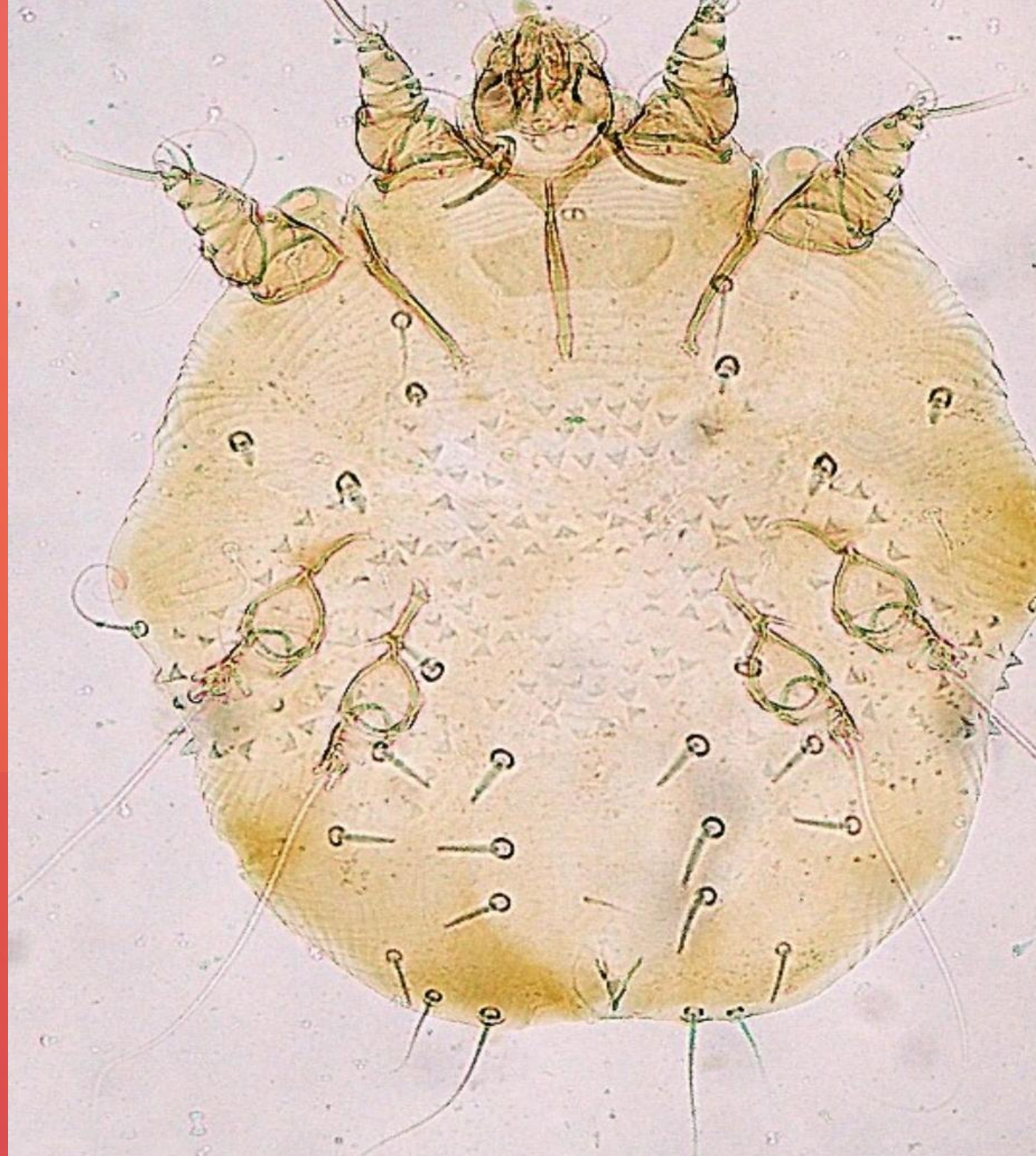
SCABIES IN THE MODERN ERA: SCIENTIFIC ADVANCES AGAINST AN ANCIENT INFESTATION"

