

# Brustimplantat-assoziierte Erkrankungen

JULIAN PÖTSCHKE, OLIVER THAMM, UWE V. FRITSCHEN, ALBA FRICKE,  
IRENE RICHTER-HEINE, ULRICH KNESER, SUSANNE REIN, THOMAS KREMER

LEIPZIG

1. ISAPS (2020) ISAPS International survey on aesthetic/cosmetic procedures performed in 2020: International Society of Aesthetic Plastic Surgery; 2020 [Available from: [https://www.isaps.org/wp-content/uploads/2022/01/ISAPS-Global-Survey\\_2020.pdf](https://www.isaps.org/wp-content/uploads/2022/01/ISAPS-Global-Survey_2020.pdf)].
2. Deva AK, Cuss A, Magnusson M, Cooter R (2019) The “game of implants”: a perspective on the crisis-prone history of breast implants. *Aesthet Surg J* 39: S55–S65
3. Santanelli di Pompeo F, Sorotos M, Clemens MW, et al (2022) Mortality rate in breast implant surgery: is an additional procedure worthwhile to mitigate BIA-ALCL risk? *Aesthetic Plast Surg*: Nov 14. doi: 10.1007/s00266-022-03138-5.
4. Kricheldorf J, Fallenberg EM, Solbach C, et al (2018) Breast implant-associated lymphoma. *Dtsch Arztebl Int*. 2018;115:628–635
5. Keech JA Jr, Creech BJ (1997) Anaplastic T-cell lymphoma in proximity to a saline-filled breast implant. *Plast Reconstr Surg* 100: 554–555
6. Longo B, Di Napoli A, Curigliano G, et al (2022) Clinical recommendations for diagnosis and treatment according to current updated knowledge on BIA-ALCL. *Breast* 66: 332–341
7. BfArM (2022) Bundesamt für Arzneimittel und Medizinprodukte; [Available from: [https://www.bfarm.de/SharedDocs/Risikoinformationen/Medizinprodukte/DE/Brustimplantate\\_ALCL\\_FDA.html](https://www.bfarm.de/SharedDocs/Risikoinformationen/Medizinprodukte/DE/Brustimplantate_ALCL_FDA.html)]
8. FDA (2022) Food & Drug Administration; [Available from: <https://www.fda.gov/medical-devices/breast-implants/medical-device-reports-breast-implant-associated-anaplastic-large-cell-lymphoma>]
9. Loch-Wilkinson A, Beath KJ, Knight RJW, et al (2017) Breast implant-associated anaplastic large cell lymphoma in Australia and New Zealand: high-surface-area textured implants are associated with increased risk. *Plast Reconstr Surg* 140: 645–654
10. Rondón-Lagos M, Rangel N, Camargo-Villalba G, Forero-Castro M (2021) Biological and genetic landscape of breast implant-associated anaplastic large cell lymphoma (BIA-ALCL). *Eur J Surg Oncol* 47: 942–951
11. Deva AK, Turner SD, Kadin ME, et al (2020) Etiology of breast implant-associated anaplastic large cell lymphoma (BIA-ALCL): current directions in research. *Cancers (Basel)* 12: 3861
12. De Jong WH, Panagiotakos D, Proykova A, et al (2021) Final opinion on the safety of breast implants in relation to anaplastic large cell lymphoma: report of the scientific committee on health, emerging and environmental risks (SCHEER). *Regul Toxicol Pharmacol* 125: 104982
13. Hu H, Johani K, Almatroudi A, et al (2016) Bacterial biofilm infection detected in breast implant-associated anaplastic large-cell lymphoma. *Plast Reconstr Surg* 137: 1659–1669
14. Dierks A, Jackisch C, Menke H (2020) Brustimplantat-assoziiertes anaplastisches großzelliges Lymphom - BIA-ALCL. *Hess Ärztebl* 4: 216–220
15. Clemens MW, Horwitz SM (2017) NCCN consensus guidelines for the diagnosis and management of breast implant-associated anaplastic large cell lymphoma. *Aesthet Surg J* 37: 285–289
16. Clemens MW, Jacobsen ED, Horwitz SM (2019) 2019 NCCN consensus guidelines on the diagnosis and treatment of breast implant-associated anaplastic large cell lymphoma (BIA-ALCL). *Aesthet Surg J* 39: S3–S13
17. Allchin RL, Wickenden K, Pilgrim S, et al (2020) The successful use of neo adjuvant brentuximab vedotin in the treatment of BIA-ALCL. *Hemisphere* 4: e501
18. Clemens MW, Medeiros LJ, Butler CE, et al (2016) Complete surgical excision is essential for the management of patients with breast implant-associated anaplastic large-cell lymphoma. *J Clin Oncol* 34: 160–168
19. Buchanan PJ, Chopra VK, Walker KL, et al (2018) Primary squamous cell carcinoma arising from a breast implant capsule: a case report and review of the literature. *Aesthet Surg J* 38: doi: 10.1093/asj/sjy092
20. Goldberg MT, Llaneras J, Willson TD, et al (2021) Squamous cell carcinoma arising in breast implant capsules. *Ann Plast Surg* 86: 268–272
21. Kitchen SB, Paletta CE, Shehadi SI, Bauer WC (1994) Epithelialization of the lining of a breast implant capsule. Possible origins of squamous cell carcinoma associated with a breast implant capsule. *Cancer* 73: 1449–52
22. Olsen DL, Keeney GL, Chen B, et al (2017) Breast implant capsule-associated squamous cell carcinoma: a report of 2 cases. *Hum Pathol* 67: 94–100

