

# On the role of lipofilling technique in diabetic patients with primary breast cancer: The lack of studies in the literature

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## Abstract

Breast cancer (BC) and diabetes are both a very common pathology in women, involving a large number of patients with a great impact on public health. To date, we know there is a strong linkage of these two different pathologies, for example in metabolic pathways, which may influence the choices of treatment. Studies have shown that BC in women with diabetes is often diagnosed in advanced stage compared with woman without diabetes and has a higher overall mortality following BC diagnosis (30-60%). This is a review of the English literature using the PubMed database that shows a lack of studies and knowledge about the consequences of this procedure in diabetic patients. Lipofilling in breast surgery is a safe technique with low morbidity and some advantages in condition of peripheral vasculopathy similar to diabetes such as local radiotherapy; however, there may be an unpredictable graft resorption, which ranges from 25%-80%, probably as result of ischemia and lack of neoangiogenesis. Despite the increased use of lipofilling in breast surgery, some queries remain, and both the high number of diagnoses of breast cancer and the increase of cases of diabetes will lead to consider dedicated surgical pathways. To answer this query, prospective studies are needed.

## Introduction

Breast cancer (BC) represents a very common pathology in women and a significant public health concerns. In a similar way, diabetes is involving a large number of patients, due to eating habits and lifestyle.

To date we know that the proliferation and spread of breast cancer are closely linked to glucose metabolism, as a consequence, insulin signalling reveals mitogenic effects. Moreover, hyperglycemia lead oxidative stress by several pathways in BC cells, increasing levels of insulin/IGF-1 and inflammatory cytokines, particularly IL-6 and TNF- $\alpha$ . The inflammatory effect of hyperinsulinemia and the increase in cytokines production may cause a susceptibility to cancer development in diabetes [1]. The strong linkage of these two different pathologies may influence the choices of treatment. Studies have shown that BC in women with diabetes is often diagnosed at an advanced stage compared with women without diabetes and the overall mortality following BC diagnosis is 30% -60% higher in women with diabetes compared with women without diabetes after adjusting for tumor stage [1]. Currently, BCs are treated either surgically or via chemoradiotherapy, in addition to the use of Trastuzumab (Herceptin) for HER2+ tumors, but surgery remains the gold standard of therapy and conservative surgery is preferred if possible.

The use of lipofilling in breast conservative surgery is well known and much different technique of harvesting and processing of fat are available in several study in the literature. However, there is a lack of knowledge about the consequences of this procedure in diabetic patients.

## Materials and method

A review of the English literature using the PubMed database was attempted with the use of keywords "lipofilling", "autologous fat

grafting", "diabetes" and "breast cancer". Unfortunately, no articles focusing on diabetes and lipofilling were found.

## Lipofilling: surgical technique

The lipofilling procedure includes two phases: lipo-aspiration (harvesting) and processing. Before harvesting the fat, the area was injected with local anesthetic diluted in a specific solution (Klein solution), but there are several alternatives in drugs and concentrations. Fat aspiration is performed with a dry technique often using a Coleman cannula and a 10-ml syringe at the donor site (abdomen, knees, thighs, hips, flank area, in one case arms, and in another the case sub-axillary region). Some authors centrifuge the harvested fat at 3000 revolutions per minute for 3 min. After filtered blood and liquid fat, the remaining lipocytes are injected into the subcutaneous layer [2].

Patients with breast implants receive one dose of prophylactic antibiotics (cloxacillin provided they were not allergic, otherwise clindamycin). A median of three [1-4] procedures could be performed until satisfactory results are obtained. The access to large volumes of fat tissue (depending on the existing amount of subcutaneous fat tissue), which can be obtained without causing significant donor site defects, and the minimal complication rate are additional advantages of this method [3].

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## Discussion

Type 2 diabetes mellitus (T2DM) is a metabolic disorder that is associated with several cancers. It is characterized by hyperglycemia, insulin resistance and hyperinsulinemia and hyperglycemia provides the metabolic substrate for cell proliferation [1]. Breast reconstruction in diabetic patients remains a surgical challenge and the popularity of autologous fat grafting in these patients is growing [4]. Autologous fat has several advantages, including biocompatibility, versatility, natural appearance, and low donor site morbidity. The main limitation is unpredictable graft resorption, which ranges from 25%-80%, probably as a result of ischemia and lack of neoangiogenesis [5]. The extraction technique, however, may have an effect on the vitality and purity of the mature adipocytes and on the number of the transplanted adipose-derived regenerative cells [3].

The lipofilling technique was explored by several retrospective studies but to date, the risk of an increase of local recurrence remains unclear. Some Authors suspect a higher risk of local recurrences in tumors with an elevated risk profile (high Ki67, poorly differentiated breast cancer) but there were not more frequent local recurrences if the lipotransfer were performed more than 3 years after breast cancer surgery. However, the current guideline for autologous fat transplantation released by the German Society for Plastic Reconstruction, Dermatology and Gynecology recommends that autologous lipotransfer should only be performed in BRCA-positive women given a strict indication [3].

