A Dermatoclastic Decision Algorithm for Pigmented Skin Malignancy

Cliff Rosenthal\d\fontname{arial} Alan Cameron\a\ Philipp Tschanz\a\ Agata Bulinska\a\ Jean-Yves Gournh\a\ Harald Kittler\a\b

Flowchart for the CHAOS & CLUES Algorithm\d\fontname{arial}

CHAOS

\begin{itemize}
\item Patient with pigmented skin lesion
\item Is there a CHAOS pattern?
\item Pattern of colour, shape, symmetry, size, or location
\item Yes: Pigmented skin lesion is benign
\item No: Pigmented skin lesion is malignant
\end{itemize}

CLUES

\begin{itemize}
\item A pattern is formed by multiple repetitions of basic structures
\item 1. Is there one pattern or more than one pattern?
\item 2. Is there one colour or more than one colour?
\item 3. Are pattern and colours combined symmetrically or asymmetrically?
\item 4. Are they on the palmar or plantar surface?
\item 5. Are the borders ill-defined or ill-defined?
\item 6. Are they flat or elevated?
\item 7. Are they smooth or rough?
\item 8. Are they tender or not?
\item 9. Are they elevated or not?
\item 10. Are they present at a site or another site?
\item 11. Are they visible or not?
\item 12. Are they present at a site or another site?
\end{itemize}

Revised Pattern Analysis\d\fontname{arial}

Pattern + Colours + Clues = Diagnosis

Is there CHAOS?

No

Exceptions.

Seem these four clues for the presence of CHAOS:

1. Change in lesions on adults, especially with increasing age, with either historic or dermatoscopic evidence of change (peripheral, radial, linear, oval or pseudopods).
2. Node lesions or very small lesions with any clue to malignancy.
3. Any lesion on the head or neck with dermatoscopic grey color.
4. Lesions on palms or soles (solar) with a parallel ridge pattern.

This is an example of a basal epithelial malignancy with the CLUE of 'grey structures' (asexual) without CHAOS.

Is a CLUE to malignancy present?

1. Grey or Blue Structures
2. Eccentric Structureless Area
3. Thick Lines Reticular or Branched
4. Black Dots or Clods, Perihelial
5. Lines Radial or Pseudopods, Segmental
6. White Lines
7. Polyomorphous Vessels
8. Lines Parallel, Ridges (Palms or Soles) or Chaotic (Nails)

Exclusion of Seborrhoeic Keratoses by Pattern Analysis

1. Multiple orange clods
2. Multiple white clods
3. Thick curved lines
4. Shilly-denniated border over total periphery
5. Multiple grouped similar lesions

Remember: malignant lesions may have orange and white clods and melanomas may be lying among grouped seborrheic keratoses. Weigh the clues. If class to malignancy is present and the diagnosis of seborrheic keratoses is expressed perform a biopsy.

Specific Diagnosis of Pigmented Skin Malignancies\d\fontname{arial}

1. Grey dots (melanoma)
2. Grey or blue structures in a basilar cell condens (BCDC)
3. Thick lines reticular (renal)
4. Thick lines radialis or pseudopods, segmental (asexual)
5. Linear pseudopods, segmental (BCDC)
6. White lines (Norton and the so-called 'spider-web structure' of metastapheline terminology)
7. Polyomorphous vessels (asexual or melanoma)
8. Lines parallel, ridges (solar) (maligant)

Evaluation of CHAOS & CLUES

Assessment of 465 consecutive pigmented lesions – Dermatologic and Clinical diagnostic accuracy\d\fontname{arial}

Cliff Rosenthal, Alan Cameron, Philipp Tschanz, Harald Kittler

Sensitivity (Lesion malignancy): 96.0%
Specificity: 82.7%
Accuracy: 93.4%
Positive predictive value (PPV): 93.4%
Negative predictive value (NPV): 89.4%

Assessment of 139 consecutive melanocytic lesions by 3 dermatologists comparing 3 point system, 7 point checklist, ROC analysis and Nemenyi test and CHAOS & CLUES

Philipp Tschanz, Alan Cameron, Cliff Rosenthal, Harald Kittler

References

Prediction without Pigment - short version

Non-pigmented lesion

Ulceraion or white clues* present — Consider Biopsy (exclude malignancy)

Ulceraion or white clues* not present — Apply vessel pattern analysis

A polymorphous pattern including dots is strongly suspicious for melanoma

Vessels as dots present

Vessels as dots not present

Dots, serpiginous or coiled

Clods (red/purple)

Vessel arrangement - non-specific (random) (includes no vessels seen)

Radial or branched

Serpiginous or centred

Vessels as dots present

Vessels as dots not present

Dots: Melanocytic naevus, IEC, viral wart, inflammation/psoriasis

Serpentine: BCC, scar

Coiled: IEC, SK

Not only clods

Only clods (red/purple)

Biopsy (exclude melanoma)

BCC, IEC, SK, LPLK

Radial or branched

Serpiginous or centred

White clues* (white circles in a raised lesion) are present so a decision to biopsy can be made without vessel pattern analysis. This is a dermatoscopic image of an SCC.

References

Abbreviations
BCC - Basal cell carcinoma
SCC - Squamous cell carcinoma
SK - Sebaceous keratosis
DF - Dermatofibroma
KA - Keratoacanthoma
IEC - Intra-epithelial carcinoma
Bowen’s disease or SCC in situ
LPLK - Lichen planus like keratosis
CACA - Clear cell acanthoma
PG - Pyogenic granuloma

Non-pigmented lesion

Ulceraion or white clues* present — Consider Biopsy (exclude malignancy)

Ulceraion or white clues* not present — Apply vessel pattern analysis (see below)

A polymorphous pattern including dots is strongly suspicious for melanoma

A clods-only pattern, and in raised lesions a centred or serpiginous pattern, should be benign. All other patterns must be assessed for malignancy.

A clods-only pattern must have no vessels within the (red/purple) clods. A centred pattern must have vessels centered in skin-coloured clods.

Prediction without Pigment - full version

Consider Biopsy (exclude malignancy)

Ulceraion BCC, SCC, Melanoma

White clues* (lines): BCC, Melanoma, Spitz naevus, DF, LPLK, PG

White clues* (other): SCC/KA

Biopsy (exclude melanoma)

BCC, IEC, SK, LPLK

Dots: Melanocytic naevus, IEC, viral wart, inflammation/psoriasis

Serpentine: BCC, scar

Coiled: IEC, SK

Haemangioma, haemorrhage

(There must be no vessels within clods)

Radial: KA/SCC, BCC with ulceration, sebaceous gland hyperplasia, molluscum

Branched: BCC, SCC/KA, Merkel cell carcinoma, any raised cyst or neoplasm

Serpiginous: CCA

Centred: SK, viral wart, dermal naeves

(Other specific vessel arrangements (clustered, linear and reticular) are not commonly encountered in a raised lesion and if present should be assessed as ‘non-specific’ for the purpose of this flowchart.)

There is no ulceration and no white clues*.

The vessel pattern is (red/purple) clods - only consistent with the benign diagnosis of haemangioma.

This pattern must not have any vessels within the clods to be interpreted as benign.