

**Additional file 4 | Reference characteristics of retracted meta-analyses before June 2021 (i=198)**

<i>No</i>	<i>First Author</i>	<i>Journal</i>	<i>Retraction year</i>	<i>Method</i>	<i>Writing</i>	<i>Ethic</i>
S1	Armstrong	<i>Gerontologist</i>	2020	✓		
S2	Asrani	<i>Medicine</i>	2017	✓	✓	
S3	Boccardi	<i>J Hum Hypertens</i>	2019	✓		
S4	Cao	<i>Molecular Neurobiology</i>	2015			✓
S5	Chan	<i>Journal of Affective Disorders</i>	2018	✓		
S6	Chang	<i>Tumor Biology</i>	2015			✓
S7	Chen	<i>DNA and Cell Biology</i>	2015			✓
S8	Chen	<i>Molecular Biology Reports</i>	2015			✓
S9	Chen	<i>Molecular Neurobiology</i>	2015			✓
S10	Chen	<i>Skeletal Radiology</i>	2015			✓
S11	Chen	<i>DNA and Cell Biology</i>	2015			✓
S12	Cheng	<i>Medicine</i>	2018			✓
S13	Cremonini ¥	<i>Aliment Pharmacol Ther</i>	2003	N/A	N/A	N/A
S14	da Costa	<i>Lancet</i>	2016			✓
S15	De Vecchis	<i>High Blood Press Cardiovasc Prev</i>	2020			✓
S16	Deng	<i>Pediatric Surgery International</i>	2019			✓
S17	Di Lorenzo	<i>Circulation</i>	2010			✓
S18	DiNicolantonio	<i>Heart</i>	2013	✓		
S19	Dong	<i>Molecular Biology Reports</i>	2015			✓
S20	Dong	<i>Molecular Neurobiology</i>	2015			✓
S21	Ezenwa	<i>Journal of Human Lactation</i>	2020	✓		
S22	Fialho	<i>Aids Care-Psychological and Socio-Medical Aspects of Aids/Hiv</i>	2016		✓	
S23	Fischer	<i>Journal of Cross-Cultural Psychology</i>	2019	✓		
S24	Gao	<i>International Journal of Geriatric Psychiatry</i>	2015	✓	✓	
S25	Gao	<i>Molecular Biology Reports</i>	2015			✓
S26	Gao	<i>Tumor Biology</i>	2015			✓
S27	Ghaderi	<i>European Journal of Clinical Pharmacology</i>	2019		✓	
S28	Gotink	<i>PLoS ONE</i>	2019	✓		✓
S29	Grilli	<i>Current Opinion in Microbiology</i>	2017		✓	
S30	Gu	<i>Archives of Physical Medicine and Rehabilitation</i>	2017			✓
S31	Gu	<i>British Journal of Psychiatry</i>	2020	✓		

<b>No</b>	<b>First Author</b>	<b>Journal</b>	<b>Retraction year</b>	<b>Method</b>	<b>Writing</b>	<b>Ethic</b>
S32	Gu	<i>Tumor Biology</i>	2015			✓
S33	Gumley	<i>British Journal of Clinical Psychology</i>	2017	✓		
S34	Guo	<i>Crop Science</i>	2006	✓	✓	
S35	Guo ¥	<i>Eur J Prev Cardiol</i>	2020	N/A	N/A	N/A
S36	Han	<i>Tumor Biology</i>	2017			✓
S37	Hao	<i>Molecular Neurobiology</i>	2015			✓
S38	He	<i>Tumor Biology</i>	2017			✓
S39	Henson	<i>Journal of Clinical Oncology</i>	2016	✓		
S40	Hoang	<i>Cancer Research and Treatment</i>	2020			✓
S41	Hofmann	<i>Psychiatry Res</i>	2018	✓		
S42	Hu	<i>Educational Psychology Review</i>	2020	✓	✓	
S43	Huang	<i>European Journal of Medical Research</i>	2015			✓
S44	Huang	<i>PLoS One</i>	2014	✓	✓	
S45	Iwamoto ‡	<i>Clinical Drug Investigation</i>	2018	N/A	N/A	N/A
S46	Iwamoto ‡	<i>Current Medical Research and Opinion</i>	2017	N/A	N/A	N/A
S47	Iwamoto ‡	<i>Current Medical Research and Opinion</i>	2017	N/A	N/A	N/A
S48	Ji	<i>International Journal of Ophthalmology</i>	2017			✓
S49	Ji	<i>Spinal Cord</i>	2015			✓
S50	Jian	<i>Medicine</i>	2019	✓		
S51	Jiang	<i>European Journal of Medical Research</i>	2015			✓
S52	Jin	<i>Tumor Biology</i>	2017			✓
S53	Kamp	<i>Journal of Affective Disorders</i>	2019			✓
S54	Li	<i>J Cardiothorac Surg</i>	2015			✓
S55	Li ¥	<i>J Integr Med</i>	2013			
S56	Li	<i>Journal of orthopaedic surgery and research</i>	2018			✓
S57	Li	<i>Molecular Biology Reports</i>	2015			✓
S58	Li	<i>Molecular Biology Reports</i>	2015			✓
S59	Li	<i>Molecular Neurobiology</i>	2017			✓
S60	Li	<i>PLoS One</i>	2018	✓	✓	
S61	Li	<i>Tumor Biology</i>	2017			✓
S62	Li	<i>Tumor Biology</i>	2017			✓
S63	Li	<i>Tumor Biology</i>	2015			✓
S64	Li	<i>Tumor Biology</i>	2015			✓
S65	Liang	<i>International Journal of Clinical and Experimental Medicine</i>	2016			✓

