

Table S1 List of included studies (n=83)

No.	Paper reference	Paper citation number
1	Kelly C, Henderson D, Corris P. Breast lumps: rare presentation of oat cell carcinoma of lung. <i>J Clin Pathol.</i> 1988;41(2):171-172. doi:10.1136/jcp.41.2.171.	(40)
2	Courtney SP, Polaczar S, Rafferty AT. Mondor's disease associated with metastatic lung cancer in the breast. <i>Postgrad Med J.</i> 1989;65(768):779-780. doi:10.1136/pgmj.65.768.779.	(41)
3	Verger E, Conill C, Velasco M, Sole M. Metastasis in the male breast from a lung adenocarcinoma. <i>Acta Oncol.</i> 1992;31(4):479. doi:10.3109/02841869209088294.	(42)
4	Hunter GJ, Choi NC, McLoud TC, Fischman AJ. Lung tumor metastasis to breast detected by fluorine-18-fluorodeoxyglucose PET. <i>J Nucl Med.</i> 1993;34(9):1571-1573.	(43)
5	Sadikot RT, Renwick DS, DaCosta P, Chalmers AG, Pearson SB. Breast metastasis from non-small cell lung cancer. <i>South Med J.</i> 1997;90(10):1063-1064. doi:10.1097/00007611-199710000-00021.	(44)
6	Jakovljević B, Stevanović O, Bacić G. Metastases to the breast from small-cell lung cancer: MR findings. A case report. <i>Acta Radiol.</i> 2003;44(5):485-488. doi:10.1080/000160003000114.x.	(45)
7	Gómez-Caro A, Piñero A, Roca MJ, et al. Surgical treatment of solitary metastasis in the male breast from non-small cell lung cancer. <i>Breast J.</i> 2006;12(4):366-367. doi:10.1111/j.1075-122X.2006.00278.x.	(46)
8	Vaughan A, Dietz JR, Moley JF, et al. Metastatic disease to the breast: the Washington University experience. <i>World J Surg Oncol.</i> 2007;5:74. Published 2007 Jul 5. doi:10.1186/1477-7819-5-74.	(16)
9	Noguera J, Martínez-Miravete P, Idoate F, et al. Metastases to the breast: a review of 33 cases. <i>Australas Radiol.</i> 2007;51(2):133-138. doi:10.1111/j.1440-1673.2007.01681.x.	(47)
10	Rimner A, Rosenzweig KE. Palliative radiation for lung cancer metastases to the breast: two case reports. <i>J Thorac Oncol.</i> 2007;2(12):1133-1135. doi:10.1097/JTO.0b013e31815ba7ba.	(48)
11	Hsu W, Sheen-Chen SM, Wang JL, Huang CC, Ko SF. Squamous cell lung carcinoma metastatic to the breast. <i>Anticancer Res.</i> 2008;28(2B):1299-1301.	(49)
12	Luh SP, Kuo C, Tsao TC. Breast metastasis from small cell lung carcinoma. <i>J Zhejiang Univ Sci B.</i> 2008;9(1):39-43. doi:10.1631/jzus.B072258.	(50)
13	Babu KS, Roberts F, Bryden F, et al. Metastases to breast from primary lung cancer. <i>J Thorac Oncol.</i> 2009;4(4):540-542. doi:10.1097/JTO.0b013e31819c8556.	(51)
14	Klingen TA, Klaasen H, Aas H, Chen Y, Akslen LA. Secondary breast cancer: a 5-year population-based study with review of the literature. <i>APMIS.</i> 2009;117(10):762-767. doi:10.1111/j.1600-0463.2009.02529.x.	(17)
15	Liu W, Palma-Diaz F, Alasio TM. Primary small cell carcinoma of the lung initially presenting as a breast mass: a fine-needle aspiration diagnosis. <i>Diagn Cytopathol.</i> 2009;37(3):208-212. doi:10.1002/dc.20995.	(52)
16	Maounis N, Chorti M, Legaki S, et al. Metastasis to the breast from an adenocarcinoma of the lung with extensive micropapillary component: a case report and review of the literature. <i>Diagn Pathol.</i> 2010;5:82. Published 2010 Dec 17. doi:10.1186/1746-1596-5-82.	(18)
17	Yoon MY, Song CS, Seo MH, et al. A case of metachronous metastasis to the breast from non-small cell lung carcinoma. <i>Cancer Res Treat.</i> 2010;42(3):172-175. doi:10.4143/crt.2010.42.3.172.	(53)