EFFECTIVE STRATEGIES TO DIAGNOSE, TREAT, AND PREVENT SCABIES OUTBREAKS



INTRODUCTION AND EPIDEMIOLOGY

Global Burden of Scabies

Widespread Prevalence

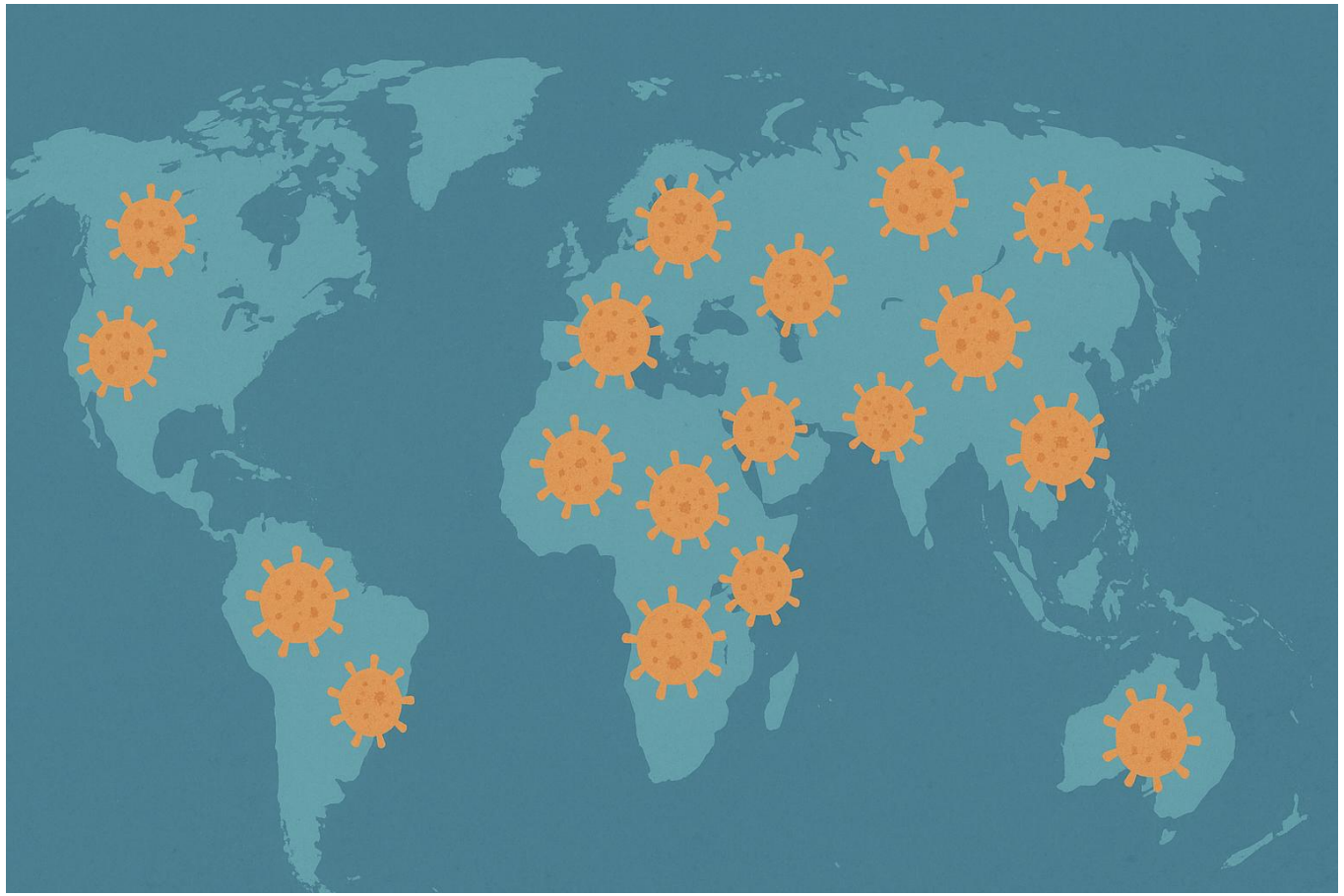
Scabies affects over 200 million people worldwide annually, posing a large public health concern.

WHO Classification

In 2017, WHO designated scabies as a Neglected Tropical Disease requiring control and research.

Epidemiological Resurgence

Recent data show increasing scabies cases in multiple regions, stressing healthcare challenges.



Socioeconomic Impact

Vulnerable Populations Affected

Scabies mainly impacts overcrowded and low-income communities with limited resources.

Economic and Social Consequences

Infestation causes missed work and school, social stigma, and worsened inequalities.

Healthcare and Public Health Burden

Increased complications and reinfections drive higher healthcare costs and strain systems.

Need for Holistic Interventions

Effective control requires medical treatment alongside social and economic support.

