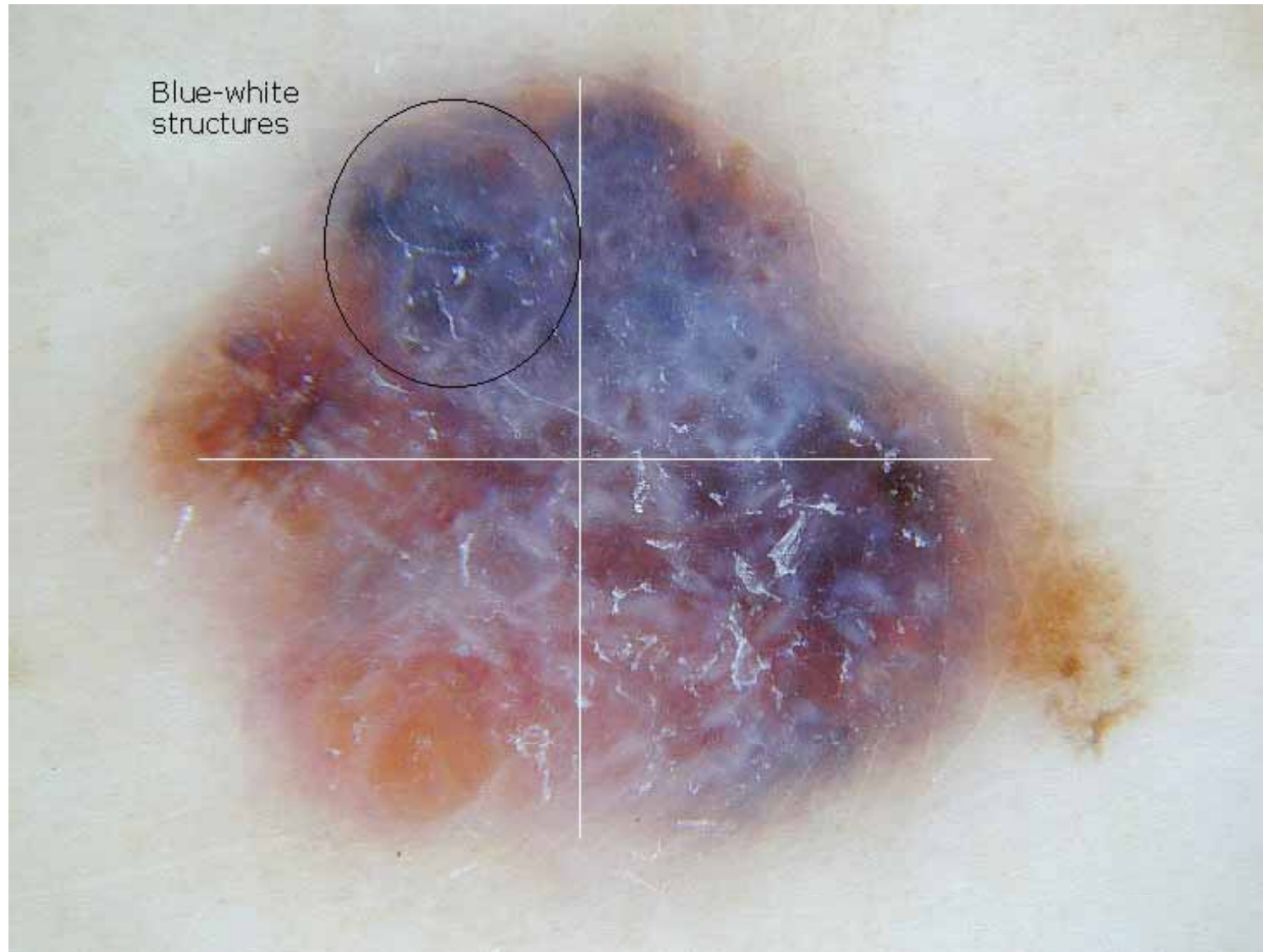
Basal cell carcinoma
The lesion is **asymmetric** and **blue-white structures** are clearly