18	Altintoprak F, Baytekin HF, Tasdemir C. Primary small cell carcinoma of the lung presenting with breast and skin metastases. <i>Korean J Intern Med.</i> 2011;26(2):207-209. doi:10.3904/kjim.2011.26.2.207.	(54)
19	Choi JJ, Buch KE, Warner RR, Divino CM. Atypical lung carcinoid metastasis to breast: a case report. <i>Pancreas.</i> 2011;40(3):487-488. doi:10.1097/MPA.0b013e31820b4e19.	(55)
20	Fukumoto K, Usami N, Okasaka T, et al. Late breast metastasis from resected lung cancer diagnosed by epidermal growth factor receptor gene mutation. <i>Lung Cancer.</i> 2011;74(2):352-353. doi:10.1016/j.lungcan.2011.08.015.	(56)
21	Güldoğan N, İçten GE, Tokat F, et al. Three Cases of Breast Metastases from Lung Cancer and Systematic Review of the Literature. <i>Eur J Breast Health.</i> 2021;17(2):200-205. Published 2021 Mar 31. doi:10.4274/ejbh.galenos.2020.5703.	(57)
22	Economopoulou P, Chrysikopoulou A, Goula K, et al. Breast Metastasis from Neuroendocrine Carcinoma of the Lung: A Case Report and Review of the Literature. <i>Case Rep Oncol.</i> 2020;13(3):1281-1284. Published 2020 Oct 16. doi:10.1159/000510936.	(58)
23	Wood B, Sterrett G, Frost F, Swarbrick N. Diagnosis of extramammary malignancy metastatic to the breast by fine needle biopsy. <i>Pathology.</i> 2008;40(4):345-351. doi:10.1080/00313020801911520.	(59)
24	Nasit JG, Parikh B, Shah M. (2011). Bilateral Breast Metastasis from an Adenocarcinoma of Lung: A Case Report. <i>National Journal of Medical Research</i> , 1(02), 83–86.	(60)
25	Branica BV, Meniga IN, Puljić I, Marusić A, Chalfe N, Ivčević A. Breast metastasis from lung adenocarcinoma diagnosed with fine needle aspiration cytology: a case report. <i>Coll Antropol.</i> 2012;36(4):1461-1465.	(61)
26	Chattopadhyay S, Aich RK, Sengupta A, Kumari P. Squamous cell carcinoma of lung metastasizing in breast. <i>J Cancer Res Ther.</i> 2012;8(4):630-632. doi:10.4103/0973-1482.106582.	(62)
27	Ko K, Ro JY, Hong EK, Lee S. Micropapillary lung cancer with breast metastasis simulating primary breast cancer due to architectural distortion on images. <i>Korean J Radiol.</i> 2012;13(2):249-253. doi:10.3348/kjr.2012.13.2.249.	(63)
28	Ji FF, Gao P, Wang JG, Zhao J, Zhao P. Contralateral breast metastasis from pulmonary adenocarcinoma: two cases report and literature review. <i>J Thorac Dis.</i> 2012;4(4):384-389. doi:10.3978/j.issn.2072-1439.2012.02.03.	(64)
29	Sato K, Takeyama Y, Yoshihara M, et al. CBDCA + Pemetrexed + Bevacizumab and Its Maintenance Chemotherapy in a Case of Solitary Breast Metastasis from a Lung Adenocarcinoma Resistant to Gefitinib. <i>Case Rep Oncol.</i> 2012;5(3):546-553. doi:10.1159/000343678.	(65)
30	Sengupta A, Saha K, Jash D, Banerjee S. Metastatic breast lump: A rare presentation of squamous cell lung cancer. <i>Clinical Cancer Investigation Journal</i> , 2012;1(2), 97-99. https://doi.org/10.4103/2278-0513.99581.	(66)
31	Sanguinetti A, Puma F, Lucchini R, et al. Breast metastasis from a pulmonary adenocarcinoma: Case report and review of the literature [retraction of: <i>Oncol Lett.</i> 2013 Jan;5(1):328-332]. <i>Oncol Lett.</i> 2019;18(6):6305. doi:10.3892/ol.2019.10965.	(67)
