**Supplementary Table ST1**: Summary of the iDASH competitions. AMIA: American Medical Informatics Association, ASHG: American Society of Human Genetics, DNA: DeoxyriboNucleic Acid, GA4GH: Global Alliance for Genomics and Health, GDS: Genomic Data Sharing, GWAS: Genome Wide Association Studies, HE: Homomorphic Encryption, SGX: Software Guard eXtension, SMC: Secure Multiparty Computation.

Year	Venue ("Co-location")	Participants (Countries)	Main Ref.	Competition Tracks and Peer-Reviewed Article References by Participating Teams	
2014	San Diego, CA	33 (2)	[1]	1	Privacy-preserving data sharing for human genomes [2]
				2	Secure release of analysis results for human genomes [3]
2015	San Diego, CA	56 (5)	[4]	1	Secure outsourcing of human genome computation using HE techniques [5-7]
				2	Secure collaboration on human genome computation by using SMC techniques [8 9]
2016	Chicago, IL (AMIA)	50 (13)	[10]	1	Practical protection of GDS through beacon services [11 12]
				2	Privacy-preserving search of similar cancer patients across organizations [13 14]
				3	Testing for genetic diseases on encrypted genomes using public clouds [15-18]
2017	Orlando, FL (ASHG/GA4GH)	65 (19)	[19]	1	De-duplication for GA4GH [20]
				2	SGX-based whole genome variation search [21 22]
				3	HE-based logistic regression model learning [23-25]
2018	San Diego, CA (ASHG)	64 (17)	[26]	1	Blockchain-based immutable logging and querying for cross-site genomic dataset access audit trail [27-30]
				2	Secure parallel GWAS using HE [31-35]
				3	Secure search of DNA segments in large genome databases [36 37]
2019	Bloomington, IN	105 (21)	[38]	1	Distributed gene-drug interaction data sharing based on blockchain and smart contracts [39 40]
				2	Secure genotype imputation using HE [41]
				3	Privacy-preserving machine learning as a service on SGX
				4	Secure collaborative training of machine learning model
2020	Houston, TX	87 (22) Virtual	[42]	1	Secure multi-label tumor classification using HE
				2	Privacy-preserving clustering of single-cell transcriptomics data in SGX
				3	Differentially private federated learning for the cancer prediction model
2021	San Diego, CA (AMIA)	69 (15) Virtual	[43]	1	Data sharing consent for health-related data using contracts on blockchain
				2	HE-based secure viral strain classification
				3	Confidential computing

Supplementary Figure SF1. Diagram of the total citation numbers (blue bars) of the 40 publications related to iDASH competition using Google Scholar [44] as of 4/20/2022. Also, the citations per year published are shown in the orange line.
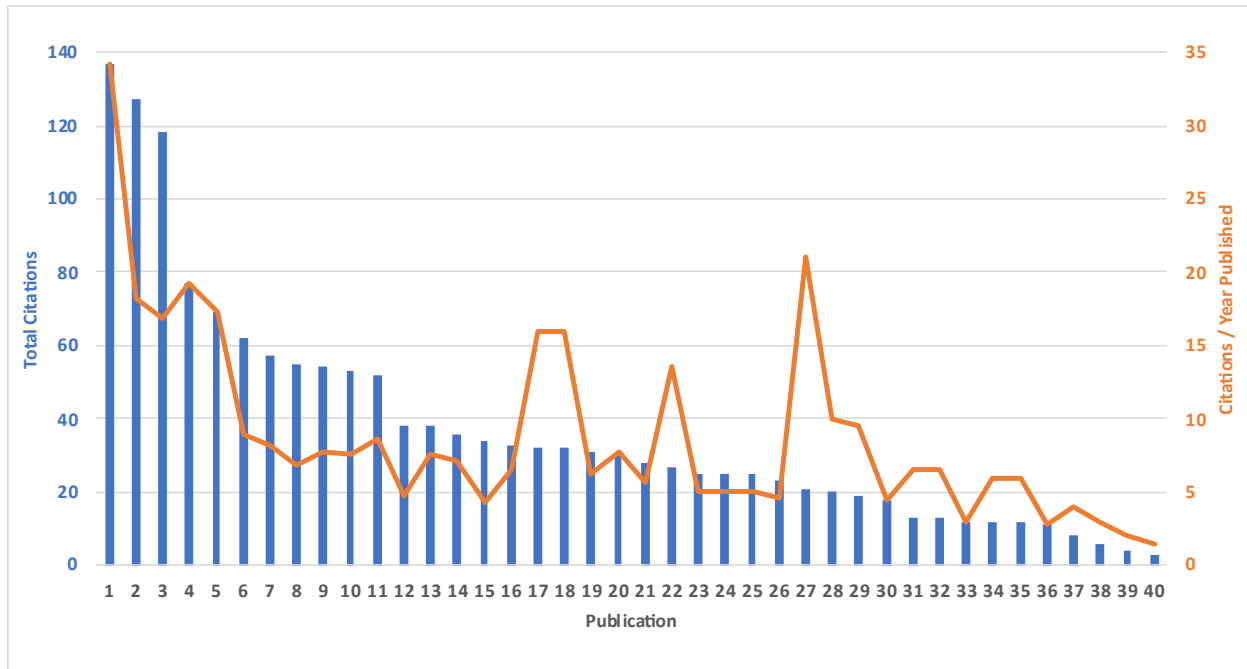
REFERENCE FOR APPENDIX