PATHOGENESIS AND TRANSMISSION

Mite Biology and Lifecycle

Causative Mite Species

Scabies is caused by the mite Sarcoptes scabiei var. hominis burrowing into the skin.

Mite Lifecycle Stages

The mite lifecycle includes egg, larva, nymph, and adult stages over 10-14 days.

Host Reaction Symptoms

Mite activity causes allergic reactions with intense itching and skin lesions.

Transmission Dynamics

Primary Transmission Mode

Scabies spreads mainly through prolonged skin-to-skin contact in close settings. It takes approximately 20 minutes

Crusted Scabies Severity

Crusted scabies contains millions of mites and is highly contagious and hard to treat.

Risk Groups

Immunocompromised and elderly individuals face higher risks from crusted scabies.

CLINICAL PRESENTATIONS OF SCABIES

Classic Scabies Presentation

- Primary Symptom
- Lesion Distribution
- Skin Manifestations.
- Delayed Symptoms

Atypical Presentations

Groups Affected:

- Infants, elderly, immunocompromised individuals.

Lesion Locations:

- Face, scalp, soles, and palms.

Symptom Variability:

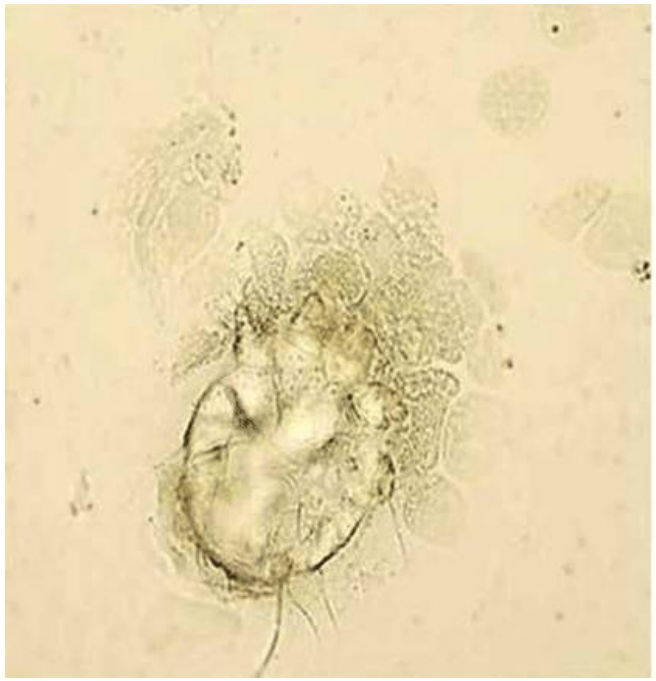
- Itching may be mild or absent in these groups.

Crusted Scabies (Severe Form)

Features:	• Thick, crusted plaques resembling psoriasis. • Often **no itching**, making diagnosis harder.
High Mite Load:	• Up to 2 million mites per person (vs. 10–15 in classic scabies).
Risk Groups:	• Elderly, immunosuppressed, HIV-positive individuals.
Transmission Risk:	• Highly contagious .

