Immediate Breast Reconstruction: Comparative Outcome Study of One-Stage Direct-to-Implant and Two-Stage/Tissue Expander Techniques

Sagit Meshulam-Derazon MD[1], Tamir Shay MD[1], Sivan Lewis[2*] and Neta Adler MD[2]

[1]Department of Plastic and Reconstructive Surgery, Rabin Medical Center, Petach Tikva, affiliated with Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel
[2]Department of Plastic and Reconstructive Surgery, Hebrew University–Hadassah Medical School, Jerusalem, affiliated with Hebrew University–Hadassah Medical School, Jerusalem, Israel

ABSTRACT: **Background:** One-stage direct-to-implant post-mastectomy breast reconstruction has been gaining popularity over the traditional two-stage/tissue-expander approach.

Objectives: To evaluate the outcome of the two post-mastectomy breast reconstruction procedures in terms of patient satisfaction.

Methods: Clinical data were collected by file review for patients who underwent mastectomy with immediate breast reconstruction at two tertiary medical centers in 2010–2013. Patients were asked to complete the BREAST-Q instrument, sent to them by post with a self-addressed, stamped, return envelope. Scores were compared by type of reconstruction performed.

Results: Of the 92 patients who received the questionnaire, 59 responded: 39 had one-stage breast reconstruction and 20 underwent two-stage reconstruction. The two-stage reconstruction group was significantly older, had more background diseases, and were followed for a longer period. The one-stage reconstruction group had a higher proportion of BRCA mutation carriers. There was no significant between-group difference in postoperative complications. Mean BREAST-Q scores were similar in the two groups for all dimensions except satisfaction with information, which was higher in the patients after one-stage reconstruction. Women with more background diseases had better sexual well-being, and married women had better psychological well-being. Breast satisfaction was lower among patients treated with radiation and higher among patients with bilateral reconstruction; the latter subgroup also had higher physical well-being. Complications did not affect satisfaction.

Conclusions: Patients were equally satisfied with the outcome of one- and two-stage breast reconstruction. The choice of technique should be made on a case-by-case basis. Cost analyses are needed to construct a decision-making algorithm.

IMAJ 2018; 20: 340–344

KEY WORDS: breast reconstruction, direct-to-implant, post-mastectomy, tissue expander

*In partial fulfillment for the MD degree requirements at Hebrew University–Hadassah Medical School, Jerusalem, Israel

Most breast reconstructions in women after mastectomy are implant-based [1]. The reconstruction can be a one-stage direct-to-implant post-mastectomy breast reconstruction or a two-step procedure, wherein a tissue expander is placed at the time of mastectomy to create a skin envelope, and when the envelope is sufficiently enlarged, the expander is replaced with a permanent implant. In recent years, skin-sparing mastectomy has been gaining popularity following findings that it is an equally good treatment in terms of prognosis to total mastectomy [2]. As a result, placement of a permanent implant immediately after mastectomy has become an attractive option, with or without simultaneous surgery of the other breast. This approach spares patients the multiple clinic visits needed for expander inflation and removal; however, the technique is more challenging to the oncologic surgeon, with a steep learning curve, and there may be a risk of more complications, such as skin necrosis. Furthermore, in cases of unilateral mastectomy without preservation of the nipple-areola complex, the skin envelope is limited in comparison to the contralateral side, which may limit implant size and projection. It remains unclear if the same precision can be achieved by the reconstructive surgeon in one-stage as in two-stage reconstruction.

The introduction of artificial dermal matrix (ADM) to breast reconstruction contributed to developing the direct-to-implant reconstruction by allowing the creation of a full pocket for the implant with less tension on the mastectomy skin flaps, thereby improving the results. In addition, ADMs increase the surgeon's control of the inframammary fold and inferior pole and may reduce capsular contracture [3-6]. However, these potential advantages must be weighed not only against the material cost of the matrix but also against the possible added risk of the matrix [7-11].

At our center, ADMs have been used only in one-stage, direct-to-implant, reconstructions to prevent the lower pole of the implant from lying directly under the mastectomy skin. In two-stage, delayed-immediate, reconstructions, we believe the extra cost of the ADM is unjustified. The choice of the one- or two-stage reconstruction procedure is made on a case-by-case basis according to the propensity and experience of the

surgeon, taking such risk factors as large breasts and patient history of smoking into account, as well as the preference of the patient after individual counseling. There are numerous articles in the medical literature quantifying the success of these techniques in terms of complications and aesthetics. However, specifically in breast reconstruction, some aspects of outcome can be fully appreciated only by the patient herself. Therefore, in recent years, we have increasingly turned our attention to careful and precise evaluation of patient-reported outcomes using standardized questionnaires, such as the BREAST-Q© [12,13].

