

Online Supplementary Tables for Ma, Li & Zhang (2024) A New SNP Comparison (SnpC) Method for Detecting Unique/Enriched Gene-SNP Variants and Comparing Population Gene Mutation Diversity.

Table 11A. Permutation test for the Population Gene-SNP Diversity (PGSD) with significant difference in GSH (Unique genes in the Former case)

Treatments	Order	Former Case	Latter Case	Delta of Diversity	Lower (95%)	Upper (95%)	<i>p</i> -Value
AFR vs. AMR	<i>q=0</i>	593	0	593	-0.8	6.248	0
	<i>q=1</i>	478.044	0	478.044	2.408	42.263	0
	<i>q=2</i>	379.4	0	379.4	-7.89	49.007	0
	<i>q=3</i>	308.74	0	308.74	-17.646	50.923	0
AFR vs. EUR	<i>q=0</i>	2213	0	2213	-0.55	10.64	0
	<i>q=1</i>	1362.53	0	1362.53	-15.37	37.328	0
	<i>q=2</i>	976.223	0	976.223	-21.203	33.567	0
	<i>q=3</i>	787.998	0	787.998	-23.716	31.958	0
AFR vs. EAS	<i>q=0</i>	3269	0	3269	-1.491	12.821	0
	<i>q=1</i>	1974.559	0	1974.559	-15.963	36.917	0
	<i>q=2</i>	1460.701	0	1460.701	-19.098	30.871	0
	<i>q=3</i>	1210.384	0	1210.384	-19.894	27.947	0
AFR vs. SAS	<i>q=0</i>	2312	0	2312	-1.025	9.495	0
	<i>q=1</i>	1427.801	0	1427.801	-12.913	34.114	0
	<i>q=2</i>	1038.9	0	1038.9	-17.467	30.601	0
	<i>q=3</i>	843.694	0	843.694	-19.638	29.102	0
AMR vs. EUR	<i>q=0</i>	618	0	618	-43.298	1.684	0
	<i>q=1</i>	408.046	0	408.046	-100.925	69.732	0
	<i>q=2</i>	257.899	0	257.899	-101.248	86.438	0
	<i>q=3</i>	185.092	0	185.092	-84.175	77.136	0
AMR vs. EAS	<i>q=0</i>	1827	0	1827	-81.727	-8.041	0
	<i>q=1</i>	1267.113	0	1267.113	-164.641	71.588	0
	<i>q=2</i>	876.679	0	876.679	-174.101	112.718	0
	<i>q=3</i>	653.994	0	653.994	-163.576	124.395	0
AMR vs. SAS	<i>q=0</i>	856	0	856	-50.883	0.045	0
	<i>q=1</i>	641.032	0	641.032	-116.369	60.864	0
	<i>q=2</i>	443.939	0	443.939	-139.349	100.933	0
	<i>q=3</i>	312.284	0	312.284	-135.288	113.043	0
EUR vs. EAS	<i>q=0</i>	1254	0	1254	-7.937	7.693	0
	<i>q=1</i>	790.871	0	790.871	-29.151	29.563	0
	<i>q=2</i>	526.718	0	526.718	-34.536	34.678	0
	<i>q=3</i>	393.955	0	393.955	-36.547	36.283	0
EUR vs. SAS	<i>q=0</i>	235	0	235	-2.537	2.969	0
	<i>q=1</i>	209.844	0	209.844	-12.353	14.362	0
	<i>q=2</i>	179.093	0	179.093	-21.977	24.417	0
	<i>q=3</i>	143.978	0	143.978	-34.603	37.148	0
EAS vs. SAS	<i>q=0</i>	433	0	433	-3.817	4.685	0
	<i>q=1</i>	339.197	0	339.197	-19.24	21.977	0
	<i>q=2</i>	256.032	0	256.032	-27.268	29.806	0
	<i>q=3</i>	198.779	0	198.779	-32.864	35.195	0

Table 11B. Permutation test for the Population Gene-SNP Diversity (PGSD) with significant difference in GSH (Unique Genes in Latter case)