ADVANCED DIAGNOSTICS

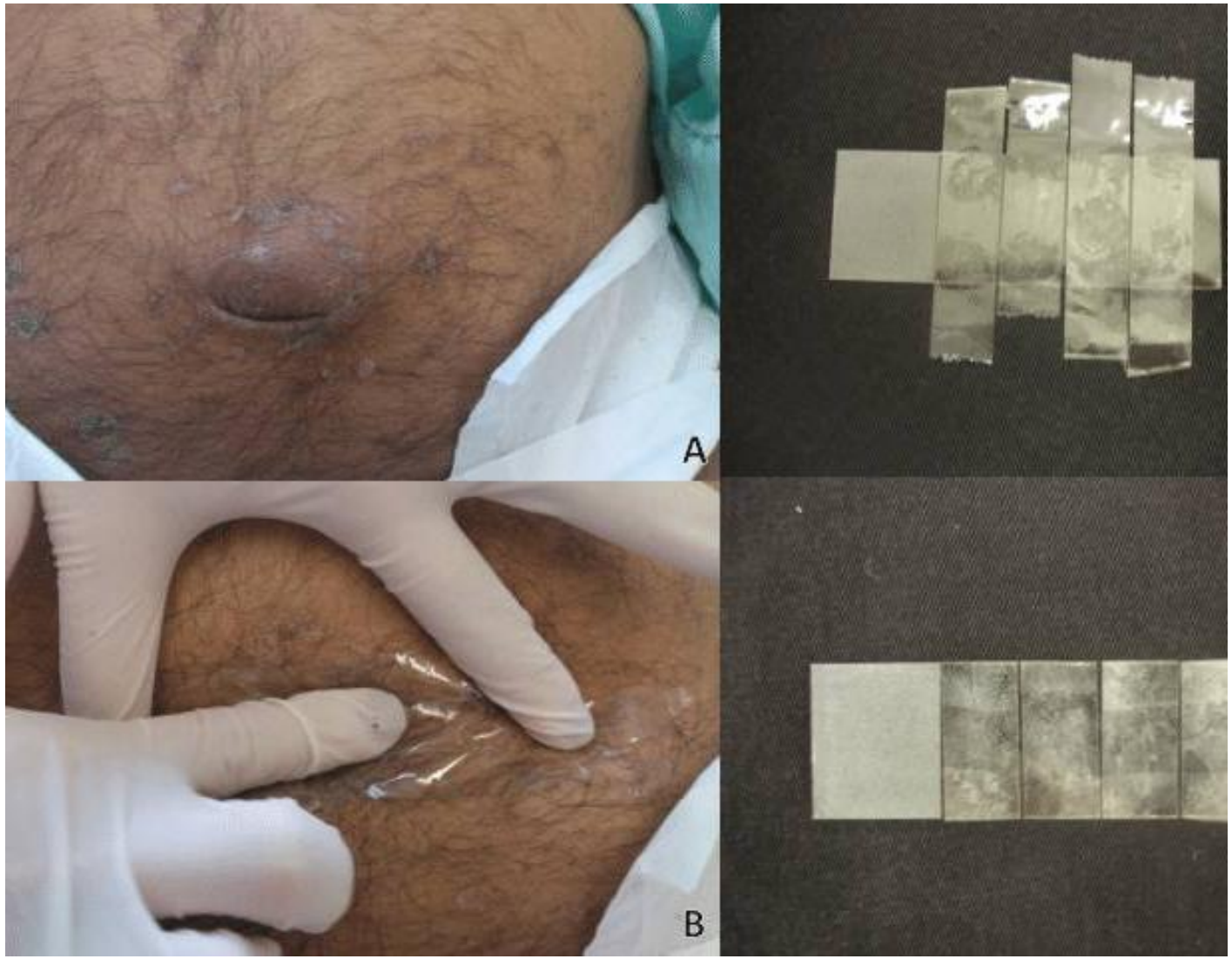
SKIN SCRAPING



Simple light microscopy of skin scrapings may show direct

visualisation of the mites, eggs or faeces in skin samples, but has

reported detection rates varying from 10 to 70%, and a risk of falsenegative results



Adhesive tape

Adhesive tape applied to skin where a lesion is present, and

removed rapidly can be transferred to a glass slide for microscopy,

this facilitates direct visualisation of the mite, faeces or eggs that are

adherent to tape media.