32	Mirrieles JA, Kapur JH, Szalkucki LM, et al. Metastasis of primary lung carcinoma to the breast: a systematic review of the literature. <i>J Surg Res.</i> 2014;188(2):419-431. doi:10.1016/j.jss.2014.01.024.	(68)
33	Wang X, Luo Y, Liu L, et al. Metastatic adenocarcinoma to the breast from the lung simulates primary breast carcinoma—a clinicopathologic study. <i>Transl Cancer Res.</i> 2021;10(3):1399-1409. doi:10.21037/tcr-20-2250.	(69)
34	Ali RH, Taraboanta C, Mohammad T, Hayes MM, Ionescu DN. Metastatic non-small cell lung carcinoma a mimic of primary breast carcinoma-case series and literature review. <i>Virchows Arch.</i> 2018;472(5):771-777. doi:10.1007/s00428-017-2262-4.	(70)
35	Roshini R and Wernberg J. Three Cases of Atypical Breast Metastasis from Lung Adenocarcinoma. <i>Clinical medicine &amp; research.</i> 2022;20,4: 231-235. doi:10.3121/cmcr.2022.1735.	(71)
36	Valenza C, Porta FM, Rappa A, et al. Complex Differential Diagnosis between Primary Breast Cancer and Breast Metastasis from EGFR-Mutated Lung Adenocarcinoma: Case Report and Literature Review. <i>Curr Oncol.</i> 2021 Aug 31;28(5):3384-3392. doi: 10.3390/curroncol28050292.	(31)
37	Cao L, and Lv L. Breast metastasis from EGFR/ALK negative lung adenocarcinoma: A case report. <i>Medicine (Baltimore).</i> 2020 Dec 4;99(49):e23503. doi: 10.1097/MD.00000000000023503.	(72)
38	Dansin E, Carnot A, Servent V, et al. EGFR-Mutated Breast Metastasis of Lung Adenocarcinoma: A Case Report. <i>Case Rep Oncol.</i> 2015 Mar 14;8(1):164-8. doi: 10.1159/000381014.	(73)
39	Chuang X, Chen Y, Yu P, et al. ALK rearrangement in lung adenocarcinoma with concurrent cervix and breast metastases: A case report. <i>Thorac Cancer.</i> 2018;9(11):1513-1518. doi:10.1111/1759-7714.12848	(74)
40	Ota T, Hasegawa Y, Okimura A, et al. Breast metastasis from EGFR-mutated lung adenocarcinoma: A case report and review of the literature. <i>Clin Case Rep.</i> 2018;6(8):1510-1516. Published 2018 Jun 19. doi:10.1002/ccr3.1636	(75)
41	Enrico D, Saucedo S, Bravo I. Breast metastasis from primary lung adenocarcinoma in a young woman: A case report and literature review. <i>World J Clin Oncol.</i> 2019 Jul 24;10(7):269-278. doi: 10.5306/wjco.v10.i7.269.	(76)
42	Ramar K, Pervez H, Potti A, Mehdi S. Breast metastasis from non-small-cell lung carcinoma. <i>Med Oncol.</i> 2003;20(2):181-4. doi: 10.1385/MO:20:2:181	(77)
43	Fulciniti F, Losito S, Botti G, et al. Metastases to the breast: role of fine needle cytology samples. Our experience with nine cases in 2 years. <i>Ann Oncol.</i> 2008 Apr;19(4):682-7. doi: 10.1093/annonc/mdm546.	(78)
44	Huang HC, Hang JF, Wu MH, Chou TY, Chiu CH. Lung adenocarcinoma with ipsilateral breast metastasis: a simple coincidence? <i>J Thorac Oncol.</i> 2013 Jul;8(7):974-9. doi: 10.1097/JTO.0b013e31828f6873.	(79)
45	Liam CK, Pang YK, Poh ME, Kow KS, Wong CK, Varughese R. Advanced right lung adenocarcinoma with ipsilateral breast metastasis. <i>Respirol Case Rep.</i> 2013;1(1):20-22. doi:10.1002/rccr.2.14.	(80)
46	Sousaris N, Mendelsohn G, Barr RG. Lung cancer metastatic to breast: case report and review of the literature. <i>Ultrasound Q.</i> 2013;29(3):205-209. doi:10.1097/RUQ.0b013e3182a00fc4.	(81)
47	Jeong YJ, Bong JG, Oh HK, Park SH, Kang SM, Bae SH. Metachronous isolated breast metastasis from pulmonary adenocarcinoma with micropapillary component causing diagnostic challenges. <i>BMC Cancer.</i> 2014;14:736. doi:10.1186/1471-2407-14-736.	(82)
