УДК 616.5-002.828

Kharisova A.R. post-graduate student
of dermatovenerology chair with
dermatovenerology and cosmetology courses
at Continuing Professional Education Institute,
Ufa city, Russia,
Khismatullina Z.R. Dr. habil. in Medicine,
Professor of dermatovenerology chair with
dermatovenerology and cosmetology courses
at Continuing Professional Education Institute,
Ufa city, Russia.

CLASSICAL METHODS OF MICROSPORIA DIAGNOSTICS (OVERVIEW)

Summary: the overview presents such standardized methods of microsporia diagnostics, such as Wood's lamp, microscopy and culture inoculation.

Key words: diagnostics, microsporia, Microsporum canis.

Харисова А.Р. аспирант
Кафедра дерматовенерологии с
курсом ИДПО дерматовенерологии и косметологии
ФГБОУ ВО БГМУ Минздрава России
Уфа, Россия,
Научный руководитель **- Хисматуллина З.Р.** доктор медицинских
наук, профессор,
Кафедра дерматовенерологии с
курсом ИДПО дерматовенерологии и косметологии
ФГБОУ ВО БГМУ Минздрава России
Уфа, Россия,

КЛАССИЧЕСКИЕ МЕТОДЫ ДИАГНОСТИКИ МИКРОСПОРИИ (ОБЗОР)

Резюме: в обзоре представлены такие стандартизированные методы диагностики микроспорий, как, например, лампа дерева, микроскопия и культуральная инокуляция.

Ключевые слова: диагностика, микроспория, Microsporum canis.

Dermatophytoses are infectious diseases of skin and dermal appendages, caused by dermatomycetes parasitic upon keratinized substrates (skin epidermis, hair, nails) [1].

Microsporia is an infectious fungal disease caused by *Microsporum fungus* characterized by lesions of skin and dermal appendages, followed by inflammation, fractured hair and alopecia [14].

Over 25 species of Microsporum *fungi* are known nowadays; the following species of which are classified as pathogenic: geophilous group (M. cookeii, M. gypseum, Keratotynomyces ajellonii), anthropophilous group (M. ferrugineum, M. audouinii, M. distorum, M. rivalieri, M. langeronii), zoophilous group (M. canis, M. nanum, M. persicolor) [14]. Zoophilous fungi Microsporum spp., transmitted by domestic cats and dogs may also cause infection contamination in humans. In case of scalp mycosis fungi are detected not only in the stratum corneum and around hair, but also around them [3].

The diagnosis of microsporia is usually established basing on clinical findings and laboratory tests data. Conventional laboratory clinical practice of microsporia diagnostics is often limited by microscopic and in vitro examination of contaminated material. Wood's lamp examination is conducted to differentiate a causative agent [10].

Microscopy is one of the main ways to determine causative agents of mycoses. Microscopic examination of pathological material is obligatory and reliable diagnostic method, as finding fungal spores and mycelium in the material under examination indicates the presence of a causative agent and constitutes grounds for establishing the diagnosis [17].

The samples for microscopic examination for dermatomycosis are collected from affected areas of skin, hair and nails (claws), from new but completely developed lesion focuses, where more fungal elements can usually be found. Microscopic examination of pathological material aimed at fungi determination is usually carried out in native and stained slides by hanging or crushed drop methods. Material clarification, concentration or, vise versa, dilution is performed for more accurate detection of fungal elements. Various substances, most commonly caustic alkali (KOH, NaOH) diluting epidermal scales, mucus, pus, lightening hair pigment and thus making the fungi available for examination are used for this purpose [8].

Fungal spores in contaminated hair visualized during microscopic examination have 2 main disposition types: endotrix and *ektotrix*. *Ektotrix* type is characterized by the presence of round spores of 2-3 μm in diameter as chains wrapping hair from outside, like mosaics. Endotrix type is characterized by predominantly internal disposition of fungal spores inside hair in regular chains. Spores of this type are of a single size, oval or round in shape [8, 17]. *Ektotrix* type is characteristic for M. canis, M. audouinii, M. ferrugineum, while endotrix type is for T. tonsurans, T. gourvilii, T. violaceum, T. youndei , T. rubrum [3].

However, microscopy of pathological material does not enable to clearly identify specific affinity of a fungus and has low sensitivity. Microscopic examination results interpretation is deemed to be subjective, as its results are based on visual evaluation and depend on the qualification of a laboratory assistant [5]. According to literature data, an average sensitivity of microscopy method is 53,8% [16, 17].

Wood's lamp is an auxiliary tool of microsporia diagnostics. Light-green fluorescence is observed during luminescent examination of hair contaminated with Microsporum sculp dermatophytes due to the presence of pteridine pigment. Hair contaminated with M. canis and M. Audouinii is characterized by the brightest luminescence [11, 16]. Contaminated hair, fluorescenting in the light of a Wood's lamp is subject to obligatory microscopic examination [9].

The method implying Wood's lamp application often shows false negative results due to patients' independent use of aniline colorants, iodine and topical steroids [3].

Culture inoculation remains a traditional method of dermatomycosis diagnostics, enabling to determine a fungal type. Contaminated hair, or, less commonly, skin pells are used to distinguish dermatomycosis. Non-shiny, fractured or otherwise abnormal hair is treated for 20 minutes in antibiotics solution before inoculation, pathological material is split on a microscope slide into small pieces, 5-6 of which are transferred to slanting agar surface and placed 1-2 sm one from another. material of one sample is inoculated into at least 2-3 test tubes (hair) or 4-5 test tubes (skin and nail squama). Standard Sabouraud agar medium with 2-4% of glucose is the most suitable for primary dermatophyte isolation [3, 7, 13].