Treatments	Order	Former Case	Latter Case	Delta of Diversity	Lower (95%)	Upper (95%)	p-Value
AFR vs. AMR	$q=0$	0	200	-200	7.322	30.36	0
	$q=1$	0	124.128	-124.128	-15.336	33.341	0
	$q=2$	0	77.564	-77.564	-21.929	30.451	0
	$q=3$	0	55.473	-55.473	-22.339	26.325	0
AFR vs. EUR	$q=0$	0	253	-253	-1.508	11.774	0
	$q=1$	0	203.491	-203.491	-10.679	24.007	0
	$q=2$	0	164.497	-164.497	-16.212	28.42	0
	$q=3$	0	137.641	-137.641	-19.837	30.456	0
AFR vs. EAS	$q=0$	0	304	-304	-1.447	7.399	0
	$q=1$	0	181.636	-181.636	-11.532	18.735	0
	$q=2$	0	99.56	-99.56	-15.423	17.375	0
	$q=3$	0	62.725	-62.725	-14.479	14.463	0
AFR vs. SAS	$q=0$	0	348	-348	-1.12	10.938	0
	$q=1$	0	248.416	-248.416	-12.643	25.652	0
	$q=2$	0	174.624	-174.624	-19.968	28.071	0
	$q=3$	0	132.057	-132.057	-23.471	28.277	0
AMR vs. EUR	$q=0$	0	43	-43	-2.443	1.743	0
	$q=1$	0	39.623	-39.623	-6.415	2.865	0
	$q=2$	0	36.48	-36.48	-8.818	4.71	0
	$q=3$	0	33.582	-33.582	-9.992	5.868	0
AMR vs. EAS	$q=0$	0	260	-260	-2.45	1.006	0
	$q=1$	0	180.202	-180.202	-17.233	8.248	0
	$q=2$	0	112.496	-112.496	-19.799	15.14	0
	$q=3$	0	70.003	-70.003	-18.862	17.544	0
AMR vs. SAS	$q=0$	0	248	-248	-3.216	1.434	0
	$q=1$	0	190.822	-190.822	-18.806	8.378	0
	$q=2$	0	143.774	-143.774	-22.919	14.419	0
	$q=3$	0	113.98	-113.98	-24.415	17.864	0
EUR vs. EAS	$q=0$	0	600	-600	-4.16	4.01	0
	$q=1$	0	373.316	-373.316	-21.047	21.171	0
	$q=2$	0	227.199	-227.199	-24.287	23.973	0
	$q=3$	0	153.413	-153.413	-23.654	22.925	0
EUR vs. SAS	$q=0$	0	549	-549	-4.692	5.6	0
	$q=1$	0	404.432	-404.432	-19.91	22.263	0
	$q=2$	0	293.999	-293.999	-27.597	29.626	0
	$q=3$	0	224.601	-224.601	-34.237	36.011	0
EAS vs. SAS	$q=0$	0	1284	-1284	-8.416	10.562	0
	$q=1$	0	906.55	-906.55	-34.161	37.792	0
	$q=2$	0	655.794	-655.794	-43.487	45.9	0
	$q=3$	0	510.112	-510.112	-51.154	53.028	0

Table 12A. Permutation test for the Population Gene-SNP Diversity (PGSD) with significant difference in GSH (SNP-enriched Genes in Former case)

