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Chapter 1 : Reflectance confocal microscopy | DermNet New Zealand

Reflectance confocal microscopy enables lesions in skin to be examined without excision, but with improved diagnostic accuracy, assessment of dermoscopic-histologic correlation, assessment of surgical margins, as well as speed and convenience for the physician and patient. This extensively enlarged.

Menu Using Reflectance Confocal Microscopy in Skin Cancer Diagnosis Biopsy and histologic evaluation have been the gold standard to diagnose skin tumors. Reflectance confocal microcopy RCM is a noninvasive, innovative diagnostic technique that enables visualization of different skin layers at an almost histologic resolution. RCM has been proven beneficial in management of various cutaneous lesions. This article highlights the clinical significance and future of RCM to diagnose common skin cancers. However, RCM cannot replace currently standard histopathologic diagnosis. More studies are required to better compare the sensitivity and specificity of skin cancer diagnosis using RCM. Introduction Until now, biopsy and histologic evaluation has been the gold standard to diagnose skin tumors. Reflectance confocal microcopy RCM is a noninvasive, innovative, and 21st century diagnostic technique that enables visualization of different skin layers at an almost histologic resolution. In the past decade RCM has been proven beneficial in management of various cutaneous lesions. The aim of this article is to highlight the clinical significance and future of RCM to diagnose common skin cancers. Confocal diagnostic features of benign melanocytic nevi, lentigo maligna, melanoma, squamous cell carcinoma SCC , and basal cell carcinoma BCC are discussed in this article. Principle of reflectance confocal microcopy The principle of RCM is based on focal point illumination and hence named confocal microscopy. This light is reflected back through a small pinhole and is imaged on the detector. The pinhole aperture filters the scattered and reflected light and allows only the light from image plane to pass through it. In this way, the computer software produces a high-resolution, 2-dimensional, gray scale image of target lesion. How to perform reflectance confocal microscopy Fig. Reflectance confocal microscopy is simple and quick procedure. Patient demographics with lesion history are entered into the computer software and the patient is prepared for confocal microscopy. A small drop of oil is applied to the target lesion and a metal ring with polymer or glass window is attached to the skin with the aid of an adhesive tape. A dermoscopy image is obtained with the vivacam through this metal ring. Next, ultrasound gel with a refractive index close to the epidermis is applied inside the metal ring. The metal ring is then connected magnetically with the vivascope head. RCM images composed of viva cubes and viva stacks are obtained at different skin layers including the epidermis, dermoepidermal junction, and upper dermis. These confocal images are stored and transferred through a high-speed Internet system to the clinical expert for analysis of the confocal images. However, early detection and better management can improve the prognosis of melanoma patients. With the aid of reflectance confocal microscopy, benign skin lesions can be differentiated successfully from malignant lesions. RCM shows distinct confocal features for different skin lesions. These confocal features aid in quick bedside diagnosis of melanoma and nonmelanoma skin cancers. Benign melanocytic nevi has symmetric architecture, well-circumscribed regular honeycomb or cobblestone pattern of the epidermis, edged papillae, and homogenous dense and sparse dermal nests Fig.

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Chapter 2 : Reflectance confocal microscopy of cutaneous tumors (eBook,) [racedaydvl.com]

Reflectance Confocal Microscopy of Cutaneous Tumors 2nd Edition Ebook The last fifteen years have witnessed an explosion of knowledge in the field of dermatology.