<b>No</b>	<b>First Author</b>	<b>Journal</b>	<b>Retraction year</b>	<b>Method</b>	<b>Writing</b>	<b>Ethic</b>
S66	Lin	<i>BioMed Research International</i>	2019	✓	✓	✓
S67	Lin	<i>Journal of Cancer Research and Therapeutics</i>	2017			✓
S68	Liu	<i>Acta Radiologica</i>	2019			✓
S69	Liu	<i>BioMed Research International</i>	2019			✓
S70	Liu	<i>International Urology and Nephrology</i>	2016			✓
S71	Liu	<i>Rheumatology</i>	2011	✓		
S72	Liu	<i>Targeted Oncology</i>	2016			✓
S73	López-Valverde	<i>Journal of Clinical Medicine</i>	2020	✓	✓	
S74	Luo	<i>Tumor Biology</i>	2017			✓
S75	Lv	<i>British Journal of Clinical Pharmacology</i>	2016			✓
S76	Lv	<i>Molecular Neurobiology</i>	2017			✓
S77	Lv	<i>Tumor Biology</i>	2017			✓
S78	Ma	<i>Tumor Biology</i>	2017			✓
S79	Mahboobi	<i>Journal of Human Hypertension</i>	2019	✓		
S80	Mahmoudi	<i>Human Vaccines and Immunotherapeutics</i>	2017	✓		
S81	Maria	<i>Resuscitation</i>	2019		✓	
S82	Maslej	<i>JAMA Psychiatry</i>	2020	✓		
S83	May	<i>International Journal of Drug Policy</i>	2018	✓		
S84	Mohsenzadeh	<i>European Journal of Obstetrics &amp; Gynecology and Reproductive Biology</i>	2019			✓
S85	Panagioti	<i>JAMA Intern Med</i>	2020	✓		
S86	Parsaik	<i>Journal of Psychiatric Practice</i>	2018	✓	✓	
S87	Parvez ¥	<i>Journal of the College of Physicians and Surgeons Pakistan</i>	2009	N/A	N/A	N/A
S88	Poolsup	<i>PLoS One</i>	2020	✓	✓	
S89	Qian	<i>European Journal of Medical Research</i>	2015			✓
S90	Ramsay	<i>BMC Medicine</i>	2018	✓		
S91	Raslau	<i>Aerospace Medicine and Human Performance</i>	2015	✓		
S92	Ren	<i>Medicine</i>	2017	✓		
S93	Roba	<i>Maternal Health, Neonatology and Perinatology</i>	2020	✓		
S94	Shao	<i>Annals of Translational Medicine</i>	2016			✓