Non-invasive Visualization Techniques

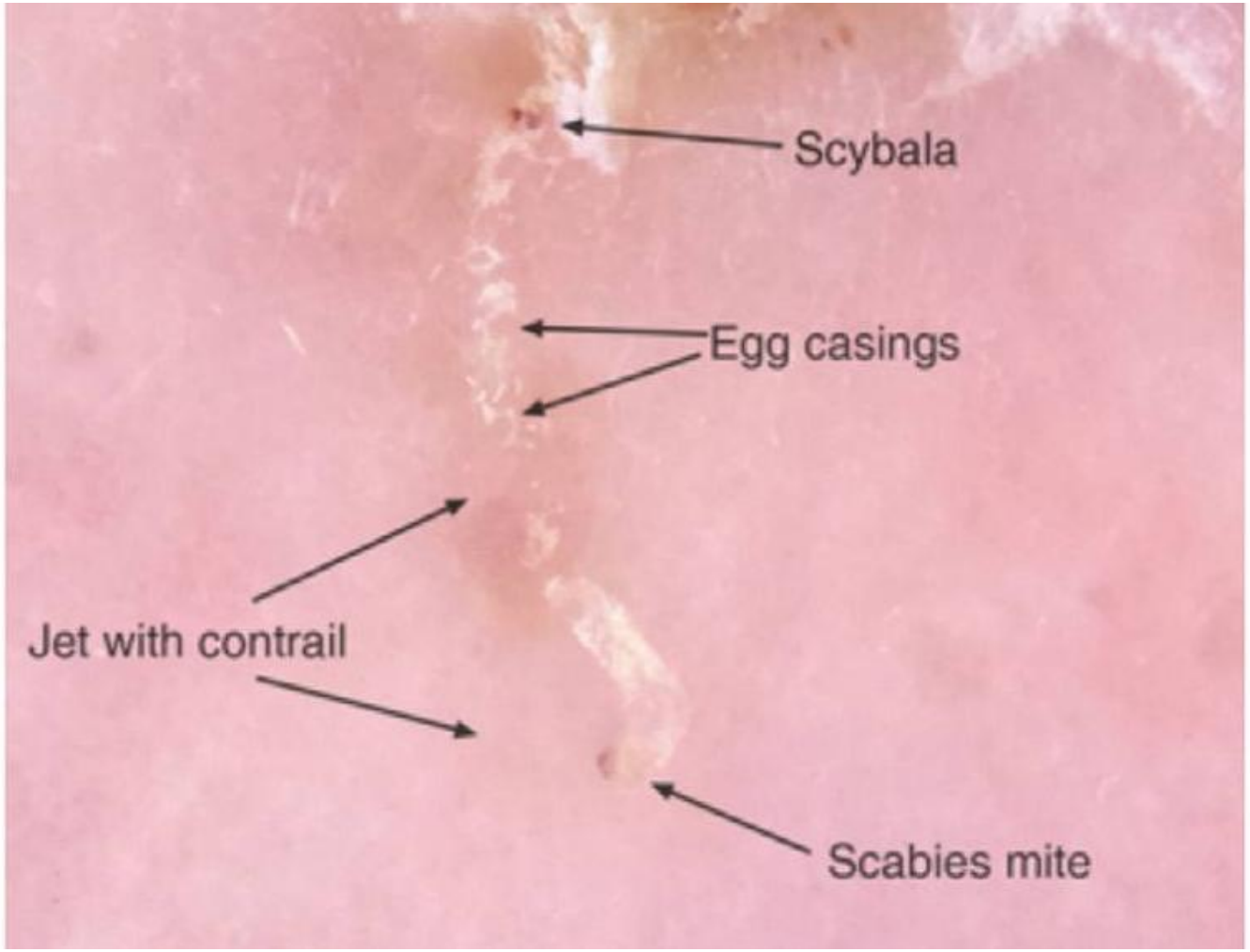
These imaging methods enhance accuracy especially in atypical or early infestations without invasiveness.

Limitations and Advancements

Accessibility and cost limit current use, but these techniques mark significant diagnostic progress.

