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Letter to the editor

# Re: 'clinical characteristics of ambulatory and hospitalised patients with monkeypox virus infection' by Mailhe et al.

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*To the Editor*

We read with great interest the article by Mailhe et al. [1] on the characteristics of patients with monkeypox virus infection in Paris, France. As underlined by the authors, there are currently no data on the profile of subjects receiving vaccination as pre-exposure prophylaxis against monkeypox.

We performed a cross-sectional study at Hôtel-Dieu hospital, a university hospital located in Paris, France with one of the largest vaccination capacities. The aim of the study was to assess the socio-demographic characteristics, motivations, and level of literacy of people receiving the first dose of the Modified Vaccinia Ankara–Bavarian Nordic vaccine (Imvanex®) vaccine.

We included consecutive patients for 7 days between July 28, 2022 and August 5, 2022, receiving the first dose of Modified Vaccinia Ankara–Bavarian Nordic vaccine as pre-exposure prophylaxis against monkeypox following French recommendations. They were given an anonymous written questionnaire. The Research Ethics Committee of the French Infectious Diseases Society approved the study (IRB00011642).

We analyzed 263 subjects: 260 (98.9%) were men; the median age was 38 years old (interquartile range, [30–50]) and 115 (43.7%) were born before 1980 (Table 1). Of the 260 patients, 255 (98.1%) identified as men who have sex with men (MSM), and the median number of sexual partners within the 30 days before vaccination was 3 (2–6). Of the 263 patients, 216 (82.1%) subjects had at least a Bachelor's degree. Of note, there were 16 health care workers (16/263, 6.1%) in participants included, and all of them were MSM having changing sexual contacts.

Thirty patients (11.5%) were living with human immunodeficiency virus infection (HIV) (PLVIH). All of them were men and had a plasma HIV RNA level <20 copies per mL and a CD4 count >200 per mm3. Of the 261participants, 102 (39.1 %) were on HIV pre-exposure prophylaxis (HIV PrEP).

Vaccination coverage was 92.8% for coronavirus disease 2019 (COVID-19), 60.1% for hepatitis A and 71.1% for hepatitis B, the last two vaccines being recommended in France for subjects at sexual risk. Compared with others participants, PLVIH and those taking HIV PrEP were significantly more frequently vaccinated against hepatitis A (69.7 % vs. 66/131, 50.4% $p = 0.014$), hepatitis B (105/132, 79.6 % vs. 82/131, 62.6%, $p = 0.015$) but HPV vaccination coverage was equally low (32/73, 43.8%).

The main reason for vaccination was individual protection ("I get vaccinated to protect myself," 253/256, 98.8%), 238 (238/253, 94.1%) completely agreed with "I get vaccinated to avoid transmissions to others" and 166 (166/249, 66.7%) with "I get vaccinated to follow public health guidelines."

The main source of information about monkeypox vaccination was mass media for 55.1% (130/236) of participants. Fourteen (14/236, 5.9%) participants, all PLVIH, were mostly informed by health care professionals. Most of the subjects did not know the brand name of the vaccine, the vaccine technology, or the level of protection. All participants who reportedly knew the level of protection declared an 85% level of protection, corresponding to previous

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**Table 1**
Baseline characteristics and demographics of 263 patients receiving a pre-exposition prophylaxis vaccination for monkeypox in Hôtel-Dieu Hospital, Paris, France

