



# Images in infectious diseases: Monkeypox – images of an exhibition

Ana M. Groh<sup>1</sup> · Holger F. Rabenau<sup>2</sup> · Christoph Stephan<sup>1</sup>

Received: 5 September 2022 / Accepted: 8 September 2022  
© The Author(s) 2022

**Keywords** Monkeypox · Men having sex with men · HIV · Skin lesions

A 35-year-old man who has sex with men (MSM) approached his HIV treating physician by email, because of new scrotal skin lesions (Fig. 1A), he noticed the day before, appearing with urethral discharge and left-sided, enlarged inguinal lymph node. Self-administered doxycycline, due to suspected syphilis, did not improve symptoms. HIV was detected in December 2019, and antiretroviral therapy was immediately started; medical and sexual transmitted infections (STI)-history was unremarkable.

Due to COVID-19 isolation, the first clinical examination was deferred to day 11, revealing four increased circular crater-shaped, scrotal skin elevations with central melting (5 × 5 mm; see Fig. 1E) and no further complaints. Laboratory investigations found slightly elevated C-reactive protein (CRP 1.11 mg/dl, nr < 0.5), normal STI check for syphilis, chlamydia, gonococci and trichomonas, but positive Monkeypox DNA from swap (Ct-value = 18.62; in-house

modified *LightMix Modular Monkeypox Virus-PCR/Tib-MolBiol*, Roche Diagnostics, Mannheim/Germany; Ct-value  $\geq 40$  = negative). CD4 cell counts (1007/ $\mu$ l, CD4/CD8-ratio 0.79) were normal and HIV-RNA undetectable. On day 29, all skin lesions were dry, scarred and inactive and no new vesicles occurred. Therefore, health authority-imposed Monkeypox isolation was finally lifted and patient returned to work as elderly care nurse.

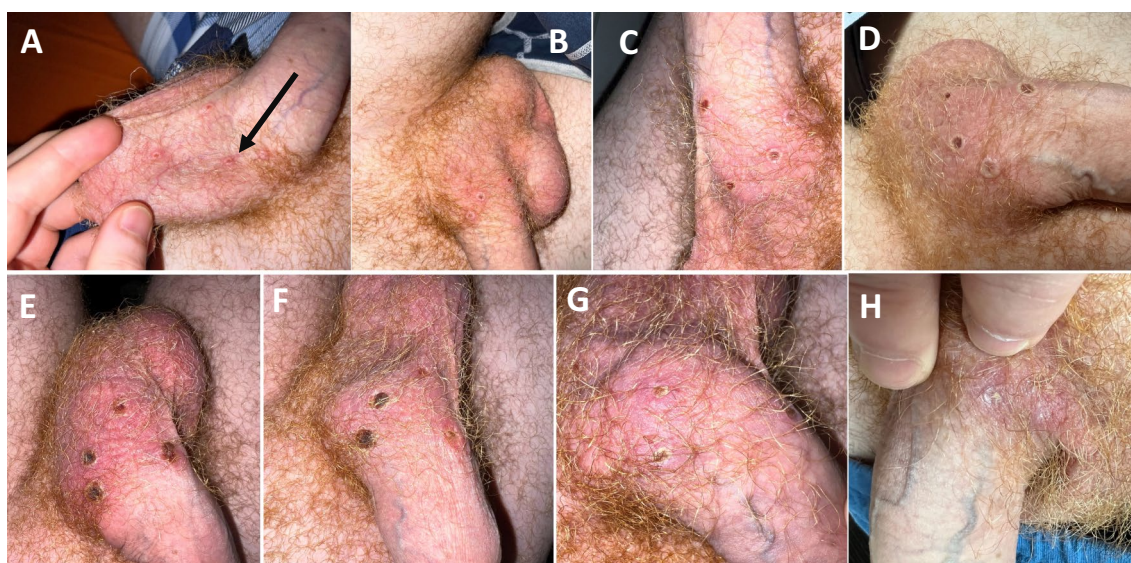
Nucleic acid assays and electron microscopy (see Fig. 2) may support clinical Monkeypox diagnosis in MSM context [1]. Best supportive care of lesions will be most frequently treatment for immunocompetent individuals, as specific antiviral therapy is unavailable [2]. Facing case numbers in Germany [3], a high level of suspicion for Monkeypox visual diagnosis is warranted and this presentation of overtime skin lesions may help for individual timing assignment.