Informatie Beschrijving Reflectance confocal microscopy enables lesions in skin to be examined without excision, but with improved diagnostic accuracy, assessment of dermoscopic-histologic correlation, assessment of surgical margins, as well as speed and convenience for the physician and patient. This extensively enlarged and updated text reviews the current and future state of the art for those involved with the diagnosis and treatment of skin tumors, with a greatly increased amount of material on the expected normal patterns of skin throughout life and on non-melanocytic tumors. Inhoudsopgave Fundamentals and Technology Advances: Fundamentals of reflectance confocal microscopy. Confocal application in everyday practice. Computational methods in skin confocal microscopy. The role of teledermatology in Reflectance Confocal Microscopy. Miniature confocal microscopy devices for imaging skin. Reflectance confocal microscopy-guided microbiopsies for targeted molecular analysis. Multimodal confocal microscopy for non-melanoma skin cancers ex vivo. Intra-operative Reflectance Confocal Microscopy to potentially guide Mohs surgery and other dermatologic surgeries. Laser ablation of basal cell carcinoma guided by confocal microscopy. Normal Skin and Mucosa: Adnexal and sensory structures of the skin. Topographic and skin phototype variations of skin with special emphasis on facial and acral skin. Healthy oral and genital mucosa. RCM diagnosis of melanocytic neoplasms: Terminology, algorithms, and their accuracy, and clinical integration. RCM-histology correlation in melanocytic lesions. How genetic traits may influence the dermoscopic and confocal morphology of nevi. Superficial spreading and nodular melanoma including amelanotic melanoma. Lentigo maligna and lentigo maligna melanoma. Melanoma in special locations. Lesions Revealing Regressive Structures. Terminology, pattern analysis and algorithms, and accuracy studies of Reflectance Confocal Microscopy applied to non-melanocytic tumors. Reflectance Confocal Microscopy-histology correlations for non-melanocytic tumors. Vascular patterns in non-melanocytic tumors. Pigmented actinic keratosis and porokeratosis. Squamous neoplasia subtypes and progression. Basal cell carcinoma simulators: Poroma, trichoepithelioma, and fibrous papules of the face. Sebaceous hyperplasia and adenoma: Clear cell acanthoma and dermatofibroma. Solar lentigo and lichen planus-like keratosis. The main clues to avoid misdiagnosing seborrheic keratosis-like simulators. Benign vascular tumors and malformations, and Kaposi sarcoma. Mycosis fungoides and other cutaneous T cell lymphomas. Diagnostic accuracy of Reflectance Confocal Microscopy in a clinical setting. Integration of Reflectance Confocal Microscopy for the management of patients with multiple nevi. Monitoring of non-invasive treatment and margin mapping prior surgery. Nail tumor management by intraoperative confocal microscopy. Field cancerization and monitoring of treatment. Monitoring of non-invasive treatment of Basal Cell Carcinoma.

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Chapter 3 : Reflectance Confocal Microscopy of Cutaneous Tumors 2nd Edition Ebook - FREEMEDWORL

Reflectance confocal microscopy enables lesions in skin to be examined without excision, but with improved diagnostic accuracy, assessment of dermoscopic-histologic correlation, assessment of surgical margins, as well as speed and convenience for the physician and patient.

This article has been cited by other articles in PMC. Abstract Reflectanceâ€”mode confocal microscopy RCM is a new in vivo skin imaging technique. We established the rank of RCM in the complex algorithm of skin cancer diagnose, showing that the presented experience can open new possibilities to implement this automated image analyzing system in the routine practice. Our analyzed cases clearly showed that confocal microscopy, therefore, optical biopsy, could guide the clinician towards an accurate diagnosis before surgical removal. Moreover, we emphasized that the development of this technique increases the potential of future teledermatologic applications. The resolution of emerging images is similar to that of classic microscopy approx. This method allows observation of the cutaneous micromorphology in vivo, in real time, therefore realizing the soâ€”called optical biopsy. The reflected light is caught through an objective and then analyzed. The images obtained through this method have a similar resolution to that of classic microscopy, but they are black and white, horizontal, and parallel with the surface of the skin [1 , 2]. In the reflectance mode, the skin imaging is based on different reflection indices of the micro anatomical structures and individual cells. This gives the image its natural contrast. The varying reflection of the laser light is collected through a small aperture and optically conjugates on focal planes confocal planes , which are analyzed and consecutively transformed into a digital image with different levels of gray. Cell nuclei also appear dark and collagen appears very bright [3]. This skin imaging technique represents a nonâ€”invasive, less painful and nonâ€”destructive tissue method. The skin is unaffected during preparing procedures, thus minimizing the artifacts. The data collected in realâ€”time are rapidly acquisitioned and processed and the segment of analyzed skin could be reâ€”examined in order to evaluate the dynamic changes, such as the response to therapy. The numerous and still increasing applications of this method are currently considered an important research topic. The present paper subscribes to the recent clinical perspective, which states that the study of skin cancers turns into an established, highly specialized discipline, namely dermatoâ€”oncology. The incidence of non-melanoma skin cancers in Europe is estimated to be of 0. Moreover, a patient with a non-melanocytic skin cancer can subsequently develop a higher probability of other types of cutaneous cancers in the next few years. Among other oncological disorders, the malignant melanoma MM is one of the most aggressive types of tumor, having a continuously growing incidence, a high morbidity and mortality, affecting the young population, with substantial costs for treatment. In the case of cutaneous tumors, the most adequate clinical approach is screening and early diagnosis. The recent development of imaging techniques offers the opportunity for in vivo assessment of the skin, in a nonâ€”invasive and highâ€”resolution way, thus improving the disadvantages of biopsy and histopathology analysis, known to be painful, timeâ€”consuming and very expensive with regard to procedures. Dermatoscopy and, recently, the reflectanceâ€”mode confocal microscopy are of practical interest in the detection of cutaneous cancers.

