CRD summary
The review concluded that autologous fat grafting for breast reconstruction had few complications without any evidence of an increase in the risk of breast cancer but these findings need to be confirmed by additional trials. The review was generally well conducted but the reliability of the conclusions is unclear due to a very limited evidence base of poor quality.

Authors' objectives
To assess the clinical applicability and safety of autologous fat grafting for reconstruction of the breast.

Searching
MEDLINE, EMBASE, SciELO and The Cochrane Library were searched without language or publication restrictions from July 1986 to June 2011; search terms were reported. Reference lists of potentially relevant studies were searched.

Study selection
Studies of any design that assessed autologous fat grafting (recently removed by liposuction) to the female breast were eligible for the review. Studies were required to measure clinical complications, radiographic changes or incidence of breast cancer. Studies that used recently aspirated mature adipocytes lower than 50% and studies characterising stem cell implants were excluded. Reviews and technical descriptions were excluded.

In the included studies, autologous fat grafting was used either for cosmetic augmentation or breast reconstruction. Most studies used structured fat grafting, where reported. Studies were undertaken between 1987 and 2011; most were performed from 2008 onwards.

Two reviewers independently searched the databases. Four reviewers independently selected studies from retrieved abstracts.

Assessment of study quality
Studies were assessed for quality using Oxford Centre for Evidence-based Medicine and Grading of Recommendation Assessment, Development and Evaluation (GRADE) criteria. Four categories were used in the GRADE assessment: high, moderate, low and very low. Observational studies and clinical trials that lacked a detailed description of the randomisation procedure were considered at high risk of bias.

Two reviewers independently assessed the studies for quality.

Data extraction
Data were extracted on the outcomes according to how they were presented in the individual studies. Data from case reports and case series with up to 20 patients were used only in the analysis of types of complication and radiographic changes and were not included in the assessment of rates. Twenty-one studies that were considered of better methodological quality, that described fixed follow-up, a standard technique and included more than 20 patients were analysed to assess incidence of clinical complications. Seventeen studies described as better methodological quality without further details were used to calculate the incidence of radiographic changes. Three studies were used to assess risk of breast cancer.

Two reviewers independently extracted data. Discrepancies discussed and reviewed by four reviewers until agreement was reached.

Methods of synthesis
Study results were synthesised narratively and presented in tables.

Results of the review
Sixty studies (at least 4,601 women, range one to 880) were included in the review. Fifty-eight studies were observational: 37 case reports or case series, seven retrospective cohort studies, 12 prospective cohort studies, one diagnostic validation cohort study and one case control study. Two studies were clinical trials that did not describe the method of randomisation. Four studies were classified as moderate quality, 33 were low quality and 23 were very low quality. Mean follow-up ranged from three to 37 months, where reported.

**Clinical outcomes:** Thirty studies (930 patients) used fat grafting for aesthetic augmentation and 41 studies (3,646 patients) used fat grafting for breast reconstruction. Clinical complications were identified in 155 out of 4,601 patients (60 studies). Nodularity and/or induration was the most common complication (60%) followed by deep infection (12.3%). In the studies of better quality (21 studies) the incidence of clinical complications was 3.9% (117 out of 3,015 patients).

**Radiographic changes:** Among all 60 studies, 299 abnormal radiographic changes were identified; 74.6% were cysts and 13.4% were microcalcification. In the studies of better quality (17 studies), the overall rate of abnormal radiological findings during follow-up was 13.0% (332 out of 2,560 patients).

**Breast cancer risk:** Fourteen recurrent cancers were identified (2.3%) in three studies that evaluated 616 patients with mean follow-up of 45.2 months.

**Authors' conclusions**
There was broad clinical applicability of autologous fat grafting for breast reconstruction with few complications and without any evidence that the procedure increased the risk of breast cancer. Additional controlled trials were required to confirm these results.

**CRD commentary**
The review addressed a clear research question supported by broad inclusion criteria in which any primary study design was eligible. Relevant sources were searched to identify studies regardless of language. No specific attempts were made to identify unpublished studies so it was possible some studies may have been missed. Appropriate methods were used to select studies, extract data and assess studies for quality, which minimised chances of reviewer error and bias. Valid tools were used to assess studies for quality and all studies were considered to have a high risk of bias. Most of the included studies were observational with very small sample sizes and almost all were downgraded because of concerns with risk of bias. Synthesis of the studies was appropriate. The authors undertook subgroup analysis to assess incidence figures only in studies of better methodological quality.

The review was generally well conducted but the reliability of the conclusions is unclear due to a very limited evidence base of poor quality.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further studies were required to assess whether fat grafting was safe without increasing the risk of breast cancer.

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