The aim of the present comparative study was to evaluate patient satisfaction with the outcome of the one- and two-stage implant-based techniques for immediate breast reconstruction.

PATIENTS AND METHODS

ETHICS APPROVALS

Ethics approval was obtained from the Hadassah Medical Center and Rabin Medical Center research ethics boards.

PATIENTS AND SETTING

The study cohort consisted of patients who underwent mastectomy with immediate breast reconstruction at Hadassah Medical Center or Rabin Medical Center between 2010 and 2013. All reconstructions were performed by the one of two senior plastic surgeons (N.A. and S.M.) or under their supervision using either a permanent implant (Mentor CPG™ Gel Breast Implants with Cohesive III™, Mentor, Santa Barbara, CA, USA) with biologic tissue support (AlloDerm®, LifeCell, Branchburg, NJ, USA) or a tissue expander (Mentor Smooth Round Tissue Expander or Siltex™ Contour Profile™ Tissue Expanders, Mentor) followed by a permanent implant. None of the patients in the study had prior radiation therapy.

SURGICAL TECHNIQUE

For the two-stage reconstruction technique, the tissue expander was inserted into a total submuscular pocket including the pectoralis major muscle, serratus anterior fascia and muscle, and rectus abdominis fascia. The skin of the breast was removed to allow primary closure over the expander. At the end of surgery, the expander was inflated to a small volume. Thereafter, expansions were performed in the clinic under sterile conditions, approximately once weekly, as determined by the surgeon. The appointments depended on the desired volume and the volume at each expansion. After 3–4 months, the expander was exchanged for a permanent implant.

One-stage implant procedures were performed immediately after skin-sparing mastectomy, with or without preservation of the nipple areola complex. AlloDerm® regenerative tissue matrix was sutured at the level of the inframammary fold, superior to the pectoralis major muscle and lateral to the serratus anterior fascia to create a pocket for the implant. A Jackson–Pratt drain was inserted between the matrix and the skin flap and, in selected cases, to the axilla. In cases of unilateral mastectomy, a symmetry procedure (reduction, mastopexy, augmentation, or augmentation-mastopexy) was performed in the contralateral breast at the same time or in a separate session, in accordance with the decision made during the preoperative discussion with the patient. It is important to note that both senior surgeons used a similar technique when performing the surgeries.

DATA COLLECTION

Clinical data for the study were derived by medical chart review, as follows: patient age, marital status, number of children, co-morbidities, smoking habits, sentinel lymph node biopsy and axillary lymph node dissection status, radiation therapy, complications, BRCA mutation, additional procedures of the reconstructed breast, symmetry procedures, and nipple reconstruction. To measure patient satisfaction, we used the BREAST-Q, a validated, condition-specific, self-report instrument designed for the evaluation of patients after breast surgery [12,13]. The questionnaire was sent to patients by post together with a cover letter explaining the purpose of the study and a self-addressed, stamped, return envelope. Nonresponders were sent an additional copy after about 1 month. Those who still did not comply, were contacted by phone 1 month later. The scores for each of the 10 dimensions of the instrument were calculated using Q-Score, an instrument developed according to the Rasch model [14,15], and transformed to a 0–100 point scale, with higher scores indicating greater satisfaction and function.

STATISTICAL ANALYSIS

For a power of 80% using a two-sided $P = 0.05$ level test, with an estimated large-size effect in BREAST-Q scores between the groups, we calculated that at least 19 subjects were needed in each group to achieve a statistically significant result. Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 20 (SPSS, IBM Corp, Armonk, NY, USA). Quantitative variables were compared with *t*-test or Mann–Whitney test, and qualitative variables with Pearson's chi-square or Fisher's exact test. Correlations between quantitative variables were assessed using Pearson's correlation and Spearman's rho.

RESULTS

RESPONSE RATE

A total of 92 patients met the inclusion criteria, of whom 59 (65.2%) completed and returned the BREAST-Q questionnaire. The respondents included 39 patients after one-stage direct-to-implant reconstruction and 20 patients after two-stage delayed-implant reconstruction.