<b>No</b>	<b>First Author</b>	<b>Journal</b>	<b>Retraction year</b>	<b>Method</b>	<b>Writing</b>	<b>Ethic</b>
S95	Shen	<i>Journal of Cellular and Molecular Medicine</i>	2018			✓
S96	Siddique	<i>Sports Medicine</i>	2019	✓		
S97	Siempos	<i>The Lancet Respiratory medicine</i>	2015	✓		
S98	Soria-Gila	<i>Journal of Strength and Conditioning Research</i>	2018		✓	
S99	Stevens	<i>Pharm Stat</i>	2007		✓	
S100	Sun	<i>Bioscience Trends</i>	2016	✓		
S101	Sun	<i>Molecular Neurobiology</i>	2015			✓
S102	Sun	<i>The Scientific World Journal</i>	2020		✓	✓
S103	Sun	<i>Tumor Biology</i>	2017			✓
S104	Tan	<i>Alzheimers Research &amp; Therapy</i>	2016	✓		
S105	Thatcher	<i>J Appl Psychol</i>	2016	✓		
S106	Tian	<i>Medicine</i>	2019	✓		
S107	Vecchis	<i>Interv Med Appl Sci</i>	2017			✓
S108	Viani	<i>International Journal of Radiation Oncology Biology Physics</i>	2013	✓		
S109	Vlok	<i>Am J Emerg Med</i>	2020			✓
S110	Wang	<i>Annals of Human Genetics</i>	2016			✓
S111	Wang	<i>Bmc Musculoskeletal Disorders</i>	2015			✓
S112	Wang	<i>Future Generation Computer Systems-the International Journal of Escience</i>	2020			✓
S113	Wang	<i>Gen Psychiatr</i>	2019	✓		
S114	Wang	<i>International Journal of Clinical and Experimental Medicine</i>	2016			✓
S115	Wang	<i>International Journal of Ophthalmology</i>	2019	✓		
S116	Wang	<i>Medicine</i>	2018	✓		
S117	Wang	<i>Molecular Biology Reports</i>	2015			✓
S118	Wang	<i>Molecular Biology Reports</i>	2015			✓
S119	Wang	<i>Nutrition Journal</i>	2018	✓		✓
S120	Wang	<i>PLoS One</i>	2016			✓
S121	Wang	<i>PLoS One</i>	2016			✓
S122	Wang	<i>PLoS One</i>	2016			✓
S123	Wang	<i>Tumor Biology</i>	2017			✓
S124	Wen ¥	<i>Tumor Biology</i>	N/A	N/A	N/A	N/A
S125	Wu	<i>Journal of Diabetes</i>	2016			✓
S126	Wu	<i>Molecular Neurobiology</i>	2015			✓

<b>No</b>	<b>First Author</b>	<b>Journal</b>	<b>Retraction year</b>	<b>Method</b>	<b>Writing</b>	<b>Ethic</b>
S127	Xiao	<i>Tumor Biology</i>	2015			✓
S128	Xing	<i>Molecular Biology Reports</i>	2015			✓
S129	Xing	<i>Tumor Biology</i>	2015			✓
S130	Xiong	<i>Ejso</i>	2015			✓
S131	Xiong	<i>Medicine</i>	2014			✓
S132	Xu	<i>European Journal of Medical Research</i>	2015			✓
S133	Xu	<i>Journal of orthopaedic surgery and research</i>	2015			✓
S134	Xu	<i>Journal of orthopaedic surgery and research</i>	2015			✓
S135	Xu	<i>Journal of Surgical Oncology</i>	2015			✓
S136	Xue ¥	<i>Tumor Biology</i>		N/A	N/A	N/A
S137	Yan	<i>Molecular Biology Reports</i>	2015			✓
S138	Yang	<i>Journal of Bone and Mineral Metabolism</i>	2019			✓
S139	Yang	<i>Journal of orthopaedic surgery and research</i>	2015			✓
S140	Yang	<i>Medical Science Monitor</i>	2016			✓
S141	Yang	<i>Molecular Neurobiology</i>	2017			✓
S142	Yang	<i>Molecular Neurobiology</i>	2017			✓
S143	Ye	<i>Eur Heart J</i>	2019	✓		
S144	Yin	<i>Journal of Dermatology</i>	2013			✓
S145	Yin	<i>Tumor Biology</i>	2017			✓
S146	Yu	<i>Molecular Biology Reports</i>	2015			✓
S147	Yu	<i>Molecular Biology Reports</i>	2015			✓
S148	Yuan	<i>Cancer Epidemiology Biomarkers &amp; Prevention</i>	2019	✓		
S149	Zarychanski	<i>Open Med</i>	2010	✓		
S150	Zhai	<i>Tumor Biology</i>	2015			✓
S151	Zhang	<i>Int J Surg</i>	2017			✓
S152	Zhang	<i>International Journal of Clinical and Experimental Medicine</i>	2016			✓
S153	Zhang	<i>Tumor Biology</i>	2017			✓
S154	Zhao	<i>Journal of Orthopaedic Surgery and Research</i>	2018	✓		
S155	Zhao	<i>Molecular Biology Reports</i>	2015			✓
S156	Zhao	<i>Reproductive Biomedicine Online</i>	2016			✓