48	Hachisuka A, Takahashi R, Nakagawa S, et al. Lung adenocarcinoma metastasis to the male breast: a case report. <i>Kurume Med J.</i> 2014;61(1-2):35-41. doi:10.2739/kurumedj.MS63010.	(83)
49	Harrett E, Davies RS, Attanoos R, Lester JF. Lung cancer masquerading as breast cancer with carcinoma en cuirasse. <i>BMJ Case Rep.</i> 2014;2014:bcr2014206596. doi:10.1136/bcr-2014-206596.	(84)
50	Venkatesulu BP, Mallick S, Singh A, Julka PK. Non small cell carcinoma of lung with metachronous breast metastasis and cardiac tamponade: Unusual presentation of a common cancer. <i>J Egypt Natl Canc Inst.</i> 2015;27(3):165-169. doi:10.1016/j.jnci.2015.03.006.	(85)
51	Shen YW, Sui YX, Zhang XM, et al. Ipsilateral breast metastasis from a pulmonary adenocarcinoma: a case report and a focused review of the literature. <i>Int J Clin Exp Pathol.</i> 2015;8(8):9647-9654. Published 2015 Aug 1.	(86)
52	Gao Q, Wang B, Zheng Y, Ren G, Zhou J. Breast metastasis from lung cancer: report of two cases of adenocarcinoma with different gene mutation and one case of squamous cell carcinoma. <i>Int J Clin Exp Path.</i> 2016;9(2):443-453.	(87)
53	Ninan J, Naik V, George GM. 'Inflammatory breast cancer' due to metastatic adenocarcinoma of lung. <i>BMJ Case Rep.</i> 2016;2016:bcr2016215857. doi:10.1136/bcr-2016-215857.	(88)
54	Lin Q, Cai GP, Yang KY, Yang L, Chen CS, Li YP. Case report: small cell transformation and metastasis to the breast in a patient with lung adenocarcinoma following maintenance treatment with epidermal growth factor receptor tyrosine kinase inhibitors. <i>BMC Cancer.</i> 2016;16:593. doi:10.1186/s12885-016-2623-4.	(89)
55	Ozturk A (2017) A man patient with ipsilateral breast metastasis from pulmonary adenocarcinoma. <i>Cancer Rep Rev 1:</i> doi:10.15761/CRR.1000103.	(90)
56	Cserni G. Solitary breast metastasis from oestrogen receptor-positive pulmonary adenocarcinoma: report of a case with a potential pitfall. <i>Pol J Pathol.</i> 2017;68(2):168-172. doi:10.5114/pjp.2017.69694.	(91)
57	Zahedi F, Mahdavi H (2017) A Case of Lung Adenocarcinoma with Metastasis to the Breast. <i>Oncol Cancer Case Rep 3:</i> 122.	(92)
58	Saad Abdalla Al-Zawi A, Ratajczak A, Idaewor P, et al. Primary lung cancer with metastasis to the ipsilateral breast—a case report. <i>International Journal of Research in Medical Sciences.</i> 2017;6(1), 334–339. https://doi.org/10.18203/2320-6012.ijrms20175744.	(93)
59	Pesce K, Chico MJ, Delgado JS, Sierra ACZ, Hadad C, Wernicke A. Metastases to the breast, an uncommon diagnosis: what do radiologists need to know?. <i>Radiologia (Engl Ed).</i> 2019;61(4):324-332. doi:10.1016/j.rj.2019.02.004.	(94)
60	Wang Y and Xue R. Cutaneous Metastases from Lung Adenocarcinoma. <i>Case Reports in Dermatological Medicine.</i> 2020;8880604(3). https://doi.org/10.1155/2020/8880604.	(95)
61	Wan X, Zhang H, Zhang Y, Peng Y. Metastases to the Breast from Extramammary Nonhematological Malignancies: Case Series. <i>Int J Gen Med.</i> 2020;13:1105-1114. doi:10.2147/IJGM.S276602.	(96)
62	Zheng J, Zhou JY, Bao Z, Shen Q, Cao H, Zhou JY. Ipsilateral breast metastasis from lung adenocarcinoma harboring anaplastic lymphoma kinase or ROS1 rearrangement and significant response after targeted therapy: report of two cases. <i>Chin Med J (Engl).</i> 2020;133(14):1725-1726. doi:10.1097/CM9.0000000000000890.	(97)