In a study performed by Van Turnhout *et al.* 114 breasts are involved in 222 fat grafting procedures. The mean clinical postoperative follow-up was 26±19 months (range 10-97). The authors did not provide information on the presence of diabetics patients in their study and concluded that Fat grafting after Breast Conservative Surgery and Radio Therapy provides significant aesthetic improvement of the breast. It has a positive effect on the postsurgical scar and irradiated tissue and helps to restore the volume deficit, which makes it suitable as a reconstructive approach in this patient group [4]. A systematic review by Decker *et al.* indicates lipofilling as an oncological safe technique with low morbidity in women with a history of breast cancer [6]. However, a search of the literature shows a lack of perspective, randomized studies concerning the reliability of this reconstructive procedure in breast cancer patients. The collection of high-quality prospective data with a representative long-term follow-up period in a national registry could help us identify methodological difficulties and limitations and determine the patients' rate of satisfaction and quality of life after the procedure [3].

Probably, there is some advantage of the lipofilling technique in diabetic patients: a condition that leads to a peripheral vasculopathy similar to diabetes is local radiotherapy and the benefit of the lipofilling after local radiotherapy is well known; obesity represents a condition frequently associated to diabetes but, at the same time, harvesting fat tissue is also important for the lipofilling technique; the surgical wound site infection and the risk of prosthesis infections in diabetic

patients are higher and the use of autologous fat may avoid other major reconstructive surgery and the use of breast implants. One of the main reasons why the fat grafting was questioned is that there may be lipofilling resorption because diffusion of nutrients from neighbouring capillaries is essential for adipocyte survival and favors their integration with the surrounding tissue [7]. To prevent, or rather minimize resorption, some authors indicate that it is crucial to perform each step of the procedure carefully, paying close attention to the technical details. An average of 200 -600 ml of Klein solution is frequently injected into the donor site before liposuction and lipoaspirate must then be purified in various ways: filtered and centrifuged [3].

## Conclusion

Despite the increased use of lipofilling in breast surgery, some queries remain. Diabetes leads to a higher risk of complications after surgery, especially after a prosthesis implant placement. However, the high number of diagnoses of breast cancer and the increase of cases of diabetes will lead to consider dedicated surgical pathways. The primary goal has to be a safe procedure, with a low risk of morbidity, and infections, and minimal tissue damage. To answer this query, prospective studies are needed.

## Conflict of interests

Author declare no conflict of interests.

## Acknowledgment

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## References

1. Roshan MH, Shing YK, Pace NP (2019) Metformin as an adjuvant in breast cancer treatment. *SAGE Open Med* 7: 2050312119865114. [[Crossref](#)]
2. Lindegren A, Schultz I, Wickman M (2019) Improved patient-reported outcomes after autologous fat transplantation and corrective surgery after breast surgery. *Journal of Plastic Surgery and Hand Surgery* 53: 111-118. [[Crossref](#)]
3. Kümmel A, Kümmel S, Blohmer JU, Faridi A, Nitz U, et al. (2019) Autologous Lipotransfer - Daily Therapeutic Practice in Breast Cancer: An Intergroup Analysis Encompassing NOGGO, WSG, GBG, AWO Gyn and DGPRÄC. *Breast Care* 14: 165-169. [[Crossref](#)]
4. van Turnhout AA, Fuchs S, Lisabeth-Broné K, Vriens-Nieuwenhuis EJC, van der Sluis WB (2017) Surgical outcome and cosmetic results of autologous fat grafting after breast conserving surgery and radiotherapy for breast cancer: A retrospective cohort study of 222 fat grafting sessions in 109 patients. *Aesth Plast Surg* 41, 1334-1341. [[Crossref](#)]
5. Trojahn Kølle SF, Oliveri RS, Glovinski PV, Elberg JJ, Fischer-Nielsen A, et al. (2012) Importance of mesenchymal stem cells in autologous fat grafting: A systematic review of existing studies. *Journal of Plastic Surgery and Hand Surgery* 46: 5968. [[Crossref](#)]
6. De Decker M, De Schrijver L, Thiessen F, Tondou T, Van Goethem M, et al. (2016) Breast cancer and fat grafting: efficacy, safety and complications—a systematic review. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 207: 100-108. [[Crossref](#)]
7. Gentile P, Sarlo F, De Angelis B, De Lorenzo A, Cervelli V (2016) Obesity phenotypes and resorption percentage after breast autologous fat grafting: Rule of low-grade inflammation. *Adv Biomed Res* 5: 134. [[Crossref](#)]