Treatments	Order	Former Case	Latter Case	Delta of Diversity	Lower (95%)	Upper (95%)	p-Value
AFR vs. AMR	$q=0$	40916	40916	0	-0.55	0.786	1
	$q=1$	38597.906	33820.656	4777.25	-234.468	253.429	0
	$q=2$	37583.873	32294.691	5289.182	-294.63	307.921	0
	$q=3$	36931.47	31465.434	5466.037	-324.049	335.746	0
AFR vs. EUR	$q=0$	41023	41023	0	-0.498	0.62	1
	$q=1$	39242.562	34291.81	4950.751	-244.018	250.624	0
	$q=2$	38311.569	32707.554	5604.016	-313.08	318.65	0
	$q=3$	37630.962	31823.087	5807.876	-345.628	350.876	0
AFR vs. EAS	$q=0$	38041	38041	0	-0.286	0.328	1
	$q=1$	36466.696	31448.934	5017.762	-249.803	245.374	0
	$q=2$	35588.477	29899.761	5688.716	-331.235	322.632	0
	$q=3$	34912.724	29043.034	5869.69	-370.843	360.221	0
AFR vs. SAS	$q=0$	40111	40111	0	-0.422	0.482	1
	$q=1$	38470.179	34032.567	4437.612	-216.516	236.648	0
	$q=2$	37615.486	32550.013	5065.473	-279.51	302.253	0
	$q=3$	36994.836	31721.543	5273.293	-309.519	333.607	0
AMR vs. EUR	$q=0$	23792	23792	0	-5.69	1.43	1
	$q=1$	22496.7	20937.491	1559.209	-126.962	126.055	0
	$q=2$	22019.042	20265.533	1753.508	-140.929	142.153	0
	$q=3$	21750.084	19902.002	1848.082	-148.036	149.739	0
AMR vs. EAS	$q=0$	25069	25069	0	-3.97	1.162	1
	$q=1$	23576.314	20950.95	2625.364	-217.453	208.961	0
	$q=2$	22944.694	20059.279	2885.415	-236.673	231.788	0
	$q=3$	22559.479	19590.702	2968.777	-242.372	238.641	0
AMR vs. SAS	$q=0$	22494	22494	0	-4.634	1.412	1
	$q=1$	21156.848	19587.154	1569.695	-126.682	117.061	0
	$q=2$	20660.742	18921.105	1739.637	-137.306	129.604	0
	$q=3$	20388.678	18567.58	1821.098	-142.97	135.645	0
EUR vs. EAS	$q=0$	24585	24585	0	-0.705	0.729	1
	$q=1$	23289.148	20681.605	2607.544	-151.598	161.777	0
	$q=2$	22704.181	19789.908	2914.273	-181.618	193.651	0
	$q=3$	22322.978	19315.824	3007.155	-193.992	206.72	0
EUR vs. SAS	$q=0$	20708	20708	0	-0.555	0.567	1
	$q=1$	19558.695	18297.105	1261.589	-82.335	81.404	0
	$q=2$	19122.076	17688.735	1433.341	-95.635	94.287	0
	$q=3$	18881.15	17364.876	1516.274	-102.355	100.822	0
EAS vs. SAS	$q=0$	25444	25444	0	-0.575	0.581	1
	$q=1$	24564.181	23148.178	1416.002	-91.688	89.642	0
	$q=2$	24188.329	22513.842	1674.487	-113.423	110.935	0
	$q=3$	23953.515	22153.814	1799.702	-125.161	122.445	0

Table 12B. Permutation test for the Population Gene-SNP Diversity (PGSD) with significant difference in GSH (SNP-enriched Genes in Latter case)