63	Liang Amy ST, Ryan C, O'Hern K, Duprat GE, Donnell SA, Simmons B. Primary estrogen receptor-positive lung adenocarcinoma identified by immunohistochemical investigation of rare cutaneous metastasis to the breast in a patient with presumed recurrent estrogen receptor-positive breast cancer. <i>JAAD Case Rep.</i> 2021;14:85-87. doi:10.1016/j.jcdr.2021.06.008	(32)
64	Mo Y, Lin L, Zhang J, et al. Confirmation of lung adenocarcinoma as the primary cancer with detection of EML4-ALK rearrangement using next-generation sequencing: a case study. <i>Pathol Res Pract.</i> 2022;238:154105. doi:10.1016/j.prp.2022.154105.	(98)
65	Li J, Liu YS, Liu DD, Li XL. Metastasis to breast from primary lung Cancer:A rare case report. <i>Asian J Surg.</i> 2022;45(11):2562-2563. doi:10.1016/j.asjsur.2022.05.154.	(99)
66	Genç B, Solak A, Sahin N, Gülşen A. Metastasis to the male breast from squamous cell lung carcinoma. <i>Case Rep Oncol Med.</i> 2013;2013:593970. doi:10.1155/2013/593970.	(100)
67	Khoury R, Bucur M, Bizot A, Khalil A. Breast metastasis of a lung carcinoma. <i>BJR Case Rep.</i> 2021;8(2):20210142. doi:10.1259/bjcr.20210142.	(101)
68	Wang L, Wang SL, Shen HH, Niu FT, Niu Y. Breast metastasis from lung cancer: a report of two cases and literature review. <i>Cancer Biol Med.</i> 2014;11(3):208-215. doi:10.7497/j.issn.2095-3941.2014.03.007.	(102)
69	Grigoropoulos P, Mariolis-Sapsakos T, Karantonis I, et al. Non small cell lung cancer metastasized to the breast and treated with modified radical mastectomy: a case report. <i>G Chir.</i> 2019;40(4):304-307.	(103)
70	Papa A, Rossi L, Verrico M, et al. Breast metastasis and lung large-cell neuroendocrine carcinoma: first clinical observation. <i>Clin Respir J.</i> 2017;11(5):574-578. doi:10.1111/crj.12385.	(104)
71	Copur MS, Horn A, Allen J, Aprn CS, Zusag T. Recurrent Small Cell Carcinoma of the Lung With Cutaneous Metastasis in Breast. <i>Oncology (Williston Park).</i> 2020;34(4):693581.	(105)
72	Sharma G, Kumar P, Veerwal H, Singh P, Gupta S, Dhingra V. Cutaneous Metastases as Initial Presentation of Lung Carcinoma. <i>Cureus.</i> 2021;13(5):e15344. Published 2021 May 31. doi:10.7759/cureus.15344.	(106)
73	Kotake M, Imai H, Onozato R, et al. Metachronous bilateral breast metastases of a lung neuroendocrine tumor: A case report. <i>Mol Clin Oncol.</i> 2020;13(5):53. doi:10.3892/mco.2020.2123.	(107)
74	Guerrouaz MA, Samba S, BenSghier A, Sbai A Sr, Mezouar L. Breast Metastasis From a Non-small Cell Lung Cancer: A Case Report. <i>Cureus.</i> 2020;12(3):e7460. doi:10.7759/cureus.7460.	(108)
75	Lee B and Harvey S. Incidental lung cancer found on screening breast MRI with eventual lymphatic metastasis to the breast. <i>Breast Dis.</i> 2015;35(3):207-210. doi:10.3233/BD-150406.	(109)
76	Liu C, Ding L, Sun B, Wu S. Bilateral breast adenocarcinomas with EML4-ALK fusion in a patient with multiple metastases successfully treated with crizotinib: is lung the primary site?. <i>Onco Targets Ther.</i> 2016;9:3589-3593. doi:10.2147/OTT.S104583.	(110)
77	Crona J, Granberg D, Norlén O, et al. Metastases from neuroendocrine tumors to the breast are more common than previously thought. A diagnostic pitfall?. <i>World J Surg.</i> 2013;37(7):1701-1706. doi:10.1007/s00268-013-2037-2.	(111)