seen. This basal cell carcinoma is, therefore, regarded as suspicious using the 3-point checklist.
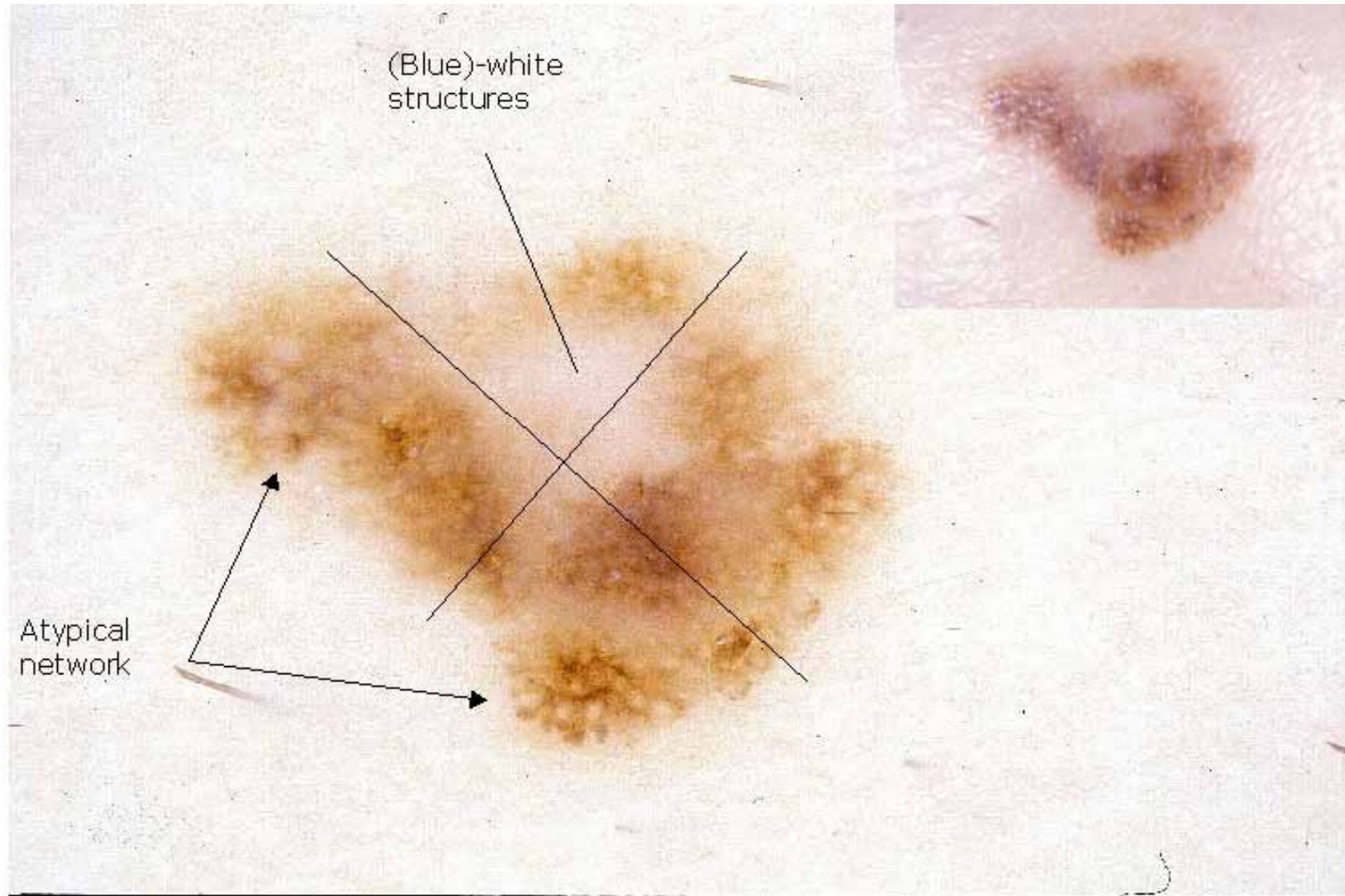