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Chapter 4 : Reflectance Confocal Microscopy | Skin Cancer And Reconstructive Surgery Center

About the e-Book Reflectance Confocal Microscopy of Cutaneous Tumors 2nd Edition pdf Reflectance confocal microscopy enables lesions in skin to be examined without excision, but with improved diagnostic accuracy, assessment of dermoscopic-histologic correlation, assessment of surgical margins, as well as speed and convenience for the physician and patient.

Published by Wiley Periodicals, Inc. Re-use of this article is permitted in accordance with the Creative Commons Deed, Attribution 2. This article has been cited by other articles in PMC. Abstract Reflectance confocal microscopy RCM images skin at cellular resolution and has shown utility for the diagnosis of nonmelanoma skin cancer in vivo. It has the potential to define lesion margins before surgical therapy. Objectives To investigate the feasibility of RCM in defining the margins of basal cell carcinoma before surgery. Methods The margins of 10 lesions were evaluated using RCM. Biopsies of the margins were used to confirm the results. A protocol was constructed to define margins. RCM was used to delineate preoperative surgical margins in 13 patients. Intraoperative frozen biopsy was used to confirm the margins. Results In seven of 10 The tumor island was the critical feature in identifying the margins. In 12 of 13 Conclusion RCM imaging of the margins is feasible and demonstrates the possibility of preoperative mapping of cancer margins. In vivo reflectance confocal microscopy RCM enables the noninvasive imaging of superficial layers of the skin with high resolution that provides cellular detail. It has been demonstrated recently that it is possible to examine nonmelanoma skin cancers in ex vivo tissue during Mohs micrographic surgery without frozen sections. Material and Methods Patients Ten patients with lesions clinically suggestive of BCC and then biopsy proven were recruited randomly from the dermatology department for the margin study. Before the biopsy, lesional and adjacent nonlesional skin was examined using RCM. Thirteen patients with biopsy-proven BCC were recruited for surgical excision. The margins of these lesions needed to be flat enough for RCM examination. This study was conducted according to the Declaration of Helsinki Principles. Institutional approval and written informed consent were obtained. Instrumentation Confocal imaging was performed using a commercially available near-infrared reflectance confocal laser scanning microscope Vivascope ; Lucid Technologies, Henrietta, NY , which uses a diode laser with a wavelength of nm and power of less than 15 mW. This system provides high-resolution images horizontal resolution 1. A comprehensive description of this system has been reported previously. Blocks of 2- by 2-mm mosaic image mode were used to detect the margins. Biopsies of the margins detected using RCM were performed for histopathologic analysis. Tumor islands were seen in most of the margins of the lesions,so we used this feature to delineate the margins. The final protocol was as follows Figure 1:

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Chapter 5 : Using Reflectance Confocal Microscopy in Skin Cancer Diagnosis | Plastic Surgery Key

In dermatology, reflectance confocal microscopy (RCM) is a non-invasive imaging technique that enables in vivo visualisation of the epidermis down to the papillary dermis in real time. Resolution is almost comparable to conventional histology.