Dermoscopy

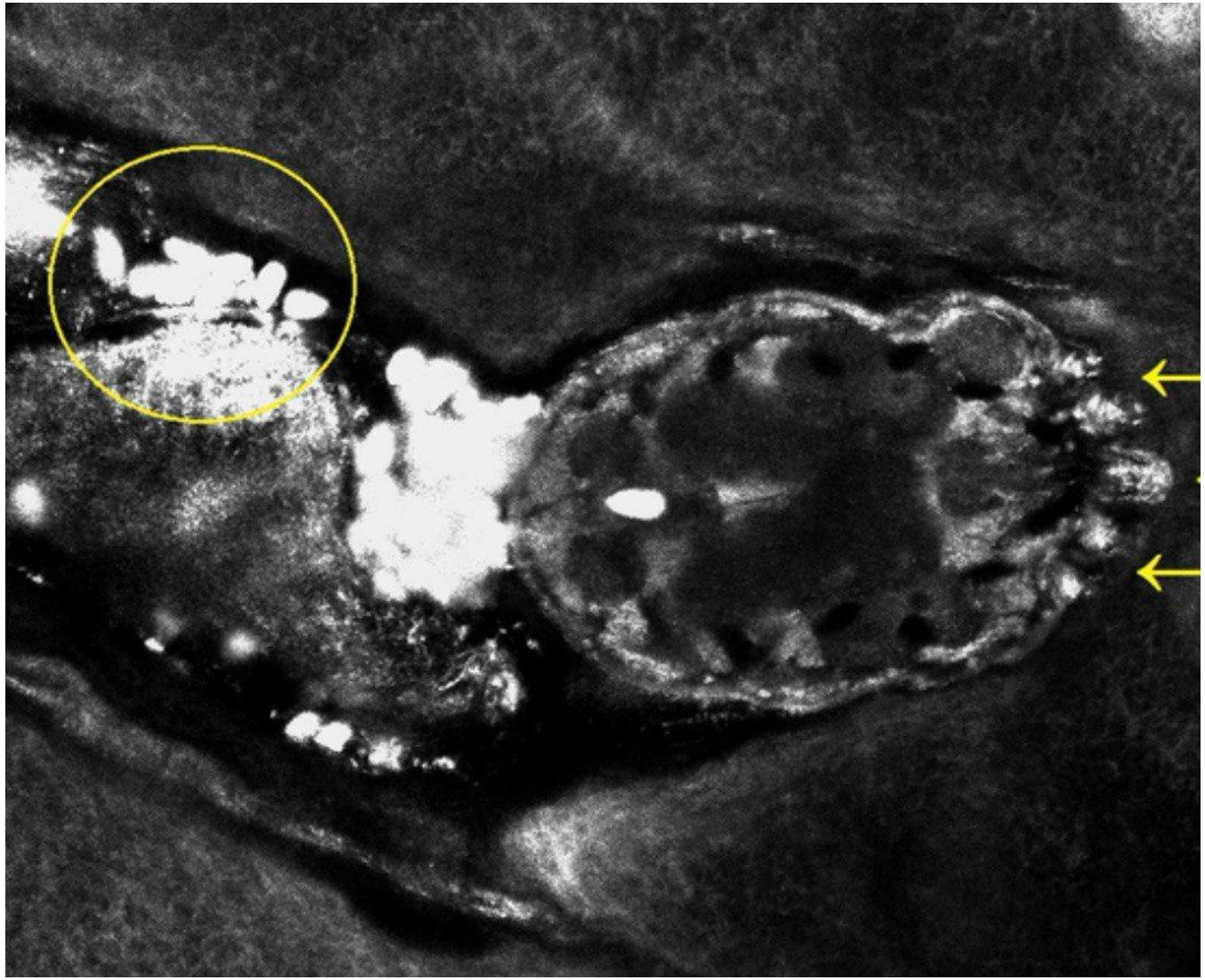
Dermoscopy offers about 85% specificity in detecting scabies mite burrows and mites.