23. Paletta C, Paletta FX Jr, Paletta FX Sr (1992) Squamous cell carcinoma following breast augmentation. *Ann Plast Surg* 29: 425–429
24. Whaley RD, Aldrees R, Dougherty RE, et al (2022) Breast implant capsule-associated squamous cell carcinoma: report of 2 patients. *Int J Surg Pathol* 30: 900–907
25. Zhou YM, Chaudhry HE, Shah A, Andrews J (2018) Breast squamous cell carcinoma following breast augmentation. *Cureus* 10: e3405
26. Zomerlei TA, Samarghandi A, Terando AM (2015) Primary squamous cell carcinoma arising from a breast implant capsule. *Plast Reconstr Surg Glob Open* 3: e586
27. Xia Z, Han B, Wang L, et al (2022) Breast implant-associated squamous cell carcinoma in a male patient: a case report and review of the medical literature. *Front Surg* 9: 983611
28. Camacho JP, Obaíd M, Bustos C, et al (2020) Squamous cell carcinoma as a result of likely industrial grade ruptured poly implant prosthèse silicone buttock implants. *Aesthet Surg J Open Forum* 2: ojaao30
29. Khoo C, McTigue C, Hunter-Smith DJ, Walker P (2021) EBV positive fibrin/chronic inflammation associated diffuse large B-cell lymphoma: an incidental finding associated with a breast implant. *Pathology* 53: 673–675
30. Malata CM, Madada-Nyakauru RN, Follows G, Wright P (2021) Epstein-Barr virus-associated diffuse large B-cell lymphoma identified in a breast implant capsule: a new breast implant-associated lymphoma? *Ann Plast Surg* 86: 383–386
31. FDA (2022) Breast implants: reports of squamous cell carcinoma and various lymphomas in capsule around implants: FDA safety communication
32. Atiyeh B, Emsieh S (2022) Breast implant illness (BII): real syndrome or a social media phenomenon? A narrative review of the literature. *Aesthetic Plast Surg* 46: 43–57
33. Tang SYQ, Israel JS, Afifi AM (2017) Breast implant illness: symptoms, patient concerns, and the power of social media. *Plast Reconstr Surg* 140: 765e–766e
34. Spit KA, Azahaf S, de Blok CJM, Nanayakkara PWB (2022) Measuring platinum levels in hair in women with silicone breast implants and systemic symptoms. *Plast Reconstr Surg Glob Open* 10: e4373
35. Spit KA, Scharff M, de Blok CJ, et al (2022) Patient-reported systemic symptoms in women with silicone breast implants: a descriptive cohort study. *BMJ Open* 12: e057159
36. Lieffering AS, Hommes JE, Ramerman L, et al (2022) Prevalence of local postoperative complications and breast implant illness in women with breast implants. *JAMA Netw Open* 5: e2236519
37. Giltay EJ, Bernelot Moens HJ, Riley AH, Tan RG (1994) Silicone breast prostheses and rheumatic symptoms: a retrospective follow up study. *Ann Rheum Dis* 53: 194–196
38. Fryzek JP, Signorello LB, Hakelius L, et al (2001) Self-reported symptoms among women after cosmetic breast implant and breast reduction surgery. *Plast Reconstr Surg* 107: 206–213
39. Kaplan J, Rohrich R (2021) Breast implant illness: a topic in review. *Gland Surg* 10: 430–443
40. Colaris MJL, Cohen Tervaert JW, Ponds R, et al (2021) Subjective cognitive functioning in silicone breast implant patients: a cohort study. *Plast Reconstr Surg Glob Open* 9: e3394
41. Yang S, Klietz ML, Harren AK, et al (2022) Understanding breast implant illness: etiology is the key. *Aesthet Surg J* 42: 370–377
42. Fryzek JP, Holmich L, McLaughlin JK, et al (2007) A nationwide study of connective tissue disease and other rheumatic conditions among Danish women with long-term cosmetic breast implantation. *Ann Epidemiol* 17: 374–379
43. Hölmich LR, Kjøller K, Fryzek JP, et al (2003) Self-reported diseases and symptoms by rupture status among unselected Danish women with cosmetic silicone breast implants. *Plast Reconstr Surg* 111: 723–732
