Longitudinal evaluation of vitamin D plasma levels during anthracycline- and docetaxel-based adjuvant chemotherapy in early-stage breast cancer patients

More than 30%–50% of women at breast cancer diagnosis are vitamin D deficient. The importance of preserving bone health in survivors of breast cancer has gained predominant priority because these women have higher than average rates of bone loss and fracture as they age and they have a 15% higher fracture risk than women without a history of breast cancer.

Recently, prospective cohort studies reported an inverse association between serum 25-hydroxyvitamin D (25-OHD) levels and breast cancer prognosis [1].

We evaluate the fluctuations of vitamin D circulating levels during sequential anthracycline- and docetaxel-based adjuvant chemotherapy in early-stage breast cancer patients.

The levels of 25-OHD at diagnosis (before chemotherapy) and during adjuvant chemotherapy (after four anthracycline-based cycles and, at the end of adjuvant chemotherapy, after four docetaxel-based administrations) in seven pre- and 13 postmenopausal women (median age was 53 years) with early-stage breast cancer following radical surgery were assessed.

Our results highlighted that all patients were deficient in vitamin D plasma levels at baseline. The median serum
25-OHD level at baseline was 9.03 ng/ml [95% confidence interval (CI) 8.20–11.82 ng/ml] and at 63 days it was 6.75 ng/ml [95% CI 5.67–10.96 ng/ml; median percent reduction (MPR) = 25.3%]; its reduction was not statistically significant when compared with basal levels (P = 0.114). The median serum 25-OHD at 147 days was 6.14 ng/ml (95% CI 5.48–9.29 ng/ml; MPR = 32.0%) and it was statistically significant (P = 0.047) when compared with the basal value.

We may hypothesize that the significant reduction of vitamin D plasma levels could be related to an increase of body mass index in terms of adipose tissue observed in our patients, and generally in early-stage breast cancer patients undergoing adjuvant chemotherapy. An increased storage of 25-OHD in adipose tissue results in lower circulating levels of it. This is a plausible explanation for increased rates of vitamin D deficiency in obese individuals [2]. Alternatively, increases in total body fat may also be the consequence of low vitamin D levels, as it has been hypothesized that low vitamin D status, by causing parathyroid hormone excess and calcium influx into adipocytes, may promote weight gain.

An additional plausible hypothesis may be a direct effect of anthracycline- and docetaxel-based regimens on 25-OHD circulating levels. A notable change in 25-OHD concentration after the same chemotherapy regimens was not observed in two studies [3, 4] but in both studies patients were supplemented with vitamin D. In our population, vitamin D supplement was forbidden. This consideration is particularly important because all tested patients were deficient in vitamin D at baseline.

In addition to its crucial effects on bone and mineral metabolism, vitamin D has pleiotropic anticancer effects.

In a recent large cohort study of early-stage breast cancer patients, low levels of vitamin D were significantly associated with an increased risk of distant recurrence and death in univariate analyses [5].

We strongly suggest oncologists to assess circulating levels of vitamin D 25-OHD in all early breast cancer patients before starting adjuvant chemotherapy and to supplement them with adequate doses of vitamin D before and during chemotherapy.

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