

## **CRHP Advanced Risk Calculator™**

# **Risk assessment in skin-cancer prevention: The CRHP Advanced Algorithm vs. dermatoscopy. Which is more reliable?**

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### **Abstract**

Skin cancer, especially malignant melanoma, can vary greatly in appearance and usually develops very quickly. Therefore, the ABCDE rule (also known as the ABCD rule in some countries) was propagated many years ago to help medical laymen to recognize for themselves when it is time to see a dermatologist. But how effective is this rule? Our previous work clearly demonstrates that another self-monitoring protocol has a higher sensitivity and better results than the outdated ABCDE rule: the C-Rapid-H-Plus Protocol. Based on this, a simple algorithm was developed which appeared to give quite promising results. Now we can present a completely new algorithm that has proven to be more reliable than dermatoscopy in predicting the need for excisional biopsy in a collective of 421 patients. The CRHP Advanced Risk Calculator, also based on the C-Rapid-H-Plus protocol, is of great value for both, in-person and telemedicine settings.

## The C-Rapid-H-Plus Protocol

The **C-Rapid-H-Plus** protocol<sup>1</sup> is proving to be a strategy of significantly improved patient safety in the era of tele-dermatology. Its establishment and success is inextricably linked to the enabling of telemedicine services in the field of dermatology. Above all, it can also be implemented in traditional dermatological medical practices, provided that a privacy-protected digital "consultation room" is set up and reliably used.

- C** stands for **change** in any way, shape, or form.
- Rapid** means **very prompt excision**, within any hesitation, 10 days at the latest without dermatoscopy or other time consuming tests prior to excision.
- H** is about leaving to make the **definitive diagnosis to a histopathology lab**.
- Plus** expresses the offer and encouragement to send in photos of changing skin lesions together with a detailed message in the interval, i.e. in the long periods **between regular check-ups** in the local practice (at any time, around the clock), which will be evaluated, analyzed and answered by a dermatologist at the latest after 24 hours.

## Real world implications

Since the introduction of the C-Rapid-H-Plus Protocol in 2020 in the clinics at which we work, we have seen a 58.6% (until February 2022) decrease in advanced stage skin cancer cases at first patient-dermatologist contact. The number of skin cancer cases requiring non-surgical follow-up after wide and deep excision has dropped to zero in our own patients. This is highly remarkable. We assume that this is also related to the less complex patient education and the digital consultation room as a convenient and always accessible service for patients. The latter in particular seems to be of immense importance.

## The risk calculator evolution

Encouraged by the above mentioned results, our team developed a risk calculator that has proven remarkably reliable based on ongoing evaluation. In particular, this first version was extremely reliable in distinguishing between skin lesions that should be biopsied and those for which waiting is acceptable. The disadvantages were a high need for information from and about the patient, applicability only to experienced dermatologists, and blind spots regarding precancerous lentigo lesions.

Therefore, our research group has developed another algorithm that does not have these disadvantages. Remained as a prerequisite is that only a dermatologist can feed the algorithm with correct data.

Otherwise, all problematic issues could be fixed and a model was developed that is as easy to use in clinical routine as an ECG pocket guide. Since this risk calculator is also based on the C-Rapid-H-Plus Protocol, we call it *CRHP Advanced Risk Calculator*<sup>TM</sup>.

## Results

Since the *CRHP Advanced Risk Calculator™* is of high practical and monetary value and capable of revolutionizing tele-dermatology in particular, we will not disclose the algorithm to the general public. This is ethically justifiable, since no one will be disadvantaged and the *CRHP Advanced Risk Calculator™* can only be used by dermatologists anyway. There will not and cannot be a version available for laymen.

A healthcare provider in India who cooperates with us and works according to western standards has tested the *CRHP Advanced Risk Calculator™* on 421 patients with skin tumors requiring examination in comparison to dermatoscopy. The endpoint was whether biopsy was deemed necessary after dermatoscopy or use of the *CRHP Advanced Risk Calculator™*, and whether this recommendation was proven correct because histopathologically worrisome diagnoses resulted. To be able to compare all 421 patients accepted an excisional biopsy, including also those for whom there was so recommendation based on medical reasons. This happened in concordance with all applicable ethical rules and regulations.

These are the data:

*Test subjects = 421*

*Physicians = 6 (dermatologists with >10 years of experience)*

*Referred to dermatology by primary care physician after visual assessment suggesting a skin lesion of concern = 421*

*Use of reflected light dermatoscopy = 221*

*Use of the CRHP Advanced Risk Calculator™ = 200*

*I. Recommendation of biopsy based on dermatoscopy = 190*

*II. Recommendation of biopsy based on CRHP Advanced Risk Calculator™ = 123*

*III. Biopsies of those without a recommendation = 108*

*I. Histopathological confirmation of a concerning diagnosis = 87*

*II. Histopathological confirmation of a concerning diagnosis = 98*

*Wrong advice (false negative) based on dermatoscopy = 36*

*Wrong advice (false negative) based on CRHP Advanced Risk Calculator™ = 08*

***Result = highly significant in favor of the CRHP Advanced Risk Calculator™***

## Conclusion

Surprisingly even for the development team, the data confirmed a highly significant better performance of the *CRHP Advanced Risk Calculator™* compared to reflected light dermatoscopy for the defined endpoint of the study. It remains to be emphasized, however, that should the *CRHP Advanced Risk Calculator™* one day find its way into the hands of laymen, it must not be used by them. It requires the expertise of an experienced dermatologist to obtain correct results. This is also true for dermatoscopy, however, attempting to use an algorithm might mistakenly appear 'doable' to a layman, as opposed to using a dermatoscope.

## Conflicts of interest

Dr. Carolina Diamandis is also a clinician in the field of (immuno-)dermatology. Dres. Makri, Tudor, Kaufmann, Papadopoulou and Ivanova have nothing to declare.

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