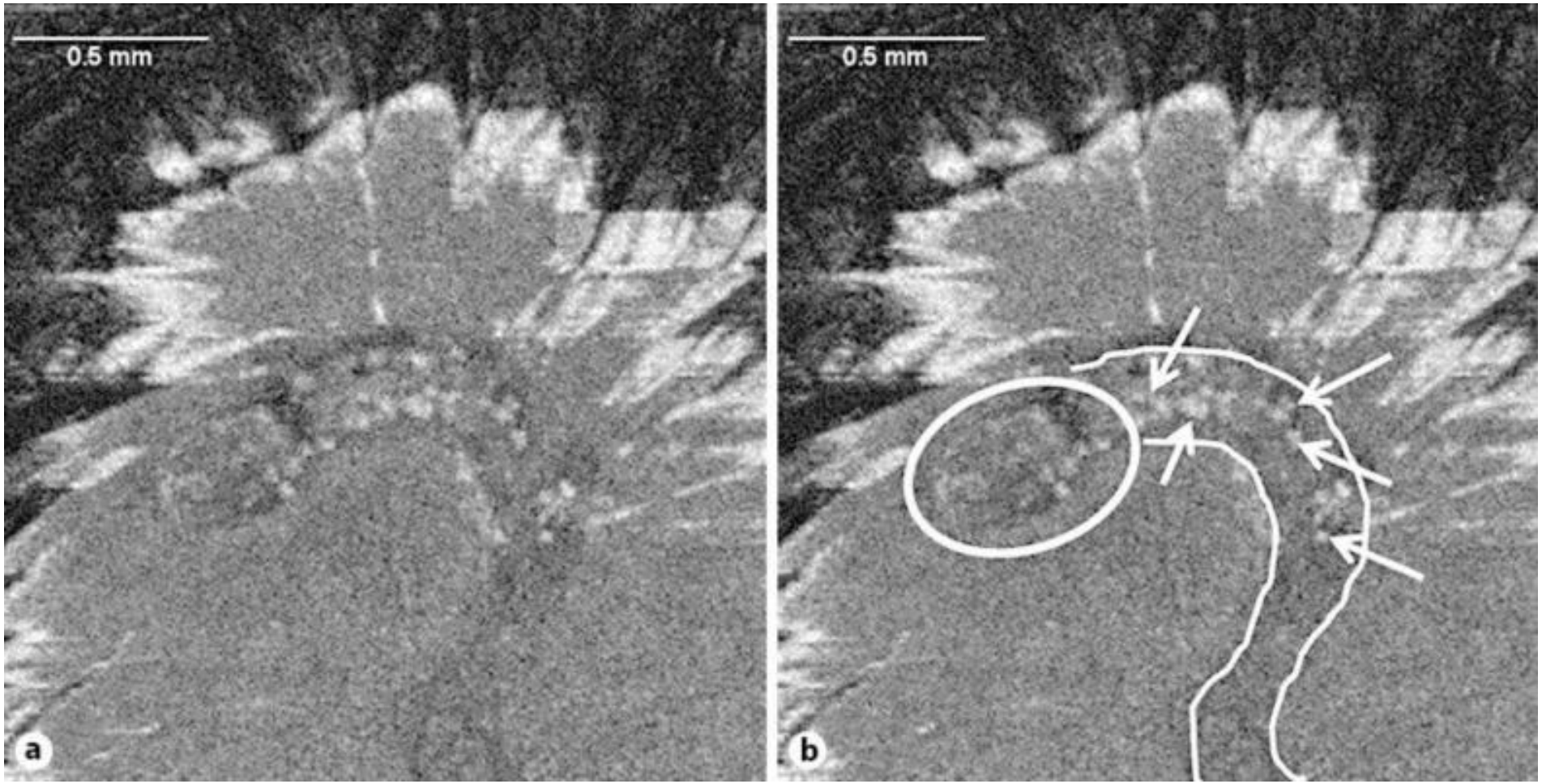
Advanced Microscopy Techniques

Reflectance Confocal Microscopy RCM

In vivo a new diagnostic optical technique capable of horizontally (en face) scanning the skin at different layers by the use of a laser beam reflected according to the refraction index of the different structures encountered.



Optical coherence tomography (OCT) is a noninvasive technique allowing morphological tissues examination by detecting near infrared beams reflected by biological structures at a cellular leve



Molecular Diagnostics

PCR

Newer techniques utilising probe-based real time polymerasechain reaction (PCR) assays to detect scabies DNA sequences present in samples from dry swabs of lesions has been developed

Use in Low Mite Counts

These methods are effective in detecting mites even with low counts or partial treatment.

Role in Outbreak Surveillance

Molecular diagnostics enable rapid identification of infested individuals and environmental contamination.

Optimizing Control Efforts

These diagnostics improve treatment outcomes and support effective disease control strategies.

TABLE 1 Summary of The International Alliance for the Control of Scabies (IACS) updated consensus criteria for the diagnosis of scabies in 2020 (adapted from Engelman D et al.).

Category	Criteria	Details
Confirmed Scabies	A1: Mites, eggs, or feces on light microscopy of skin samples	Requires direct visualization of mites, eggs, or feces under microscopy.
	A2: Mites, eggs, or feces visualized using a high-powered imaging device	Advanced imaging tools confirm the presence of scabies.
	A3: Mite visualized using dermoscopy	Dermoscopy reveals the characteristic 'delta sign' at the end of a burrow.
Clinical Scabies	B1: Scabies burrows	Visible burrows on the skin indicative of scabies infestation.
	B2: Typical lesions affecting male genitalia	Lesions in specific areas such as male genitalia.
	B3: Typical lesions in a typical distribution and two history features	Lesions in common areas (e.g., wrists, elbows) with history of itching and contact exposure.
Suspected Scabies	C1: Typical lesions in a typical distribution and one history feature	Lesions in common areas with either itching or contact history.
	C2: Atypical lesions or atypical distribution and two history features	Unusual lesions with both itching and contact history.
History Features:	H1: Itch.	
	H2: Positive contact history with an individual who has itch or typical lesions in a typical distribution.	

TREATMENT MODALITIES

Topical and Systemic Therapies

First-line Topical Treatment

Permethrin 5% cream is the traditional treatment for uncomplicated scabies.

Benzyl benzoate 25%

May offer superior efficacy and reasonable tolerability compared to permethrin 5%, particularly in areas where permethrin resistance is prevalent

Systemic Treatment Role

Oral ivermectin is important for crusted scabies and mass drug administration programs.