CLINICAL PARAMETERS

Comparison of the clinical data of the two groups [Table 1] showed that the two-stage reconstruction group was significantly older and had significantly more co-morbidities. The one-stage reconstruction group had a significantly higher proportion of BRCA mutation carriers. The rate of complications was higher in the two-stage reconstruction group, but the difference was not statistically significant. Although high blood pressure was found to be directly correlated to complication rates ($P = 0.02$), in a multivariate analysis that included high blood pressure, there was still no difference in complication rate between the groups. Mean follow-up time was significantly longer in the two-stage reconstruction group.

Approximately 52.7% of the women had bilateral reconstruction (not statistically significant different in the groups). Most of the women, irrespective of reconstruction method, did not have any additional procedure on the reconstructed breast (nipple reconstruction 24.1%, implant removal 23.6%, other surgery to the reconstructed breast 19.6%) or a symmetry procedure to the other breast (only 23.2% underwent a symmetry procedure).

Table 1. Clinical data of 59 patients after one-stage direct-to-implant or two-stage delayed-immediate breast reconstruction. Chi square statistical test was used, unless stated otherwise

Variable	One-stage procedure (n=39)	Two-stage procedure (n=20)	*P* value§
Age at procedure, mean ± SD, years	42.82 ± 10.26	53.1 ± 10.24	**0.01** (*t*-test)
Follow-up from mastectomy, mean ± SD, months	20.52 ± 10.71	32.59 ± 12.69	‹ 0.001 (*t*-test)
Married, n (%)	25 (64.1%)	12 (63.2%)	1.000
Number of children, mean ± SD	2.28 ± 0.77	2.38 ± 1.02	0.724
Smoker, n (%)	3 (7.7%)	2 (10%)	1.000
Co-morbidities, n (%)			
Any co-morbidity	6 (15.4%)	9 (45%)	**0.013**
Hypertension	3 (7.7%)	6 (30%)	**0.05**
Diabetes	1 (2.6%)	4 (20%)	**0.041**
Axillary lymph node dissection, n (%)	6 (15.4%)	6 (30%)	0.305
BRCA mutation, n (%)	15 (62.5%)	3 (27.3%)	0.053
Surgical procedure, n (%)			
Bilateral reconstruction	21 (53.8%)	10 (50%)	0.791
Symmetry procedure to contralateral side*	7(17.9%)	6 (35.3%)	0.153
Nipple reconstruction	13 (33.3%)	3 (15.8%)	0.217
Additional surgery to reconstructed breast**	7 (17.9%)	4 (23.5%)	0.719
Postoperative radiation, n (%)	4 (10.8%)	5 (33.3%)	0.100
Complications, n (%)			
Any complication	10 (25.6%)	8 (42.1%)	0.092
Minor	0	2 (10.5%)	
Major	10 (25.6%)	6 (31.6%)	
Implant replacement, n (%)***	7 (17.9%)	6 (37.5%)	0.165

*Reduction, mastopexy, augmentation, and augmentation-mastopexy

**Scar revision, fat injection

***With or without capsulotomy or capsulectomy

§Significant values are in bold

Silicone implant volume ranged from 170–675 cc with an average of 375 cc ± 105 cc. The average volume was smaller in the immediate implant group compared to the tissue expander group; however, it did not reach statistical significance: 370cc ± 100 cc compared with 400 cc ± 115 cc, respectively ($P = 0.366$).

BREAST-Q SCORES

There was no statistically significant between-group difference in scores on the BREAST-Q dimensions [Table 2] except for satisfaction with information received, which was higher in the one-stage reconstruction group. None of the demographic factors that were found to be significantly different in the groups (age, background disease, BRCA mutation, follow-up time) were significantly correlated with satisfaction with outcome. There was a significant correlation between better sexual well-being and more background diseases and between better psychological well-being and married status. Scores for breast satisfaction were higher in women who did not received adjuvant radiation than in women who did (score 59 vs. 49; Mann–Whitney test, $P = 0.043$). In addition, patients who underwent bilateral reconstruction had higher breast satisfaction and physical well-being than patients who underwent

Table 2. Scores for BREAST-Q domains in patients after one-stage direct-to-implant or two-stage delayed-immediate breast reconstruction