| Characteristics | Value |
|---|---|
| **Age, y** | 38 [30–50] |
| Born before 1980 | 115 (43.7) |
| **Sex** | |
| Male | 260 (98.9) |
| Female | 1 (0.4) |
| Transgender | 2 (0.8) |
| **Occupation** | |
| Self-employed (craftsperson, shopkeeper, and entrepreneur) | 35 (13.3) |
| Manager and 'higher intellectual profession' | 132 (50.2) |
| Health care worker | 16 (6.1) |
| Worker | 10 (3.8) |
| Intermediate professions | 26 (9.9) |
| Student | 13 (4.9) |
| Unemployed | 8 (3.0) |
| Retired | 13 (4.9) |
| Sex worker | 2 (0.8) |
| Do not want to answer/missing data | 7 (2.7) |
| **Education** | |
| Below high school diploma | 10 (3.8) |
| High school diploma | 33 (12.5) |
| Bachelor's degree | 60 (22.8) |
| Master's degree | 106 (40.3) |
| Above master's degree | 50 (19.0) |
| Do not want to answer/missing data | 4 (1.5) |
| **Men having sex with men ($N = 260$)** | |
| Yes | 255 (98.1) |
| No | 1 (0.3) |
| Do not want to answer/missing data | 4 (1.5) |
| **Number of sex partners within the previous 30 days before vaccination** | 3 [2-6] |
| **Comorbidities** | |
| Active smoking ($N = 250$)[a] | 61 (24.4) |
| Obesity ($N = 243$) | 9 (3.7) |
| Atopic dermatitis ($N = 229$) | 3 (1.3) |
| HIV | 30 (11.5) |
| Immunosuppressive disease | 4 (1.5) |
| Other comorbidity ($N = 263$) | 12 (13.1) |
| **Infectious risk prevention** | |
| **HIV pre-exposure prophylaxis (PrEP) user ($N = 261$)** | 102 (39.1) |
| **COVID-19 vaccine status** | |
| Fully vaccinated (valid Green Pass) | 244 (92.8) |
| Not vaccinated/not fully vaccinated | 12 (4.6) |
| Do not want to answer/missing data | 7 (2.7) |
| **Hepatitis A vaccine status** | |
| Fully vaccinated or previous infection | 158 (60.1) |
| Not vaccinated | 18 (6.8) |
| Unknown status/do not want to answer/missing data | 87 (33.1) |
| **Hepatitis B vaccine status** | |
| Fully vaccinated or previous infection or current infection | 187 (71.1) |
| Not vaccinated | 20 (7.6) |
| Unknown status/do not want to answer/missing data | 56 (21.3) |
| **Human papillomavirus vaccine status ($N = 73$ eligible)**[b] | |
| Fully vaccinated | 32 (43.8) |
| Not vaccinated | 41 (56.2) |
| **Motivations to get vaccinated** | |
| "To protect myself" (I completely agree)[c] ($N = 256$) | 253 (98.8) |
| "To avoid transmission to others" (I completely agree) ($N = 253$) | 238 (94.1) |
| "To follow public health guidelines" (I completely agree) ($N = 249$) | 166 (66.7) |
| **Main source of information about monkeypox vaccination ($N = 236$)** | |
| Mass media (television, radio, press, etc.) | 130 (55.1) |
| Relatives/friends/sex partners | 53 (22.5) |
| Social media/websites/dating applications | 34 (14.4) |
| General practitioners or other health care workers | 14 (5.9) |
| Others | 5 (2.1) |
| **Knowledge on monkeypox vaccine (Imvanex) ($N = 216$)** | |
| Brand name | 56 (25.9) |
| Vaccine technology | 42 (19.4) |
| Level of protection | 80 (37.0) |

Continuous variables are presented as medians with interquartile ranges unless otherwise stated. Categorical variables are presented in absolute numbers (percentage, %). COVID-19, coronavirus disease 2019; HIV, human immunodeficiency virus infection.

[a] Patients eligible for human papillomavirus vaccination in France i.e. since 2017, patients aged <26 years old.

[b] ($N$=): number of subjects with available data.

[c] Four-answer questionnaire ranking answers from "I completely agree" to "I completely disagree" (see questionnaire in Supplementary Material).

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data on smallpox vaccine efficacy against endemic monkeypox in Africa, according to CDC [2].

Overall, participants were mostly MSM, of high social status, motivated to get vaccinated to protect themselves, although their theoretical knowledge about vaccination was limited.

We also confirm the population receiving monkeypox vaccination as PrEP matches the one targeted by the guidelines, as well as the cohort published in the literature. Indeed, Mailhe et al. [1] reported a cohort study of 264 patients with proven monkeypox infections in France in which 262 patients (262/264, 99%) were men, 245 (245/259, 95%) were MSM, and 73 (73/256, 29%) were PLVIH [1]. Our population, with 39.1% HIV PrEP users, and 82.1% with higher education, corresponds to a population with high intention to get vaccinated [3]. We identify a "high-confidence, low-literacy" vaccine profile, confirming the importance of confidence in vaccine uptake [4].

Our work has several limitations. First, our study was led in a unique vaccination centre, but to which patients from all neighbourhoods in Paris were addressed. Secondly, these data were collected at the beginning of the monkeypox PrEP vaccination campaign, and temporal changes may occur in the perception of the vaccination and/or the disease and may affect the intention to get vaccinated, particularly as vaccine scarcity is becoming an increasing problem worldwide [5].

In conclusion, this study confirms that the PrEP monkeypox vaccination campaign has been successful in France to reach the targeted population. Participants got information about vaccination mostly from mass media and were motivated by individual protection. Public health authorities should be aware of this "high-confidence, low-literacy" profile which may potentially be influenced by the contradicting data in the literature, with optimistic preliminary data from the USA and Israel, but contradictory immunogenicity data from the Netherlands [6–8]. This also may be associated with risk compensation, for example, participants feel protected and thus stop being precautious. This emphasizes the critical role of transparent communication on vaccine efficacy and safety and further studies on the impact of PrEP vaccination in the outbreak dynamics.

## Authors' contributions

Y.K. and O.L. conceptualized the study. Y.K., L.B.L.N., and O.L. were involved in the methodology of the study. Y.K., L.B.L.N., and O.L. were involved in the formal analysis and investigation of the study. Y.K., L.B.L.N., and O.L. prepared the draft. Y.K., L.B.L.N., F.B., and O.L. reviewed and edited the manuscript; F.B., and O.L. supervised the study.

## Transparency declaration

The authors declare that they have no conflicts of interest.

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