Treatments	Order	Former Case	Latter Case	Delta of Diversity	Lower (95%)	Upper (95%)	p-Value
AFR vs. AMR	$q=0$	16525	16525	0	-0.553	6.971	1
	$q=1$	14885.345	15934.408	-1049.063	-78.629	87.065	0
	$q=2$	14449.183	15682.45	-1233.266	-95.503	103.031	0
	$q=3$	14209.93	15521.729	-1311.799	-102.873	110.167	0
AFR vs. EUR	$q=0$	16690	16690	0	-0.859	1.351	1
	$q=1$	14927.445	16042.179	-1114.734	-69.509	72.45	0
	$q=2$	14479.002	15771.276	-1292.275	-85.192	87.941	0
	$q=3$	14234.598	15598.362	-1363.765	-92.669	95.427	0
AFR vs. EAS	$q=0$	18987	18987	0	-0.709	0.981	1
	$q=1$	17371.873	18492.134	-1120.26	-69.201	74.811	0
	$q=2$	16890.859	18243.897	-1353.038	-90.454	97.017	0
	$q=3$	16618.284	18063.687	-1445.403	-101.08	108.171	0
AFR vs. SAS	$q=0$	16946	16946	0	-0.873	1.435	1
	$q=1$	15213.67	16293.684	-1080.014	-71.009	70.128	0
	$q=2$	14760.537	16020.743	-1260.207	-87.146	84.945	0
	$q=3$	14513.831	15848.595	-1334.764	-94.719	92.039	0
AMR vs. EUR	$q=0$	16041	16041	0	-0.346	0.306	1
	$q=1$	14773.958	15439.457	-665.499	-55.858	49.473	0
	$q=2$	14323.627	15167.131	-843.505	-73.621	67.25	0
	$q=3$	14073.166	15008.226	-935.06	-83.464	77.146	0
AMR vs. EAS	$q=0$	23806	23806	0	-0.244	0.216	1
	$q=1$	21915.511	23144.873	-1229.362	-79.9	72.502	0
	$q=2$	21320.406	22828.946	-1508.541	-102.901	94.952	0
	$q=3$	20976.95	22621.528	-1644.578	-115.507	107.185	0
AMR vs. SAS	$q=0$	20073	20073	0	-0.4	0.332	1
	$q=1$	18184.479	19274.565	-1090.086	-81.292	75.929	0
	$q=2$	17626.46	18926.619	-1300.16	-100.051	95.454	0
	$q=3$	17317.39	18720.527	-1403.137	-109.732	105.463	0
EUR vs. EAS	$q=0$	27817	27817	0	-0.57	0.566	1
	$q=1$	24852.479	26840.915	-1988.436	-120.335	112.475	0
	$q=2$	24014.532	26370.538	-2356.007	-153.317	143.564	0
	$q=3$	23538.4	26042.31	-2503.91	-170.223	159.535	0
EUR vs. SAS	$q=0$	25131	25131	0	-0.821	0.855	1
	$q=1$	22376.8	23945.632	-1568.833	-102.269	103.519	0
	$q=2$	21634.976	23462.558	-1827.582	-121.759	123.196	0
	$q=3$	21230.815	23177.016	-1946.201	-130.901	132.469	0
EAS vs. SAS	$q=0$	24643	24643	0	-0.755	0.827	1
	$q=1$	20827.263	23231.649	-2404.386	-156.787	161.198	0
	$q=2$	19956.027	22627.742	-2671.715	-181.604	186.643	0
	$q=3$	19496.792	22259.634	-2762.842	-191.263	196.623	0

Table 13. Permutation test for the Population Gene-SNP Diversity (PGSD) of significantly different genes with 1000 times of re-sampling