44. Singh N, Picha GJ, Hardas B, et al (2017) Five-year safety data for more than 55,000 subjects following breast implantation: comparison of rare adverse event rates with silicone implants versus national norms and saline implants. *Plast Reconstr Surg* 140: 666–679
45. Tugwell P, Wells G, Peterson J, et al (2001) Do silicone breast implants cause rheumatologic disorders? A systematic review for a court-appointed national science panel. *Arthritis Rheum* 44: 2477–2484
46. Watad A, Rosenberg V, Tiosano S, et al (2018) Silicone breast implants and the risk of autoimmune/rheumatic disorders: a real-world analysis. *Int J Epidemiol* 47: 1846–1854
47. Coroneos CJ, Selber JC, Offodile AC 2nd, et al (2019) US FDA breast implant postapproval studies: long-term outcomes in 99,993 patients. *Ann Surg* 269: 30–36
48. Cohen Tervaert JW (2018) Autoinflammatory/autoimmunity syndrome induced by adjuvants (ASIA; Shoenfeld's syndrome): A new flame. *Autoimmun Rev* 17: 1259–1264
49. Metzinger SE, Homsy C, Chun MJ, Metzinger RC (2022) Breast implant illness: treatment using total capsulectomy and implant removal. *Eplasty* 22: e5
50. Lee M, Ponraja G, McLeod K, Chong S (2020) Breast implant illness: a biofilm hypothesis. *Plast Reconstr Surg Glob Open* 8: e2755
51. Dijkman H, Slaats I, Bult P (2021) Assessment of silicone particle migration among women undergoing removal or revision of silicone breast implants in the Netherlands. *JAMA Netw Open* 4: e2125381
52. Lykissa ED, Kala SV, Hurley JB, Lebovitz RM (1997) Release of low molecular weight silicones and platinum from silicone breast implants. *Anal Chem* 69: 4912–4916
53. McGuire P, Glicksman C, Wixtrom R, et al (2023) Microbes, histology, blood analysis, enterotoxins, and cytokines: findings from the ASERF systemic symptoms in women-biospecimen analysis study: part 3. *Aesthet Surg J* 43: 230–244
54. Ahern M, Smith M, Chua H, Youssef P (2002) Breast implants and illness: a model of psychological illness. *Ann Rheum Dis* 61: 659
55. Lipworth L, Kjøller K, Hölmich LR, et al (2009) Psychological characteristics of danish women with cosmetic breast implants. *Ann Plast Surg* 63: 11–14
56. Miseré RML, Colaris MJL, Tervaert JWC, van der Hulst R (2021) The prevalence of self-reported health complaints and health-related quality of life in women with breast implants. *Aesthet Surg J* 41: 661–668
57. Bresnick SD (2023) Understanding breast implant illness: the important role of nocebo and placebo-like effects. *Aesthet Surg J: sjado15*. doi: 10.1093/asj/sjado15
58. Colaris MJL, de Boer M, van der Hulst RR, Cohen Tervaert JW (2017) Two hundreds cases of ASIA syndrome following silicone implants: a comparative study of 30 years and a review of current literature. *Immunol Res* 65: 120–128

59. de Boer M, Colaris M, van der Hulst R, Cohen Tervaert JW (2017) Is explantation of silicone breast implants useful in patients with complaints? *Immunol Res* 65: 25–36
60. Katsnelson JY, Spaniol JR, Buinewicz JC, et al (2021) Outcomes of implant removal and capsulectomy for breast implant illness in 248 patients. *Plast Reconstr Surg Glob Open* 9: e3813
61. Maijers MC, de Blok CJ, Niessen FB, et al (2013) Women with silicone breast implants and unexplained systemic symptoms: a descriptive cohort study. *Neth J Med* 71: 534–540
62. Bird GR, Niessen FB (2022) The effect of explantation on systemic disease symptoms and quality of life in patients with breast implant illness: a prospective cohort study. *Sci Rep* 12: 21073