### Check for updates

### **OPEN ACCESS**

APPROVED BY Frontiers Editorial Office, Frontiers Media SA, Switzerland

RECEIVED 30 October 2023 ACCEPTED 08 November 2023 PUBLISHED 21 November 2023

#### CITATION

Du Y, Li S, Wang X, Liu J, Gao Y, Lv W, Liu P, Huang H, Luan J and Zhang L (2023) Corrigendum: Meta-analysis of the association between toll-like receptor gene polymorphisms and hepatitis C virus infection. *Front. Microbiol.* 14:1330170. doi: 10.3389/fmicb.2023.1330170

### COPYRIGHT

© 2023 Du, Li, Wang, Liu, Gao, Lv, Liu, Huang, Luan and Zhang. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

# Corrigendum: Meta-analysis of the association between toll-like receptor gene polymorphisms and hepatitis C virus infection

Yuxuan Du<sup>1</sup>, Shumin Li<sup>1</sup>, Xinyu Wang<sup>1</sup>, Jialu Liu<sup>1</sup>, Yan Gao<sup>1</sup>, Weimiao Lv<sup>1</sup>, Ping Liu<sup>2</sup>, Haiyan Huang<sup>1</sup>, Junwen Luan<sup>1\*</sup> and Leiliang Zhang<sup>1\*</sup>

<sup>1</sup>School of Clinical and Basic Medical Sciences & Institute of Basic Medical Sciences, Shandong First Medical University & Shandong Academy of Medical Sciences, Jinan, China, <sup>2</sup>School of Public Health, Shandong First Medical University & Shandong Academy of Medical Sciences, Jinan, China

### KEYWORDS

hepatitis C (HCV), virus, toll-like receptor (TLR), single nucleotide polymorphisms (SNP), meta-analysis

## A corrigendum on

Meta-analysis of the association between toll-like receptor gene polymorphisms and hepatitis C virus infection

by Du, Y., Li, S., Wang, X., Liu, J., Gao, Y., Lv, W., Liu, P., Huang, H., Luan, J., and Zhang, L. (2023). *Front. Microbiol.* 14:1254805. doi: 10.3389/fmicb.2023.1254805

In the published article, there was an error in Table 1. We mistakenly labeled the reference by Sizova et al. (2016) as Russia. It should be corrected to Ukraine. The corrected Table 1 and its caption appear below.

In the published article, there was an error. The selected studies used for our metaanalysis contain populations from seven countries, instead of six countries.

A correction has been made to Results, *Study characteristics and quality assessment results*, Paragraph 1. This sentence previously stated:

"The selected studies contain populations from six countries, covering many regions, such as Africa, Europe, and Asia."

The corrected sentence appears below:

"The selected studies contain populations from seven countries, covering many regions, such as Africa, Europe, and Asia."

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

# Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

# References

Abdelwahab, S. F., Hamdy, S., Osman, A. M., Zakaria, Z. A., Galal, I., Sobhy, M., et al. (2020). Association of the polymorphism of the Toll-like receptor (TLR)-3 and TLR-9 genes with hepatitis C virus-specific cell-mediated immunity outcomes among Egyptian health-care workers. *Clin. Exp. Immunol.* 203, 3–12. doi: 10.1111/cei.13514

Chi, X.-W., Liu, J., Zhang, L., Zhang, Y., Chen, H., Wang, H., et al. (2017). Relationship between TLR3 polymorphisms and disease progression in patients with chronic HCV infection combined with HIV infection. *Chin. J. Integr. Tradit. West. Med. Dig.* 25, 965–969. doi: 10.3969/j.issn.1671-038X.2017.12.17

Fakhir, F.-Z., Lkhider, M., Badre, W., Alaoui, R., Meurs, E. F., Pineau, P., et al. (2017). Genetic variations in toll-like receptors 7 and 8 modulate natural hepatitis C outcomes and liver disease progression. *Liver Int.* 38, 432–442. doi: 10.1111/liv.13533

Hamdy, S., Osman, A. M., Zakaria, Z. A., Galal, I., Sobhy, M., Hashem, M., et al. (2018). Association of Toll-like receptor 3 and Toll-like receptor 9 single-nucleotide polymorphisms with hepatitis C virus persistence among Egyptians. *Arch. Virol.* 163, 2433–2442. doi: 10.1007/s00705-018-3893-8

Malov, S. I., Baatarkhuu, O., Ogarkov, O. B., Ariunaa, S., and Baigalmaa, J., Davaakhuu, B., et al. (2018). The role of human genetic factors in the natural selection of hepatitis C virus' dominant genotype in ethnically close populations of Buryats and Khalkha-Mongols. *Sovrem. Tehnol. Med.* 10, 21. doi: 10.17691/stm2018. 10.3.3