1. Jiang X, Zhao Y, Wang X, et al. A community assessment of privacy preserving techniques for human genomes. BMC medical informatics and decision making 2014; **14** (1): S1.

2. Wang S, Mohammed N, Chen R. Differentially private genome data dissemination through top-down specialization. BMC medical informatics and decision making 2014; **14** (1): S2.

3. Yu F, Ji Z. Scalable privacy-preserving data sharing methodology for genome-wide association studies: an application to iDASH healthcare privacy protection challenge. BMC medical informatics and decision making 2014; **14** (1): S3.

4. Tang H, Jiang X, Wang X, et al. Protecting genomic data analytics in the cloud: state of the art and opportunities. BMC medical genomics 2016; **9** (1): 63.

5. Lu W-J, Yamada Y, Sakuma J. Privacy-preserving genome-wide association studies on cloud environment using fully homomorphic encryption. BMC medical informatics and decision making; 2015. Springer.

6. Kim M, Lauter K. Private genome analysis through homomorphic encryption. BMC medical informatics and decision making; 2015. Springer.

7. Zhang Y, Dai W, Jiang X, Xiong H, Wang S. Foresee: Fully outsourced secure genome study based on homomorphic encryption. BMC medical informatics and decision making; 2015. Springer.

8. Constable SD, Tang Y, Wang S, Jiang X, Chapin S. Privacy-preserving GWAS analysis on federated genomic datasets. BMC medical informatics and decision making; 2015. Springer.

9. Zhang Y, Blanton M, Almashaqbeh G. Secure distributed genome analysis for GWAS and sequence comparison computation. BMC medical informatics and decision making; 2015. BioMed Central.

10. Wang S, Jiang X, Tang H, et al. A community effort to protect genomic data sharing, collaboration and outsourcing. NPJ genomic medicine 2017; **2** (1): 1-6 doi: 10.1038/s41525-017-0036-1.

11. Wan Z, Vorobeychik Y, Kantarcioglu M, Malin B. Controlling the signal: Practical privacy protection of genomic data sharing through Beacon services. BMC medical genomics 2017; **10** (2): 39.

12. Al Aziz MM, Ghasemi R, Waliullah M, Mohammed N. Aftermath of bustamante attack on genomic beacon service. BMC medical genomics 2017; **10** (2): 43.

13. Wang XS, Huang Y, Zhao Y, Tang H, Wang X, Bu D. Efficient genome-wide, privacy-preserving similar patient query based on private edit distance. Proceedings of the 22nd ACM SIGSAC Conference on Computer and Communications Security; 2015.

14. Al Aziz MM, Alhadidi D, Mohammed N. Secure approximation of edit distance on genomic data. BMC medical genomics 2017; **10** (2): 41.

15. Çetin GS, Chen H, Laine K, Lauter K, Rindal P, Xia Y. Private queries on encrypted genomic data. BMC medical genomics 2017; **10** (2): 45.

16. Ziegeldorf JH, Pennekamp J, Hellmanns D, et al. BLOOM: BLoom filter based oblivious outsourced matchings. BMC medical genomics 2017; **10** (2): 44.

17. Sousa JS, Lefebvre C, Huang Z, et al. Efficient and secure outsourcing of genomic data storage. BMC medical genomics 2017; **10** (2): 46.

18. Kim M, Song Y, Cheon JH. Secure searching of biomarkers through hybrid homomorphic encryption scheme. BMC medical genomics 2017; **10** (2): 42.

19. Wang X, Tang H, Wang S, et al. iDASH secure genome analysis competition 2017. BMC Medical Genomics 2018; **11** (4): 85 doi: 10.1186/s12920-018-0396-0.

20. Laud P, Pankova A. Privacy-preserving record linkage in large databases using secure multiparty computation. BMC medical genomics 2018; **11** (4): 84.

21. Carpov S, Tortech T. Secure top most significant genome variants search: iDASH 2017 competition. BMC medical genomics 2018; **11** (4): 82.