Moxidectin offers longer half-life and potential single-dose cure, currently in Phase II trials.

Emerging Therapy

Moxidectin

- a macrocyclic lactone with a significantly longer plasma half-life than ivermectin (detectable up to 47 days vs. 7 days for ivermectin)
- , is currently in Phase II trials. Its prolonged action suggests the potential for a single-dose curative therapy, which would greatly simplify treatment regimens and improve compliance. Geraniol Efficacy

Geraniol

- Plant-Based
- shows 100% mite mortality with no toxicity, offering an eco-friendly treatment option.

Combination Therapies

Combination Therapy Benefits

Combining permethrin and oral ivermectin increases treatment success in resistant or severe cases.

Contact Treatment Importance

Treating all household contacts simultaneously is crucial to avoid reinfection and control spread.

Environmental Decontamination

Hot-water laundering of linens and clothing is vital for thorough environmental cleaning.

DRUG RESISTANCE AND SURVEILLANCE

Mechanisms and Impact

Genetic Mutation Resistance

Permethrin resistance is linked to mutations in mite sodium channels, reducing insecticide effectiveness.

Ivermectin Resistance Mechanism

Ivermectin resistance involves changes in glutamate-gated chloride channels disrupting drug action.

Consequences of Resistance

Resistance causes treatment failure, prolonged suffering, risk of secondary infections, and healthcare strain.

Surveillance Importance

Robust surveillance systems are critical to track resistance patterns and inform treatment choices.

PUBLIC HEALTH STRATEGIES

Mass Drug Administration and Environmental Control

Effectiveness of MDA

MDA programs using ivermectin significantly reduce scabies prevalence in affected areas.

Single Dose Impact

Even one dose of ivermectin in MDA campaigns can greatly lower disease rates.

Environmental Hygiene

Laundering clothes and bedding in hot water helps prevent scabies reinfestation.

Surface Cleaning Importance

Cleaning surfaces is essential to stop scabies transmission and outbreaks.

Healthcare Worker Training and Community Engagement

Healthcare Worker Training

Training includes diagnosis, treatment protocols, and community outreach for effective scabies management.

Community Engagement Importance

Community education and compliance monitoring are critical to preventing scabies outbreaks.

Comprehensive Treatment Approach

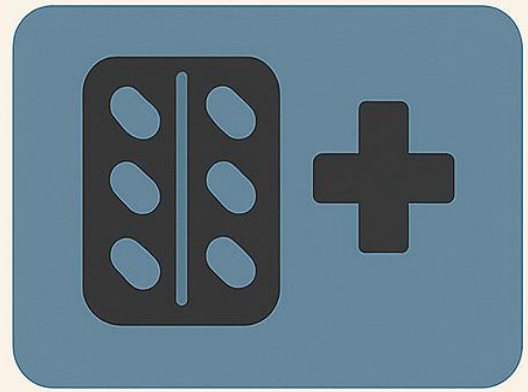
Treating all contacts regardless of symptoms improves disease control and intervention impact.

Collaborative Public Health Efforts

Integrating scabies control into public health programs requires multidisciplinary collaboration.

CHALLENGES TO SCABIES GLOBAL CONTROL

Challenges related
to disease transmission



Challenges related
to therapy

Challenges related
to diagnostic tools

Diagnostic research
challenges and update

Chainyes related to vaccine

CONCLUSION

Summary and conclusion

Effective Treatments

Permethrin and ivermectin are emphasized as effective treatments for scabies in current guidelines.

Preventive Strategies

Mass drug administration and environmental control are critical for managing scabies outbreaks effectively.

Emerging Therapies

New therapies like vaccines and novel agents such as moxidectin show promise for long-term scabies control.

Community-Based Surveillance (CBS)

Train community health workers to identify and report suspected scabies cases, especially in high-risk areas like prisons, nursing homes,psychiatric institutions

References

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- Frontiers Review: https://www.frontiersin.org/journals/tropical-diseases/articles/10.3389/fitd.2024.1429266/full
- Moxidectin Trials: https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0004389
- Diagnostics Review: https://academic.oup.com/trstmh/article/116/1/4/6185178
- Medscape Workup: https://emedicine.medscape.com/article/1109204-workup
- MDA Meta-Analysis: https://academic.oup.com/cid/article/75/6/959/6516510
- WHO MDA Guidelines: https://iris.who.int/bitstream/handle/10665/353981/9789240045026-eng.pdf