Advertisement App to facilitate skin self-examination and early detection. Miiskin What is reflectance confocal microscopy? In dermatology, reflectance confocal microscopy RCM is a non-invasive imaging technique that enables in vivo visualisation of the epidermis down to the papillary dermis in real time. Resolution is almost comparable to conventional histology. The confocal microscope was invented by Prof Marvin Minsky in the mid s. RCM in skin imaging was later described by Dr Rajadhyaksha and his colleagues in Since then, there has been a lot of interest in using this technique in the diagnosis of skin malignancies such as melanoma and in inflammatory skin conditions. How does reflectance confocal microscopy work? RCM uses the diode laser as a source of monochromatic and coherent light. The light passes through a beam splitter, a scanning and focussing optical lens and a skin contact device. It penetrates the skin and illuminates a small tissue spot. Light reflected from the focal point reflects back through the lens, which focusses it into a small pinhole and forms an image on a photodetector. The pinhole only allows light from a focal point to pass through i. RCM relies on reflectance back-scattering of light from structures with endogenous contrast, such as melanin, haemoglobin and some organelles. Reflectance occurs at the boundaries of two structures with different refractive indices, such as membranes, keratohyaline granules and melanosomes. Confocal microscope How is reflectance confocal microscopy used? RCM is a painless procedure. A small amount of immersion oil is applied to the skin refractive index of oil is close to that of the stratum corneum. A glass window is attached to a metal ring and placed over the oil. The glass window is fixed to the skin using medical adhesive tape to prevent skin movement. A water-based immersion medium, e. RCM allows horizontal scanning of the imaged tissue at a pre-selected depth. Each basic image generated is 5 mm x 5 mm. Entire lesions up to 8 mm x 8 mm can be imaged. The basic images are stitched together by a computer forming a block or mosaic. A vertical series of images can be obtained at the same horizontal position and is called a stack. The RCM device has an attachment for a dermatoscope. This allows dermatoscopic-confocal microscopy correlation. Video of capillary blood flow can also be filmed. What are the potential clinical applications of reflectance confocal microscopy? RCM can be used to diagnose benign and malignant skin lesions, such as: Melanoma , especially lentigo maligna.

Chapter 6 : The role of confocal microscopy in the dermatoâ€“oncology practice

In Vivo Reflectance Confocal Microscopy is the latest technology being developed to meet these needs: it allows optical sectioning of an area of skin without the need for physical sectioning and could thus be ideal for dermatologists wishing to examine detailed features of a skin lesion without troubling the patient for a biopsy specimen.