Scale	Reconstruction type	No. responding	Mean score (0–100)	Standard deviation	*P* value§
Satisfaction with breasts	One-stage	39	57.26	16.524	0.664
	Two-stage	20	59.1	14.158	
Satisfaction with outcome	One-stage	39	69.69	21.655	0.713
	Two-stage	20	67.45	22.888	
Psychosocial well-being	One-stage	39	72.21	17.284	0.421
	Two-stage	2	76.20	19.086	
Sexual well-being	One-stage	36	54.83	22.824	0.415
	Two-stage	15	60.80	25.420	
Physical well-being: chest	One-stage	39	68.44	20.022	0.940
	Two-stage	20	68.05	14.731	
Satisfaction with nipple	One-stage	14	65.00	29.52	0.105
	Two-stage	4	36.75	26.55	
Satisfaction with information	One-stage	39	75.26	20.023	**0.016**
	Two-stage	20	61.90	18.761	
Satisfaction with surgeon	One-stage	39	92.92	13.863	0.302
	Two-stage	20	88.80	15.412	
Satisfaction with medical staff	One-stage	38	87.97	23.483	0.144
	Two-stage	20	77.60	28.541	
Satisfaction with office staff	One-stage	38	83.79	27.498	0.517
	Two-stage	20	78.85	27.285	

§Significant values are in bold

unilateral reconstruction ($P = 0.06$). Complications did not affect patient satisfaction.

DISCUSSION

The application of the one-stage direct-to-implant approach to breast reconstruction seems to be increasing [16-18], probably because of the increase in nipple-areola complex-sparing and prophylactic mastectomies, in addition to the availability of ADM to support the lower pole of the implant. However, the different advantages and disadvantages of the one-stage and traditional two-stage delayed-immediate implant-based techniques, variations in findings and personal experience of surgeons, and the sometimes inconsistent results make decisions regarding the choice of technique difficult. Although studies have found the one-stage approach to be viable in terms of overall complications [19,20] some authors suggested that it be reserved for select, low-risk patients (e.g., nonsmokers, normal body mass index). This finding was supported by the multi-institutional study conducted by Davila and colleagues [21], which found that single-stage reconstruction was associated with a slightly higher short-term complication rate than two-stage reconstruction (6.8% vs. 5.4%). In addition, some authors advocated using ADM only in one-stage reconstructions, whereas others also used it in two-stage procedures.

Numerous studies have investigated the possible adverse effect of AlloDerm on the complication rate, but the findings remain unclear [4,5,8]. Cost-effectiveness was reported to be about the same, but it depends on the healthcare system [22,23]. Besides sparing patients the multiple clinic visits needed for expansion in the two-stage approach, the direct-to-implant method, according to its advocates, seems to achieve a better aesthetic result in selected patients. Currently, however, there are no published data to support this perception. In our study, even though the tissue expander patients were older and affected by more co-morbidities than the direct to implant patients, there was no significant difference in the complication rate in the groups. Both groups had a small, but not insignificant, percentage of implant removal or replacement (23.6%). A possible explanation for this finding is that it is our routine in both centers to replace the implant in any case of revision surgery with opening of the implant's pocket even if the implant is intact; therefore, this group includes revisions for capsular contracture or dissatisfaction with the aesthetic results as well as implant tear and infection.

The aim of the present study was to determine whether the one-stage, direct-to-implant, approach had a clear advantage in outcome over the traditional two-stage approach by evaluating the satisfaction of the women themselves using the BREAST-Q questionnaire. Analysis of the responses yielded no significant difference in overall patient satisfaction in the two techniques. The women with more background diseases had better sexual well-being, which could be explained by the older age of this subgroup and consequently, their better acceptance of their body image. The better psychological well-being found in the married women was not surprising, as they may have had a better support system than unmarried women. The higher breast satisfaction in the women who were not treated with radiation was also expected, given the known adverse effect of irradiation on breast reconstruction. We assumed that the higher breast satisfaction of the women after bilateral reconstruction was attributable to the greater breast symmetry achieved relative to unilateral reconstruction. Finally, the one-stage reconstruction group was more satisfied with the information received, perhaps because the more complex process of expansion is more difficult to explain and to comprehend.

