LETTER TO THE EDITOR

Radiation therapy utilisation in patients with bone metastases secondary to prostate cancer: A multicenter study

Bone metastases (BMs) occur in 65%–90% of patients affected by advanced breast cancer (BC) or prostate cancer (PC; Parker et al., 2013). Recently, Lebret et al. (2016) have assessed the management of BMs in patients with solid tumours and haematological malignancies across five European countries, for evaluating the use of bisphosphonates. Prompted by their study, we wish to assess whether an increase both in incidence and in prevalence of PC corresponds to a numerical increase of radiation treatments for BMs.

We have retrospectively collected data of all patients who underwent radiotherapy for BMs from all tumours (ATBMs) in three Sicilian provinces (Messina, Catania and Ragusa), in a 10-year period. The study period was from January 2004 to December 2013. We retrieved patients’ data from the registries of every radiation department operating in the three provinces. Data on PC incidence and prevalence were collected from the database “tumori.net”, which reports data up to 2015. Data on the number of inhabitants were retrieved from database of the Italian National Institute of Statistics (Istituto Nazionale di Statistica; Sicilia).

In the 10-year period, we identified 5,775 patients affected by BMs who underwent radiation treatments. 1,307/5,775 (or 22.63%) of these patients had prostate cancer BMs (PCBMs), with a mean of 130.7 patients per year, ranging from 102 in 2005 to 155 in 2009 (vs. mean of 200.9 patients per year for breast cancer BMs, \( p < .001 \) by ANOVA test). Difference in the percentage of treatments per year for ATBMs with respect to treatments for PCBMs reached statistical significance (\( \chi^2 = 23.545, p = .005 \)).

The total annual number of patients who underwent radiation therapy for ATBMs increased linearly from 534 in 2004 to 686 in 2013 (\( r = .723, p = .018 \)), whereas no statistically significant increase was found for the treatments for PCBMs in the same period of time (\( r = .527, p = .118 \)) (Figure 1). In the three provinces, there were 981,571 men living in 2004 compared to 983,756 in 2013 (\( r = .323, p = .363 \)).

In Sicily, the number of new diagnoses of PC increased linearly from 2,349 in 2004 to 2,899 in 2013 (\( r = .998, p < .001 \)). Also prevalence increased linearly, with 9,546 cases of PC in 2004 and 18,704 cases of PC in 2013 (\( r = .999, p < .001 \)) (Figure 2). In term of percentages, there was a 21% increase of the incidence that was 97.86/100,000 in 2004 and 119.05/100,000 in 2013; regarding the prevalence, it was 397.64/100,000 in 2004 and 767.97/100,000 in 2013, resulting in a 93.13% increase from 2004 to 2013.

We think that the absence of increment in radiation treatments for PCBMs could be caused by novel therapeutic approaches, i.e., bisphosphonates and denosumab, which reduce skeletal-related events (Lipton et al., 2015; Maisano, Pergolizzi & Cascinu, 2001). Theoretically, the increment both of incidence and prevalence in the examined Sicilian population of PC would have to be resulted in an increase in patients suffering for BMs and therefore in an increment of radiation treatments, as reported from Pergolizzi, Pontoriero, Delia & Santacaterina (2004) on the procedures for BMs in the same macro-area and including all departments operating in 2000, but it could be possible also that in our provinces some patients with painful BMs are not referred to radiation departments; this is only an hypothesis and it is conjectural.

**FIGURE 1** Yearly number of patients who underwent radiation therapy for bone metastases from all tumours (ATBMs) and from prostate cancer (PCBMs) at eight radiation departments in Sicily over the study period (2004–2013)

**FIGURE 2** Incidence and prevalence of prostate cancer (PC) in Sicily over the study period (2004–2013)
In another epidemiological study on the true workload of radiation departments for BMs (Runco et al., 2014), in 2014, we investigated the correlation between BC and BMs treatments observed in a period of 8 years: an increase both in incidence and prevalence of BC in Sicily was found even if, as in the present study, no increment in skeletal-related events requiring irradiation in such patients in eastern Sicily radiation departments was observed. A study from Spain (Expósito, Jaén, Alonso & Tovar, 2012) reported on the use of palliative radiotherapy in a Spanish macro-area, Andalusia (7.8 million inhabitants), including 12 radiation departments. During 2007, the authors observed a total of 744 patients irradiated for BMs, being 24.6% and 14.3% of BM cases BC and PC patients, respectively. Analysing these data with respect to incidence data for BC and PC in Andalusia, we have found that fewer patients were treated in Andalusia with respect to our studies.

Limitations of the study include lacking of information on patient migration for radiotherapy outside eastern Sicily. In this study, we aimed to determine the true workload in order to obtain data which could more closely affect reality, through the analysis of performed irradiation procedures.

In conclusion, in our provinces, the increment in incidence and prevalence of PC does not seem to increase the request for radiation treatments for BMs. These data should be a matter of concern to regional health managers, given the impact on the quality of life of patients.

CONFLICT OF INTEREST
The authors declare that they have no conflicts of interest.

KEYWORDS
bone metastases, incidence, prevalence, prostate cancer, radiation therapy

REFERENCES