Editor s Bio Summary Reflectance confocal microscopy enables lesions in skin to be examined without excision, but with improved diagnostic accuracy, assessment of dermoscopic-histologic correlation, assessment of surgical margins, as well as speed and convenience for the physician and patient. This extensively enlarged and updated text reviews the current and future state of the art for those involved with the diagnosis and treatment of skin tumors, with a greatly increased amount of material on the expected normal patterns of skin throughout life and on non-melanocytic tumors. Table of Contents Fundamentals and Technology Advances: Fundamentals of reflectance confocal microscopy. Confocal application in everyday practice. Computational methods in skin confocal microscopy. The role of teledermatology in Reflectance Confocal Microscopy. Miniature confocal microscopy devices for imaging skin. Reflectance confocal microscopy-guided microbiopsies for targeted molecular analysis. Multimodal confocal microscopy for non-melanoma skin cancers ex vivo. Intra-operative Reflectance Confocal Microscopy to potentially guide Mohs surgery and other dermatologic surgeries. Laser ablation of basal cell carcinoma guided by confocal microscopy. Normal Skin and Mucosa: Adnexal and sensory structures of the skin. Topographic and skin phototype variations of skin with special emphasis on facial and acral skin. Healthy oral and genital mucosa. RCM diagnosis of melanocytic neoplasms: Terminology, algorithms, and their accuracy, and clinical integration. RCM-histology correlation in melanocytic lesions. How genetic traits may influence the dermoscopic and confocal morphology of nevi. Superficial spreading and nodular melanoma including amelanotic melanoma. Lentigo maligna and lentigo maligna melanoma. Melanoma in special locations. Lesions Revealing Regressive Structures. Terminology, pattern analysis and algorithms, and accuracy studies of Reflectance Confocal Microscopy applied to non-melanocytic tumors. Reflectance Confocal Microscopyâ€”histology correlations for non-melanocytic tumors. Vascular patterns in non-melanocytic tumors. Pigmented actinic keratosis and porokeratosis. Squamous neoplasia subtypes and progression. Basal cell carcinoma simulators: Poroma, trichoepithelioma, and fibrous papules of the face. Sebaceous hyperplasia and adenoma: Clear cell acanthoma and dermatofibroma. Solar lentigo and lichen planus-like keratosis. The main clues to avoid misdiagnosing seborrheic keratosis-like simulators. Benign vascular tumors and malformations, and Kaposi sarcoma. Mycosis fungoides and other cutaneous T cell lymphomas. Diagnostic accuracy of Reflectance Confocal Microscopy in a clinical setting. Integration of Reflectance Confocal Microscopy for the management of patients with multiple nevi. Monitoring of non-invasive treatment and margin mapping prior surgery. Nail tumor management by intraoperative confocal microscopy. Field cancerization and monitoring of treatment. Monitoring of non-invasive treatment of Basal Cell Carcinoma. The current President of the International Society of Confocal Microscopy, he is active in research and clinical practice internationally.

Chapter 7 : Reflectance Confocal Microscopy of Cutaneous Tumors - CRC Press Book

Reflectance Confocal Microscopy (RCM) is a non-surgical alternative to skin biopsy. The laser-assisted imaging device delivers cellular level, detailed, black and white images of moles and suspicious lesions for physician analysis of potential malignancy.

Despite the ongoing research, advanced melanoma is still incurable; therefore, the most appropriate solution seems to be early detection combined with complete surgical excision 2. Since the diagnostic protocol of suspicious lesions includes a complete excision with safety margins 2 , the problem of unnecessary scarring is significant. The real challenge in this case is to have a properly formulated diagnosis before acquiring a biopsy. Currently available non-invasive techniques are coherence tomography, digital dermoscopy, and reflectance confocal microscopy. All these techniques allow for a presumptive diagnosis, but the most promising results are provided by reflectance confocal microscopy. Reflectance confocal microscopy RCM is an optical imaging technique that uses a laser diode as a source of coherent monochromatic light which penetrates the tissue and illuminates a single point. Light from the stimulated section is reflected and passes through a filter, thereby forming the image on the detector. This filter enables selective excitation of a particular point on which focus is achieved and rejects reflection from the out-of-focus area, thus obtaining a "confocal" image. Contrast is the result of differences in the refractive index of the cell organelles and microstructures, resulting in white structures on a black background. This technique allows, as opposed to conventional light microscopy, the analysis of sections obtained at a bi- or tri-dimensional level and controlling the depth of the field, permitting out-of-focus artifacts to be eliminated. In dermatology, this technique is useful for both clinical and research purposes. It is the only technique that allows horizontal viewing of the skin up to the superficial dermis approximately mm, at a cellular level resolution 0. It allows both in vivo and ex vivo diagnosis, while providing the possibility for long-term monitoring. It has proved to be especially valuable for in vivo examinations of melanocytic lesions, whereas melanin and melanosomes are a powerful source of contrast, allowing the individualization of melanocytic cells 4. We report the case of a year-old Caucasian woman who presented to the Dermatology Department of University of Modena and Reggio Emilia, Italy, for the examination of an atypical lesion, of unknown history, localized in the right preauricular area. The clinical presentation was highly indicative of malignancy, as it met all the ABCD clinical criteria: The dermatoscopic examination revealed an asymmetric multicomponent pattern with atypical network, structureless areas, peripheral irregular globules, and a blue-white veil. Because clinical and dermatoscopic features pointed towards a suspicious lesion which was situated on the face, where unnecessary scarring is unwanted, reflectance confocal microscopy RCM examination was proposed and performed VivaScope ; MAVIG GmBH, Munich, Germany 5. It revealed the following features: A Clinical examination of an atypical melanocytic lesion situated at the right preauricular area. C Confocal examination of dermo-epidermal junction and superficial dermis which reveals a meshwork pattern yellow circle with edged AND non-edged papillae, non-homogenous junctional clusters yellow star , dense nests, dense AND sparse nests red star and atypical cells in a sparse distribution arrow. The clinical and confocal data indicated a malignant melanocytic tumor, so an excisional biopsy with safety margins was performed. The histopathological report indicated superficial spreading melanoma with a Breslow of 0. This case illustrates the important role confocal microscopy examination has in the management of melanocytic lesions situated in special areas like the face. Reflectance confocal microscopy is an imaging technique that allows viewing the layers of the skin up to the superficial dermis and therefore turns out to be extremely useful in obtaining a pertinent diagnosis before acquiring a biopsy. According to the data available so far, it was established that reflectance confocal microscopy increases the diagnostic accuracy for melanocytic lesions in both pigmented and hypopigmented lesions. In a study conducted by Borsari et al. By improving the accuracy of clinical and dermatoscopic diagnosis, the reflectance confocal microscopy technique contributes to increasing the