The recently published study by Susarla and co-authors [24] compared patient satisfaction with one- and two-stage breast reconstruction. They reported no significant between-group difference in the complication rate, similar to our study. However, sexual well-being in their cohort was higher in the women who had a single-stage procedure. This difference in the studies might be explained by the difference in follow-up time. The earlier study was conducted over an 8 year period, but the specific duration of follow-up in the two groups was not mentioned. We assume that there was a trend toward the performance of more direct-to-implant surgeries in recent years, such that the follow-up time in these patients was shorter. Thus, satisfaction and sexual well-being may have changed over time, reaching the same levels in both groups. Another difference in the studies is that we used ADM only in one-stage procedures, with a very standardized technique, whereas Susarla and colleagues [24] used ADM in some of the two-stage procedures, and operations were performed by six different surgeons. Both of these factors could have affected the complication rate and the aesthetic result.

CONCLUSION

Patients appear to be equally satisfied with the outcome of one- and two-stage immediate breast reconstruction after mastectomy. Therefore, we recommend that the choice of technique be made on a case-by-case basis. Further cost analyses are needed to build an algorithm for decision-making in implant-based reconstruction.

Acknowledgements

This study was funded by the 2013 Israel Cancer Association Award.

Correspondence

Dr. N. Adler

Dept. Plastic Surgery, Hadassah–Hebrew University Medical Center, Mount Scopus, Jerusalem 91120, Israel

Phone: (972-2) 677-6473

Fax: (972-2) 641-8868

email: netaad@gmail.com

References

1. American Society of Plastic Surgeons. Report of the 2013 plastic surgery statistics. https://www.plasticsurgery.org/documents/News/Statistics/2013/plastic-surgery-statistics-full-report-2013.pdf [Accessed May 2018].
2. Cunnick GH, Mokbel K. Skin-sparing mastectomy. *Am J Surg* 2004; 188 (1): 78-84.
3. Spear SL, Sher SR, Al-Attar A. Focus on technique: supporting the soft-tissue envelope in breast reconstruction. *Plast Reconstr Surg* 2012; 130 (5 Suppl 2): 89S-94S.
4. Vardanian a J, Clayton JL, Roostaeian J, et al. Comparison of implant-based immediate breast reconstruction with and without acellular dermal matrix. *Plast Reconstr Surg* 2011; 128 (5): 403e-410e.
5. Zienowicz RJ, Karacaoglu E. Implant-based breast reconstruction with allograft. *Plast Reconstr Surg* 2007; 120 (2): 373-81.
6. Basu CB, Jeffers L. The role of acellular dermal matrices in capsular contracture: a review of the evidence. *Plast Reconstr Surg* 2012; 130 (5 Suppl 2): 118S-24S.
7. Kim JYS, Davila AA, Persing S, et al. A meta-analysis of human acellular dermis and submuscular tissue expander breast reconstruction. *Plast Reconstr Surg* 2012; 129 (1): 28-41.
8. Ho G, Nguyen TJ, Shahabi A, et al. A systematic review and meta-analysis of complications associated with acellular dermal matrix-assisted breast reconstruction. *Ann Plast Surg* 2012; 68 (4): 346-56.
9. McCarthy CM, Lee CN, Halvorson EG, et al. The use of acellular dermal matrices in two-stage expander/implant reconstruction: a multicenter, blinded, randomized controlled trial. *Plast Reconstr Surg* 2012; 130 (5 Suppl 2): 57S-66S.
10. Lanier ST, Wang ED, Chen JJ, et al. The effect of acellular dermal matrix use on complication rates in tissue expander/implant breast reconstruction. *Ann Plast Surg* 2010; 64 (5): 674-8.
11. Sbitany H, Serletti JM. Acellular dermis-assisted prosthetic breast reconstruction: a systematic and critical review of efficacy and associated morbidity. *Plast Reconstr Surg* 2011; 128 (6): 1162-9.
12. Cano SJ, Klassen A, Pusic AL. The science behind quality-of-life measurement: a primer for plastic surgeons. *Plast Reconstr Surg* 2009; 123 (3): 98e-106e.
13. Pusic AL, Klassen AF, Scott AM, et al. Development of a new patient-reported outcome measure for breast surgery: the BREAST-Q. *Plast Reconstr Surg* 2009; 124 (2): 345-53.
14. The BreastQ. Available at :https://eprovide.mapi-trust.org/instruments/breast-q [Accessed May 2018].
15. Rasch analysis. Available at: http://qportfolio.org/breastq/scoring/ [Accessed May 2018].
16. Gui GPH, Kadayaprath G, Tan S-M, et al. Long-term quality-of-life assessment following one-stage immediate breast reconstruction using biodimensional expander implants: the patient's perspective. *Plast Reconstr Surg* 2008; 121 (1): 17-24.
17. Roostaeian J, Sanchez I, Vardanian A, et al. Comparison of immediate implant placement versus the staged tissue expander technique in breast reconstruction. *Plast Reconstr Surg* 2012; 129 (6): 909e-18e.
18. Wink JD, Fischer JP, Nelson JA, et al. Direct-to-implant breast reconstruction: an analysis of 1612 cases from the ACS-NSQIP surgical outcomes database. *J Plast Surg Hand Surg* 2014; 48 (6): 375-81.
19. Liu AS, Kao H-K, Reish RG, et al. Postoperative complications in prosthesis-based breast reconstruction using acellular dermal matrix. *Plast Reconstr Surg* 2011; 127: 1755-62.
20. Antony AK, McCarthy CM, Cordeiro PG, et al. Acellular human dermis implantation in 153 immediate two-stage tissue expander breast reconstructions: determining the incidence and significant predictors of complications. *Plast Reconstr Surg* 2010; 125 (6): 1606-14.
21. Davila A a, Mioton LM, Chow G, et al. Immediate two-stage tissue expander breast reconstruction compared with one-stage permanent implant breast reconstruction: a multi-institutional comparison of short-term complications. *J Plast Surg Hand Surg* 2013; 47 (5): 344-9.
22. Colwell AS, Damjanovic B, Zahedi B, et al. Retrospective review of 331 consecutive immediate single-stage implant reconstructions with Acellular Dermal Matrix. *Plast Reconstr Surg* 2011; 128 (6): 1170-8.
23. Jansen LA, Macadam SA. The use of AlloDerm in postmastectomy alloplastic breast reconstruction: part II. A cost analysis. *Plast Reconstr Surg* 2011; 127 (6): 2245-54.
24. Susarla SM, Ganske I, Helliwell L, et al. Comparison of clinical outcomes and patient satisfaction in immediate single-stage versus two-stage implant-based breast reconstruction. *Plast Reconstr Surg* 2015; 135 (1): 1e-8e.