Treatments	Order	Former Case	Latter Case	Delta of Diversity	Lower (95%)	Upper (95%)	<i>p</i> -Value
AFR vs. AMR	<i>q=0</i>	58034	57641	393	12.316	37.468	0
	<i>q=1</i>	53187.947	49152.116	4035.831	-161.128	190.794	0
	<i>q=2</i>	51324.083	46944.507	4379.576	-205.326	226.421	0
	<i>q=3</i>	50104.466	45594.636	4509.83	-227.977	247.157	0
AFR vs. EUR	<i>q=0</i>	59926	57966	1960	2.366	18.604	0
	<i>q=1</i>	54468.26	49655.838	4812.421	-230.836	242.709	0
	<i>q=2</i>	52416.74	47308.889	5107.851	-274.929	283.491	0
	<i>q=3</i>	51034.778	45847.186	5187.593	-295.757	303.833	0
AFR vs. EAS	<i>q=0</i>	60297	57332	2965	0.512	17.084	0
	<i>q=1</i>	54699.105	49144.413	5554.692	-289.9	289.611	0
	<i>q=2</i>	52428.822	46801.388	5627.434	-337.341	331.48	0
	<i>q=3</i>	50851.552	45333.617	5517.936	-357.461	350.119	0
AFR vs. SAS	<i>q=0</i>	59369	57405	1964	1.764	17.146	0
	<i>q=1</i>	54169.031	49758.712	4410.319	-209.918	236.042	0
	<i>q=2</i>	52206.851	47539.216	4667.635	-249.117	273.434	0
	<i>q=3</i>	50899.327	46161.806	4737.522	-266.919	291.494	0
AMR vs. EUR	<i>q=0</i>	40451	39876	575	-47.299	0.685	0
	<i>q=1</i>	37288.121	36241.89	1046.231	-109.438	101.984	0
	<i>q=2</i>	36202.745	35200.291	1002.454	-101.702	96.982	0
	<i>q=3</i>	35586.484	34595.075	991.41	-99.974	95.724	0
AMR vs. EAS	<i>q=0</i>	50702	49135	1567	-84.615	-9.433	0
	<i>q=1</i>	45747.444	43761.883	1985.561	-224.768	205.871	0
	<i>q=2</i>	44072.207	42305.63	1766.578	-202.3	189.756	0
	<i>q=3</i>	43055.607	41441.858	1613.749	-192.159	180.492	0
AMR vs. SAS	<i>q=0</i>	43423	42815	608	-54.415	-1.495	0
	<i>q=1</i>	39379.403	38742.904	636.499	-101.807	84.54	0
	<i>q=2</i>	38112.074	37581.5	530.574	-87.747	75.052	0
	<i>q=3</i>	37400.168	36909.908	490.26	-84.468	72.591	0
EUR vs. EAS	<i>q=0</i>	53656	53002	654	-8.622	8.248	0
	<i>q=1</i>	48083.747	47152.486	931.261	-67.935	72.21	0
	<i>q=2</i>	46159.739	45409.464	750.275	-62.903	66.705	0
	<i>q=3</i>	44927.542	44321.275	606.267	-58.099	61.501	0
EUR vs. SAS	<i>q=0</i>	46074	46388	-314	-5.061	6.447	0
	<i>q=1</i>	41793.395	42187.442	-394.047	-33.651	34.231	0
	<i>q=2</i>	40458.052	40907.396	-449.344	-37.793	37.976	0
	<i>q=3</i>	39689.851	40168.024	-478.173	-40.074	40.182	0
EAS vs. SAS	<i>q=0</i>	50520	51371	-851	-8.25	11.342	0
	<i>q=1</i>	45093.523	46486.385	-1392.862	-101.048	104.323	0
	<i>q=2</i>	43591.321	44882.881	-1291.56	-98.888	102.067	0
	<i>q=3</i>	42713.581	43901.01	-1187.429	-95.566	98.798	0

Table 14. Permutation test for the Population Gene-SNP Diversity (PGSD) of all genes with 1000 times of re-sampling

Treatments	Order	Former Case	Latter Case	Delta of Diversity	Lower (95%)	Upper (95%)	p-Value
AFR vs. AMR	$q=0$	66860	66271	589	101.9	175.58	0
	$q=1$	60521.169	56469.554	4051.615	-162.84	198.912	0
	$q=2$	58368.79	54061.733	4307.057	-207.119	231.16	0
	$q=3$	56978.827	52623.642	4355.184	-229.507	251.436	0
AFR vs. EUR	$q=0$	66860	64842	2018	12.741	76.691	0
	$q=1$	60397.431	55625.538	4771.893	-230.823	244.506	0
	$q=2$	58102.133	53108.761	4993.371	-275.236	284.804	0
	$q=3$	56559.191	51570.244	4988.947	-296.059	305.129	0
AFR vs. EAS	$q=0$	66860	63644	3216	11.51	92.866	0
	$q=1$	60274.515	54739.674	5534.841	-291.619	292.788	0
	$q=2$	57792.256	52262.012	5530.244	-339.147	333.984	0
	$q=3$	56066.098	50728.35	5337.748	-359.324	352.644	0
AFR vs. SAS	$q=0$	66860	64837	2023	26.614	94.052	0
	$q=1$	60494.103	56109.545	4384.558	-210.154	238.474	0
	$q=2$	58281.163	53706.187	4574.976	-249.539	275.087	0
	$q=3$	56815.446	52245.408	4570.038	-267.313	293.071	0
AMR vs. EUR	$q=0$	66271	64842	1429	-463.61	-108.382	0
	$q=1$	58646.608	57581.346	1065.262	-158.553	139.227	0
	$q=2$	56811.928	55832.589	979.34	-137.735	127.331	0
	$q=3$	55859.925	54902.113	957.812	-134.119	124.747	0
AMR vs. EAS	$q=0$	66271	63644	2627	-498.402	-112.706	0
	$q=1$	58507.9	56448.417	2059.483	-254.406	227.553	0
	$q=2$	56406.258	54609.291	1796.967	-224.025	207.717	0
	$q=3$	55186.377	53553.591	1632.786	-213.055	197.902	0
AMR vs. SAS	$q=0$	66271	64837	1434	-429.386	-97.696	0
	$q=1$	58529.378	57828.289	701.089	-154.784	126.773	0
	$q=2$	56631.028	56079.784	551.244	-131.932	113.767	0
	$q=3$	55630.204	55129.064	501.14	-127.427	110.515	0
EUR vs. EAS	$q=0$	64842	63644	1198	-83.232	83.848	0
	$q=1$	57275.316	56309.895	965.42	-72.071	76.488	0
	$q=2$	55057.19	54273.91	783.281	-65.726	69.669	0
	$q=3$	53676.911	53026.566	650.345	-60.894	64.463	0
EUR vs. SAS	$q=0$	64842	64837	5	-62.018	92.438	0.913
	$q=1$	57634.099	57995.648	-361.549	-37.23	39.088	0
	$q=2$	55800.649	56227.902	-427.252	-41.194	42.177	0
	$q=3$	54802.018	55252.804	-450.787	-43.611	44.406	0
EAS vs. SAS	$q=0$	63644	64837	-1193	-41.56	66.264	0
	$q=1$	56589.113	58009.651	-1420.538	-103.452	106.871	0
	$q=2$	54750.941	56061.91	-1310.969	-100.574	103.777	0
	$q=3$	53701.083	54906.466	-1205.383	-97.092	100.403	0