<b>No</b>	<b>First Author</b>	<b>Journal</b>	<b>Retraction year</b>	<b>Method</b>	<b>Writing</b>	<b>Ethic</b>
S157	Zheng	<i>Journal of ECT</i>	2016	✓		
S158	Zheng	<i>Journal of ECT</i>	2016	✓		
S159	Zhgan	<i>Medicine</i>	2019			✓
S160	Zhou	<i>European Journal of Medical Research</i>	2016			✓
S161	Zhou	<i>Molecular Biology Reports</i>	2015			✓
S162	Zhu	<i>Medicine</i>	2018			✓
S163	Zhu	<i>PLoS One</i>	2018	✓		
S164	Zuo	<i>Molecular Biology Reports</i>	2015			✓
S165	Liu	<i>Aging Clinical and Experimental Research</i>	2020			✓
S166	Hariyanto	<i>AIDS Research and Human Retroviruses</i>	2021			✓
S167	Vlok	<i>The American Journal of Emergency Medicine</i>	2020			✓
S168	Wang	<i>BioMed Research International</i>	2021	✓		✓
S169	Li	<i>BioMed Research International</i>	2020	✓		✓
S170	Sun	<i>BioMed Research International</i>	2020	✓		✓
S171	Yang	<i>BioMed Research International</i>	2021	✓		✓
S172	Albay	<i>BMC Neurology</i>	2020	✓		
S173	Zhong ‡	<i>Clinical Drug Investigation</i>	2021	N/A	N/A	N/A
S174	Ferlito	<i>Clinical Rehabilitation</i>	2021	✓	✓	
S175	Vorilhon	<i>European Journal of Clinical Pharmacology</i>	2021	✓		
S176	Shih	<i>Experimental and therapeutic medicine</i>	2021	✓		
S177	Li	<i>Gastroenterology Research and Practice</i>	2020	✓		✓
S178	Tian	<i>Italian Journal of Pediatrics</i>	2021			✓
S179	Zhou	<i>Journal of Orthopaedic Surgery and Research</i>	2021			✓
S180	Hodkinson	<i>JAMA network open</i>	2020	✓		
S181	Cai	<i>Journal of Cellular Biochemistry</i>	2021	✓		
S182	López-Valverde	<i>Journal of Clinical Medicine</i>	2020	✓		
S183	Li	<i>Journal of Cosmetic Dermatology</i>	2020			✓
S184	Fan	<i>Journal of Hypertension</i>	2021	✓		
S185	Zhang ‡	<i>Journal of Stroke &amp; Cerebrovascular Diseases</i>	2021	N/A	N/A	N/A
S186	Guo	<i>Journal of Zhejiang University-SCIENCE B</i>	2020	✓		

<i>No</i>	<i>First Author</i>	<i>Journal</i>	<i>Retraction year</i>	<i>Method</i>	<i>Writing</i>	<i>Ethic</i>
S187	Liu	<i>Medicine</i>	2020	✓		✓
S188	He	<i>Medicine</i>	2020	✓		
S189	Peng	<i>Medicine</i>	2020	✓	✓	
S190	Zeng	<i>Medicine</i>	2021	✓		
S191	Tan	<i>Medicine</i>	2021	✓		
S192	Huang	<i>Medicine</i>	2021			✓
S193	Huang	<i>Medicine</i>	2021			✓
S194	De Vecchis	<i>MINERVA CARDIOANGIOLOGICA</i>	2020			✓
S195	Hussain	<i>Obesity Research &amp; Clinical Practice</i>	2021	✓		
S196	Wang	<i>PLoS One</i>	2021			✓
S197	Song	<i>PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES</i>	2021	✓		
S198	Zhang	<i>Scientific Reports</i>	2021	✓		

¥ No official announcement or clear reasoning for the retraction.

‡ The reason of retraction: Original research (randomized controlled trials) in their analyses were retracted after the meta-analysis had been published, and authors performed their meta-analysis without cognisance of the concerns with respect to data integrity in the original trials.