Blue-white structures

Melanoma
Stereotypical example of invasive melanoma exhibiting **all melanoma-specific dermoscopic criteria** of the 3-point checklist.

Atypical network

Blue-white structures
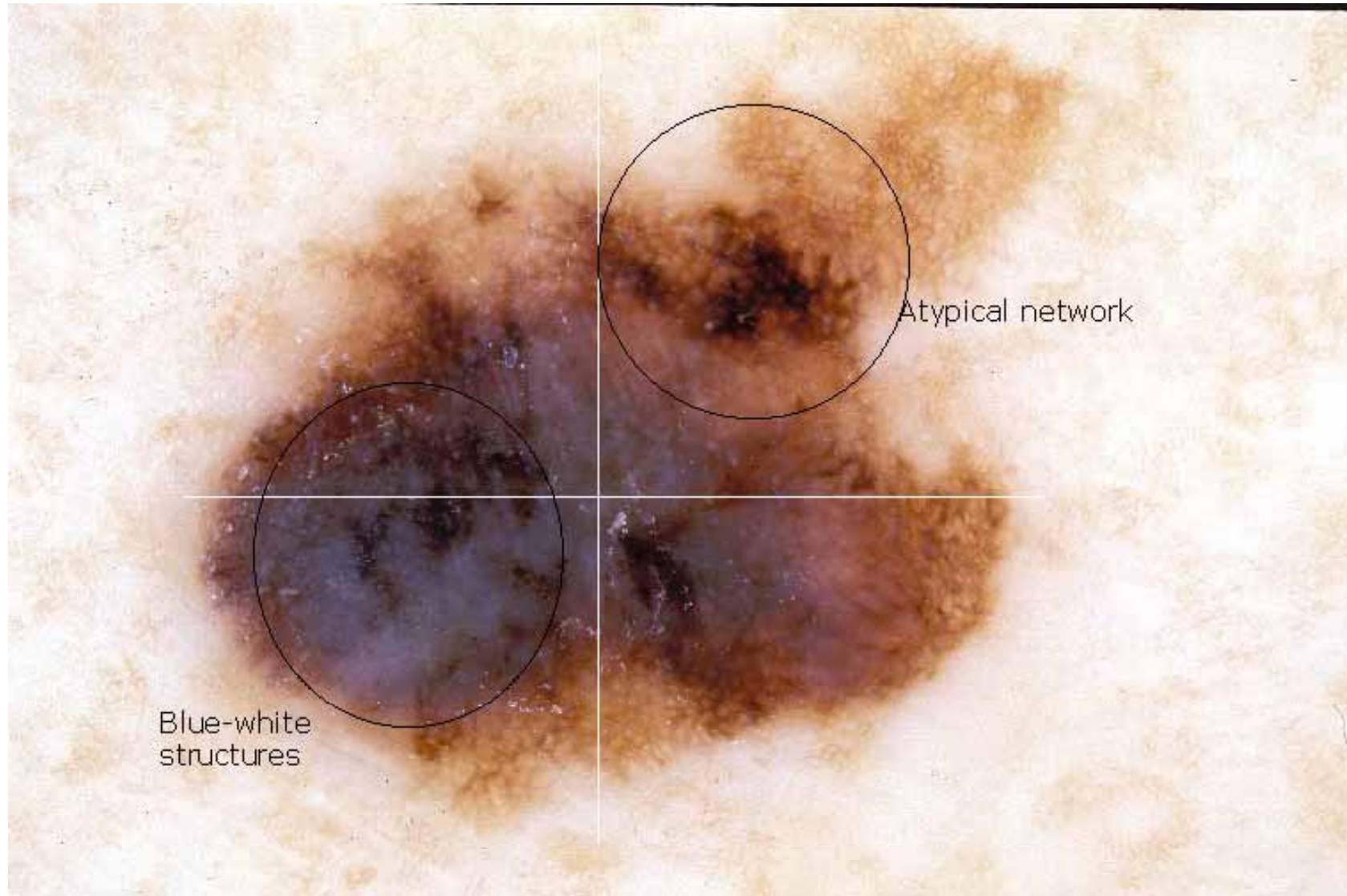
Melanoma
Early invasive melanoma exhibiting **white scar-like areas**. Asymmetry and atypical network are also seen.

Melanocytic nevus
This lesion exhibits **only 1 out of 3** melanoma-specific dermoscopic criteria; thus, it is considered benign.

Blue-white
structures