Mosaad, Y. M., Metwally, S. S., Farag, R. E., Lotfy, Z. F., and AbdelTwab, H. E. (2018). Association between *Toll-Like Receptor 3* (*TLR3*) rs3775290, *TLR7* rs179008, *TLR9* rs352140 and Chronic HCV. *Immunol. Investig.* 48, 321–332. doi: 10.1080/08820139.2018.1527851

Sghaier, I., Zidi, S., Mouelhi, L., Ghazoueni, E., Brochot, E., Almawi, W., et al. (2018). *TLR3* and *TLR4* SNP variants in the liver disease resulting from hepatitis B virus and hepatitis C virus infection. *Br. J. Biomed. Sci.* 76, 35–41. doi: 10.1080/09674845.2018.1547179

Sizova, L., Koval, T., Kaidashev, I., Ilchenko, V., and Dubinskaya, G. (2016). The role of genetic polymorphisms toll-like receptor 4 and 7 in the chronic hepatitis c and gender features of their distribution. *Georgian. Med. News* 250, 51–56.

Valverde-Villegas, J. M., Dos Santos, B. P., de Medeiros, R. M., Mattevi, V. S., Lazzaretti, R. K., Sprinz, E., et al. (2017). Endosomal toll-like receptor gene polymorphisms and susceptibility to HIV and HCV co-infection - differential influence in individuals with distinct ethnic background. *Hum. Immunol.* 78, 221–226. doi: 10.1016/j.humimm.2017.01.001

Zayed, R. A., Omran, D., Mokhtar, D. A., Zakaria, Z., Ezzat, S., Soliman, M. A., et al. (2017). Association of toll-like receptor 3 and toll-like receptor 9 single nucleotide polymorphisms with hepatitis C virus infection and hepatic fibrosis in Egyptian patients. *Am. J. Trop. Med. Hyg.* 16, 0644. doi: 10.4269/ajtmh.16-0644

Study	Country	Controls	Sample size*	Distribution of genotype and allele					Genotyping method	$P_{\mathrm{HWE}}$
rs3775290(TLR3)				СС	СТ	TT	С	Т		
Mosaad et al. (2018)	Egypt	Healthy individuals	100/100	6/37	90/50	4/13	102/124	98/76	PCR-RFLP	0.541
Abdelwahab et al. (2020)	Egypt	Seronegative health-care workers	70/159	46/105	18/46	6/8	110/256	30/62	PCR-RFLP	0.323
Sghaier et al. (2018)	Tunisia	Seronegative individuals	174/360	77/157	51/149	46/54	205/463	143/257	PCR-RFLP	0.062
Hamdy et al. (2018)	Egypt	Seronegative health-care workers	235/284	141/170	78/95	16/19	360/435	110/133	PCR-RFLP	0.257
Zayed et al. (2017)	Egypt	Healthy individuals	100/100	66/55	28/39	6/6	160/149	40/51	PCR-RFLP	0.791
Chi et al. (2017)	China	Healthy individuals	122/42	37/12	41/16	44/14	115/40	129/44	SNPscanTM Multiplex SNP Typing Kit	0.126
rs179008(TLR7)				AA	AT	TT	А	Т		
Mosaad et al. (2018)	Egypt	Healthy individuals	30/30	13/11	10/14	7/5	144/138	56/62	PCR-RFLP	0.880
Fakhir et al. (2017)	Morocco	Individuals without liver diseases	246/72	85/33	83/27	78/12	312/133	346/77	TaqMan allelic discrimination assays, PCR-RFLP	0.123
Valverde-Villegas et al. (2017)	Brazil (European descendants)	HIV-infected individuals	16/81	10/57		6/24	22/64	2/13	PCR-RFLP	0.802
	Brazil (African descendants)	HIV-infected individuals	19/45	12/33		7/12	32/43	6/13	PCR-RFLP	0.050
Malov et al. (2018)	Russia	Healthy individuals	120/132	99/119	15/10	6/3	213/248	27/16	AmpliSense-HCV-genotype kit, real-time PCR	0.000
Sizova et al. (2016)	Ukraine	Healthy individuals	125/85	102/63	21/19	2/3	225/145	25/25	PCR-RFLP	0.460

\*HCV group/control group; PCR-RFLP, PCR-restriction fragment length polymorphism; some  $P_{HWE}$  values were obtained directly from the original text of the study, the investigator calculated it and retained three decimal places when there was no information of  $P_{HWE}$  value in the original text,  $P_{HWE} < 0.05$  indicates that it does not conform to Hardy-Weinberg equilibrium; The TLR7 rs179008 gene polymorphism occurs on the X chromosome, so only the female population is used as study objects in principle when counting the genotype distribution; In Valverde-Villegas et al. (2017) studies, the sample size of genotype AT and TT only showed the sum of these two because the data provided in the original article was not detailed.