confidence of the clinical and dermatoscopic diagnosis 7. In this regard, confocal reflectance microscopy reduces unnecessary excisions, particularly in cases of damage to cosmetically important areas, such as the face or the neck, simultaneously detecting the malignant lesions that require a surgical approach, as seen in the case presented, where confirmation of the diagnosis by confocal microscopy allowed for a safe excision. In fact, the head and neck are the most appropriate body location for reflectance confocal examination, especially because RCM showed a high diagnostic accuracy for lesions located on sun-damaged skin, as these two areas frequently are adjusted odds ratio aOR , 2. Reflectance confocal microscopy is very helpful in the management of special lesions, like facial lentigo maligna melanoma. This type of lesion is considered to be a real challenge for the dermatologist because of its clinical and morphological features that are similar to other lesions such as solar lentigines and pigmented actinic keratoses. In this case, reflectance confocal excels at specificity of the diagnosis, but also at to the ability to define the margins more accurately, permitting a pre-surgical mapping and for possibility of identifying the optimal site for biopsy 8,9. By improving diagnostic ability, reflectance confocal microscopy technique may contribute to the selection of lesions that may be eligible for non-surgical treatment. Facial pigmented non-melanocytic macules like solar lentigo, flat seborrheic keratosis, lichen planus-like keratosis, and pigmented actinic keratosis can mimic a lentigo maligna, or even a lentigo maligna melanoma, but with the help of the RCM, an accurate diagnosis can be established, sparing the patient can be from unwanted facial scars using a non-surgical approach laser, cryotherapy, imiquimod 10, Furthermore, reflectance confocal microscopy can be a valuable method for the monitoring of a skin lesion over time, especially melanocytic nevi, reducing unnecessary surgical excision, such as for patients with multiple atypical nevi that undergo multiple biopsies 12, Like all other diagnostic methods, RCM has its limitations: To summarize, reflectance confocal microscopy can improve clinical and dermatoscopic diagnosis of melanocytic lesions, detecting the lesions that need an invasive approach and preventing unnecessary excision. It has proven to be very helpful in the management of lentigo maligna and lentigo maligna melanoma, achieving high specificity in the diagnosis and simultaneously allowing an optimal approach. This technique can be a reliable bridge between dermoscopy and histopathology, being able to provide an alternative to histopathological examination.

Chapter 8 : What is the role of confocal microscopy in melanoma diagnosis? - Cancer Guidelines Wiki

Cutaneous metastases in patients with metastatic breast cancer can occur in up to 30% after a mean time of years, mostly in those with ductal carcinomas. Clinical presentation varies from skin-colored to red macules, papules and plaques sometimes with necrosis.