78	Cao X, Chen P, Agyekum EA, et al. Lung cancer with breast metastasis: a case report and review of the literature. <i>J Int Med.</i> 2023;51(7):3000605231188287. doi:10.1111/IMJ.15231.	(112)
79	Malek D, Buccheri S, Dey CB, Samli B, Plemmons J. Lung cancer metastasis to the breast mimicking inflammatory breast carcinoma on imaging. <i>Radiol Case Rep.</i> 2019;14(12):1500-1505. Published 2019 Oct 17. doi:10.1016/j.radcr.2019.09.024.	(113)
80	Zinzuwadia S, Olivieri J, Zhang C, et al. Bilateral breast metastases from small cell lung carcinoma: Case report and review of the literature. <i>Radiol Case Rep.</i> 2021;16(7):1718-1726. doi:10.1016/j.radcr.2021.03.056.	(114)
81	Bannon M, Marak C, Ashraf A, et al. Unusual presentation of a small cell lung cancer with bilateral breast metastases: Case report and a brief review of the literature. <i>Respir Med Case Rep.</i> 2022;38:101693. doi:10.1016/j.rmcr.2022.101693.	(115)
82	Zhao M, Xiang Y, Su F, Ling X. Male small-cell lung cancer with breast mass as the first manifestation: A rare case report. <i>Asian J Surg.</i> 2023;46(6):2587-2589. doi:10.1016/j.asjsur.2022.12.124.	(12)
83	Bartella L, Kaye J, Perry NM, et al. Metastases to the breast revisited: radiological-histopathological correlation. <i>Clin Radiol.</i> 2003;58(7):524-531. doi:10.1016/s0009-9260(03)00068-0.	(116)

**Table S2** Bias mitigation summary

Stage of review	Potential bias	Prevention method
Protocol development	Selection bias	<ul style="list-style-type: none"><li>• Define clear inclusion/exclusion criteria before starting</li><li>• Create detailed search strategy</li><li>• Document any protocol changes</li></ul>
Study selection	Screening bias	<ul style="list-style-type: none"><li>• Two independent reviewers for screening</li><li>• Third reviewer for disagreements</li><li>• Blind reviewers to journal and authors</li><li>• Document reasons for exclusion</li></ul>
Data extrtaction	Information bias	<ul style="list-style-type: none"><li>• Create standardized data extraction form</li><li>• Pilot test extraction form</li><li>• Double independent data extraction</li><li>• Regular calibration meetings</li></ul>
Quality assessment	Assesment bias	<ul style="list-style-type: none"><li>• Independent assessment by two reviewers</li><li>• Document justification for judgments</li><li>• Regular team calibration</li></ul>
Data synthesis	Reporting bias	<ul style="list-style-type: none"><li>• Follow pre-specified analysis plan</li><li>• Report all planned outcomes</li><li>• Transparent handling of missing data</li></ul>
Results interpretation	Confirmation bias	<ul style="list-style-type: none"><li>• Involve multiple team members in interpretation</li><li>• Consider alternative explanations</li><li>• Acknowledge limitations</li></ul>

Each row presents a distinct stage of review, the potential bias that may arise during that stage, and specific prevention methods to maintain research integrity. The prevention methods listed represent evidence-based practices designed to minimize systematic errors and enhance the reliability of research findings. This framework serves as a practical guide for researchers conducting systematic reviews.