Capsule

Carboplatin in *BRCA1/2*-mutated and triple-negative breast cancer BRCAness subgroups: the TNT Trial

Germline mutations in *BRCA1/2* predispose individuals to breast cancer (termed germline-mutated *BRCA1/2* breast cancer, gBRCA-BC) by impairing homologous recombination (HR) and causing genomic instability. HR also repairs DNA lesions caused by platinum agents and PARP inhibitors. Triple-negative breast cancers (TNBCs) harbor subpopulations with *BRCA1/2* mutations, hypothesized to be especially platinum-sensitive. Cancers in putative 'BRCAness' subgroups – tumors with *BRCA1* methylation, low levels of *BRCA1* mRNA (*BRCA1* mRNA-low), or mutational signatures for HR deficiency and those with basal phenotypes – may also be sensitive to platinum. **Tutt** and co-workers assessed the efficacy of carboplatin and another mechanistically distinct therapy, docetaxel, in a phase 3 trial in subjects with unselected advanced TNBC. A prespecified protocol enabled biomarker-treatment interaction analyses in gBRCA-BC and BRCAness subgroups. The primary endpoint was objective response rate (ORR). In the unselected population (376 subjects; 188 carboplatin, 188 docetaxel), carboplatin was not more active than docetaxel (ORR, 31.4% versus 34.0%, respectively; $P = 0.66$). In contrast, in subjects with gBRCA-BC, carboplatin had double the ORR of docetaxel (68% vs. 33%, respectively; biomarker, treatment interaction $P = 0.01$). Such benefit was not observed for subjects with *BRCA1* methylation, *BRCA1* mRNA-low tumors, or a high score in a Myriad HRD assay. Significant interaction between treatment and the basal-like subtype was driven by high docetaxel response in the nonbasal subgroup. The authors concluded that patients with advanced TNBC benefit from characterization of *BRCA1/2* mutations, but not *BRCA1* methylation or Myriad HRD analyses, to inform choices on platinum-based chemotherapy. In addition, gene expression analysis of basal-like cancers may also influence treatment selection.

Nature Med 2018; 24: 628

Eitan Israeli