22. Chen F, Wang C, Dai W, et al. PRESAGE: PRivacy-preserving gEnetic testing via SoftwAre guard extension. BMC medical genomics 2017; **10** (2): 48.

23. Kim A, Song Y, Kim M, Lee K, Cheon JH. Logistic regression model training based on the approximate homomorphic encryption. BMC medical genomics 2018; **11** (4): 83.

24. Chen H, Gilad-Bachrach R, Han K, et al. Logistic regression over encrypted data from fully homomorphic encryption. BMC medical genomics 2018; **11** (4): 81.

25. Bonte C, Vercauteren F. Privacy-preserving logistic regression training. BMC medical genomics 2018; **11** (4): 86.

26. Kuo T-T, Jiang X, Tang H, et al. iDASH Secure Genome Analysis Competition 2018: Blockchain Genomic Data Access Logging, Homomorphic Encryption on GWAS, and DNA Segment Searching. BMC Medical Genomics 2020; **13** (7): 98 doi: 10.1186/s12920-020-0715-0.

27. Gursoy G, Bjornson R, Green ME, Gerstein M. Using blockchain to log genome dataset access: Efficient storage and query. BMC Medical Genomics 2020; **13** (7): 1-9.

28. Pattengale ND, Hudson CM. Decentralized genomics audit logging via permissioned blockchain ledgering. BMC Medical Genomics 2020; **13** (7): 1-9.

29. Ma S, Cao Y, Xiong L. Efficient logging and querying for blockchain-based cross-site genomic dataset access audit. BMC Medical Genomics 2020; **13** (7): 1-13.

30. Ozdayi MS, Kantarcioglu M, Malin B. Leveraging blockchain for immutable logging and querying across multiple sites. BMC Medical Genomics 2020; **13** (7): 1-7.

31. Kim M, Song Y, Li B, Micciancio D. Semi-parallel logistic regression for GWAS on encrypted data. BMC Medical Genomics 2020; **13** (7): 1-13.

32. Carpov S, Gama N, Georgieva M, Troncoso-Pastoriza JR. Privacy-preserving semi-parallel logistic regression training with fully homomorphic encryption. BMC Medical Genomics 2020; **13** (7): 1-10.

33. Blatt M, Gusev A, Polyakov Y, Rohloff K, Vaikuntanathan V. Optimized homomorphic encryption solution for secure genome-wide association studies. BMC Medical Genomics 2020; **13** (7).

34. Kim D, Son Y, Kim D, Kim A, Hong S, Cheon JH. Privacy-preserving approximate GWAS computation based on homomorphic encryption. BMC Medical Genomics 2020; **13** (7): 1-12.

35. Sim JJ, Chan FM, Chen S, Tan BHM, Aung KMM. Achieving GWAS with homomorphic encryption. BMC Medical Genomics 2020; **13** (7): 1-12.

36. Sotiraki K, Ghosh E, Chen H. Privately computing set-maximal matches in genomic data. BMC Medical Genomics 2020; **13** (7): 1-8.

37. Hasan MZ, Mahdi MSR, Sadat MN, Mohammed N. Secure count query on encrypted genomic data. Journal of biomedical informatics 2018; **81**: 41-52.

38. iDASH Privacy & Security Workshop - Secure Genome Analysis Competition 2019. 2019. http://www.humangenomeprivacy.org/2019/ Accessed May 29, 2020

39. Kuo T-T, Bath T, Ma S, et al. Benchmarking Blockchain-Based Gene-Drug Interaction Data Sharing Methods: A Case Study from the iDASH 2019 Secure Genome Analysis Competition Blockchain Track. International Journal of Medical Informatics 2021; **154**: 104559 doi: 10.1016/j.ijmedinf.2021.104559.

40. Gürsoy G, Brannon CM, Gerstein M. Using Ethereum blockchain to store and query pharmacogenomics data via smart contracts. BMC Medical Genomics 2020; **13**: 1-11.

41. Kim M, Harmanci AO, Bossuat J-P, et al. Ultrafast homomorphic encryption models enable secure outsourcing of genotype imputation. Cell Systems 2021; **12** (11): 1108-20.e4 doi: 10.1016/j.cels.2021.07.010.

42. iDASH Privacy & Security Workshop - Secure Genome Analysis Competition 2020. 2020. http://www.humangenomeprivacy.org/2020/ Accessed June 2, 2020

43. iDASH Privacy & Security Workshop - Secure Genome Analysis Competition 2021. 2021. http://www.humangenomeprivacy.org/2021/ Accessed February 22, 2022

44. Google. Google Scholar. http://scholar.google.com/ Accessed September 28, 2020