---

✉ Christoph Stephan  
c.stephan@em.uni-frankfurt.de

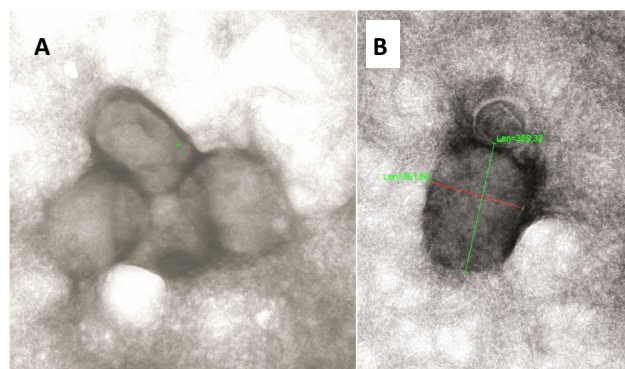
<sup>1</sup> Center of Internal Medicine, Infectious Diseases Unit, University Hospital Frankfurt, Goethe University, Frankfurt, Germany

<sup>2</sup> Institute for Medical Virology, University Hospital Frankfurt, Goethe University, Theodor-Stern-Kai 7, 60590 Frankfurt, Germany



**Fig. 1** Overtime development of Monkeypox lesions was meticulously documented by the (nurse) patient's photograph series, after the suspected diagnosis had been mentioned in a first phone call. See detailed diary of skin lesions: **A**—Day 1 (July 5th, 2022): crater-shaped lesions, see arrow: 2×2 mm (diameter); **B**—Day 3, hardly changed lesions; **C**—Day 4, the central meltdowns now present

enlarged, with more intense redness; **D**—Day 5, lesions start to dry up; **E**—Day 10, central redness enlarge and begin to encrust, lesions' diameter: now 5×5 mm; **F**—Day 15, the lesions are completely covered by reddish crust; **G**—Day 22, scarring regression, crusts start to fall off; **H**—Day 27, scarred healing of lesions



**Fig. 2** Monkeypox virus: Scanning electron microscopy (sample obtained from another individual in Frankfurt). Panel **A** shows a group of 4 typically box-shaped (Monkey-) Pox viruses, panel **B** shows measurement procedure outcome (longitudinal diameter = 359 nm)

**Acknowledgements** To the patient for alert and wonderful photo documentation,—this would merit authorship, but he refused, for understandable discretion interest.

**Author contribution** AMG and CS wrote the main manuscript text, and CS and HFR prepared Figs. 1 and 2. All the authors reviewed the manuscript.

**Funding** Open Access funding enabled and organized by Projekt DEAL. This study was funded by Frankfurt University Hospital.

**Data availability** The authors confirm that the data supporting the findings of this study were raised from clinical routine in Frankfurt University Hospital outpatient department and are available within this article.

## Declarations

**Conflict of interest** None of the authors reported any conflict of interest in context with this study.

**Consent to participate and consent to publish** The patient consents to having the data published.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

1. Thornhill JP, Barkati S, Walmsley S, Rockstroh J, Antinori A, Harrison LB, Palich R, Nori A, Reeves I, Habibi MS, Apea V, Boesecke C, Vandekerckhove L, Yakubovsky M, Sendagorta E,

- Blanco JL, Florence E, Moschese D, Maltez FM, Goorhuis A, Pourcher V, Migaud P, Noe S, Pintado C, Maggi F, Hansen AE, Hoffmann C, Lezama JJ, Mussini C, Cattelan A, Makofane K, Tan D, Nozza S, Nemeth J, Klein MB, Orkin CM, SHARE-net Clinical Group. Monkeypox virus infection in humans across 16 countries—April–June 2022. *N Engl J Med.* 2022;387(8):679–91.
2. Laudisoit A, Tepage F, Colebunders R. Oral tecovirimat for the treatment of smallpox. *New Eng J Med.* 2018;379(21):2084–5. <https://doi.org/10.1056/NEJMc1811044>.
  3. Hoffmann C, Jessen H, Teichmann J, Wyen C, Noe S, Kreckel P, Köppe S, Krauss AS, Schuler C, Bickel M, Lenz J, Scholten S, Klausen G, Lindhof HH, Jensen B, Glaunsinger T, Pauli R, Härter G, Radke B, Unger S, Marquardt S, Masuhr A, Esser S, Flettner TO, Schäfer G, Schneider J, Spinner CD, Boesecke C. Monkeypox in Germany—initial clinical observations. *Dtsch Arztebl Int.* 2022;119:551–7.