Table S15. The Fst (Fixation Index) value of top 20 genes which show divergence between AFR and other four populations in the olfactory transduction pathway illustrated in Fig 5

Genes	AFR vs. AMR	AFR vs. EUR	AFR vs. EAS	AFR vs. SAS	AMR vs. EUR	AMR vs. EAS	AMR vs. SAS	EUR vs. EAS	EUR vs. SAS	EAS vs. SAS
PRKG1	0.519	0.584	0.580	0.506	0.003	0.002	0.001	0.000	0.007	0.006
SLC8A1	0.504	0.536	0.268	0.408	0.001	0.051	0.007	0.072	0.015	0.021
ANO2	0.451	0.406	0.703	0.502	0.003	0.073	0.002	0.095	0.009	0.050
GNAL	0.447	0.361	0.304	0.290	0.008	0.021	0.026	0.004	0.006	0.000
OR2M4	0.437	0.451	0.323	0.538	0.000	0.020	0.008	0.019	0.010	0.054
OR2L13	0.426	0.450	0.674	0.417	0.000	0.078	0.001	0.067	0.001	0.083
NCALD	0.422	0.561	0.576	0.523	0.024	0.033	0.009	0.001	0.004	0.008
OR4F16	0.420	0.515	0.157	0.213	0.010	0.079	0.045	0.144	0.097	0.005
OR10J1	0.398	0.512	0.552	0.525	0.015	0.047	0.024	0.013	0.001	0.007
GNB1	0.397	0.329	0.315	0.172	0.004	0.006	0.059	0.000	0.034	0.029
PDE1C	0.373	0.382	0.363	0.219	0.000	0.001	0.033	0.000	0.032	0.026
SLC8A3	0.370	0.317	0.224	0.175	0.001	0.020	0.043	0.012	0.031	0.004
OR6N1	0.359	0.432	0.222	0.180	0.008	0.018	0.036	0.051	0.079	0.003
ADCY3	0.357	0.241	0.304	0.301	0.014	0.002	0.003	0.005	0.004	0.000
OR1B1	0.353	0.449	0.591	0.561	0.007	0.091	0.063	0.048	0.028	0.007
SLC24A4	0.352	0.274	0.373	0.163	0.005	0.001	0.043	0.011	0.020	0.060
GRK2	0.349	0.486	0.345	0.479	0.020	0.001	0.019	0.031	0.000	0.029
CAMK2A	0.346	0.439	0.073	0.291	0.007	0.125	0.006	0.191	0.025	0.085
OR2AT4	0.339	0.196	0.262	0.281	0.021	0.004	0.002	0.007	0.011	0.000
OR2M5	0.335	0.368	0.168	0.360	0.000	0.052	0.000	0.058	0.000	0.055