M. canis colonies are radiantly-lanate, fluffy, off-white, sometimes yellow-tinted. The culture is determined both by appearance and by microscopic findings. Sporulation and mycelium organ forms are distinguished, fungal morphology is being studied at macro- and microscopic levels to identify the isolate obtained from clinical material, as many non-cognate fungi may have practically identical morphological markings of colonies and be characterized by abnormal pleomorphism depending on their growth conditions [6, 12, 17].

Pure culture differentiation method plays an important role in dermatomycosis diagnostics in cases when some of microscopy results are negative [4, 8]. According to the data provided by the aforesaid authors, culture method sensitivity is up to 22-59,8% [1, 2, 17].

Therefore, such methods as microscopy and microsporia causative agent culture picking are proposed for sufficient diagnostics. Fungal causative agent identification may be complicated even when using inoculations, as the percentage of causative agent determination is often not high enough, thus it will further require to improve dermatophytosis laboratory diagnostic methods. Diagnostic value of traditional examination methods also to a great extent

depends on acquired results interpretation, accuracy of pathological material collection and examinator's qualification.

List of literature

1. Beifuss B. et al. Direct detection of five common dermatophyte species in clinical samples using a rapid and sensitive 24-h PCR–ELISA technique open to protocol transfer // Mycoses. – 2011. – Vol.54. – №2. – P. 137-145.
2. Bergmans A.M.C. et al. Evaluation of a single-tube real-time PCR for detection and identification of 11 dermatophyte species in clinical material // Clinical Microbiology and Infection. – 2010. – Vol.16. – №6. – P. 704-710.
3. Elinov N.P., Vasil'eva N.V., Raznatovskij K.I. Dermatomikozy, ili poverhnostnye mikozy kozhi i ejo pridatkov-volós i nogtej. Laboratornaja diagnostika. Problemy medicinskoj mikologii // Dermatomycosis or Superficial Mycosis of Skin and its Appendages – Hair and Nails. Laboratory Diagnostics. Contemporary Issues of Medical Mycology – 2008. – Vol.10. – №1. – P. 27-34.
4. Kane J. Laboratory handbook of dermatophytes: a clinical guide and laboratory and book of dermatophytes and other filamentous fungi from skin, hair, and nails - Belmont, CA: Star Pub., - 1997, - P. 344.
5. Kozin V.M., Al-Halil A. Ljuminescentnyj metod diagnostiki v dermatologii s pomoshh'ju lampy Vuda. Dostizhenija fundamental'noj, klinicheskoj mediciny i farmacii / Luminescence Method of Dermatological Diagnostics with Wood's Lamp Application. Discoveries of Fundamental, Clinical Medicine and Pharmaceutics: materialy 68-j nauch. ses. sotr. un-ta [Materials of the 68th research session of University employees], - Vitebsk, - 2013.
6. Larone D.H. Medically important fungi: a guide to identification – New York : Elsevier, - 1987. – Vol.196. – P. 203.
7. Leshhenko V.M. Laboratornaja diagnostika gribkovyh zabolevanij [Laboratory Diagnostics of Fungal Diseases] // Medicina, - 1982.
8. Men'shikov V.V. Molekuljarnye issledovanija v diagnostike infekcionnyh zabolevanij [Molecular Investigations in Diagnostics of Infectious Diseases] – Moscow: Labora Publ., - 2009. – Vol.3. – 855 p.
9. Moriello K.A. Diagnostic techniques for dermatophytosis // Clinical techniques in small animal practice – 2001. – Vol.16. №4. – P. 219-224.
10. Raznatovskij K.I., Rodinov A.N., Kotrehova L.P. Dermatomikozy [Dermatomycosis] - Saint-Petersburg: SPbMAPO publishing house, - 2006. – P. 9-112.
11. Rodionov A.N. Gribkovye zabolevanija kozhi: rukovodstvo dlja vrachej [Fungal Skin Diseases. Doctors' Reference Book] – Saint-Petersburg., Moscow, Kharkiv, Minsk, - 2000.

12. Rodionov A.N., Raznatovskij K.I. Dermatogistopatologija. Ruk. dlja vrachej [Dermatohistopathology. Doctors' Reference Book] – Saint-Petersburg, - 2006. – P. 40-41, 81-83.

13. Satton D., Fotergill A., Rinaldi M. Opredelitel' patogennyh i uslovno patogennyh gribov [Detrminators of Pathogenic and Opportunistic Fungi] – 2001.

14. Sergeev A.Ju., Sergeev Ju.V. Gribkovye infekcii. Rukovodstvo dlja Vrachej [Fungal Infections. Doctor Reference Book] – Moscow: BINOM Publ., - 2008. – 480 p.

15. Sovremennyj spravochnik vracha veterinarnoj mediciny. [Modern Veterinarian Reference Book] / Under general editorship of V.G. Gavrish, S.P. Ubiraeva – Rostov-on-Don, - 2007. – P. 406-407.

16. Ufimceva M.A. et al. Infil"trativno-nagnoitel"naja mikrosporija u detej 7 i 9 let. Klinicheskie sluchai [Infiltration and Suppurative Microsporia in Children of 7 and 9 Years Old. Clinical Cases]. Sovremennye problemy nauki i obrazovanija [Contemporary Issues of Education and Science] – 2016. №3. – P. 125-125.

17. Zubareva I.M., Bimba I.A., Smykova N.V. Analiz jepizooticheskoj kartiny dermatomikozov koshek i sobak v Ust'-Kamenogorske [Analysis of Epizootic Picture of Cats and Dogs Dermatomycosis in Ust-Kamenogorsk]. Sb. mat. Ross. nauchno-prakt. konf. [Collection of materials from Russian Research and Practice Conference] – Novosibirsk, - 2003. – P. 73-74.