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LETTER

Identification of a seasonal pattern to brain metastases

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Minas Sakellakis[1]
Angelos Koutras[1]
Maria Pittaka[2]
Dimitrios Kardamakis[2]
Melpomeni Kalofonou[1]
Haralabos P Kalofonos[1]
Despina Spyropoulou[2]

[1]Division of Oncology, Department of Medicine, [2]Department of Radiation Oncology, University Hospital, Patras Medical School, Rion, Patras, Greece

Dear editor

We have previously tested our hypothesis that there is a seasonality in the incidence of carcinomatous meningitis.[1] Although further validation is needed in a larger cohort, we found that leptomeningeal metastasis occurred more often during warm months of the year which, in the case of Greece, is the period generally marked with the larger daytime length.[1] Carcinomatous meningitis is closely related to brain metastasis, and a logical question is whether warm season is marked by a greater propensity also for brain metastasis.[2]

We conducted a single-center retrospective review of the medical records of patients with brain metastases that received whole brain irradiation from 2008 to 2013 (6 years).

We extracted the following parameters for each patient: sex, age, tumor histology, date of first cancer diagnosis, and date of brain metastasis diagnosis. We divided the year into two parts based on the official meteorological data regarding seasonal temperature distribution in our region (15 April–15 October and 15 October–15 April).[3] Each patient was categorized in either the first or second group, depending on the date of first diagnosis of brain metastasis. Whenever we could not clearly specify whether a patient developed brain metastases during either the first or the second period, the patient was excluded. Statistical analysis was performed using binomial testing.

A total of 343 patients with brain metastases were eligible for our study. Median age was 63 years. Overall, 142 patients developed brain metastases during the cold period, while 199 patients developed metastases during the warm period (142 vs 199, P=0.002). Seasonality was noted mostly among non-newly diagnosed cancer patients (P=0.002). Regarding tumor histology, seasonality was mostly evident in colorectal cancer (P=0.013), renal cell (P=0.04), and small-cell lung cancer (P=0.04).

Our results provide strong evidence that there might be a seasonal variability in the incidence of brain metastases, with a predilection toward the warm months of the year. This finding should be considered hypothesis-generating.

Interestingly, non-small-cell lung cancer, which was the most frequently diagnosed neoplasia in our study (n=143), was not associated with such a periodicity (P=0.518). On the other hand, small-cell lung cancer, renal cell, and colorectal cancer were associated with a significant seasonal difference, but the results should be interpreted with caution due to the small number of patients in each of these subgroups.

Thus far, no studies have been widely published or reported (including our institution) on the observation of higher cancer diagnosis during warm months.[4] What is

Correspondence: Minas Sakellakis
Division of Oncology, Department of Medicine, University Hospital, Patras Medical School, Rion 26504, Patras, Greece
Tel +30 26 1099 9535
Fax +30 26 1099 4645
Email doctorsakellakis@yahoo.com

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important to note is that despite seasonal temperature fluctuations, our region is not isolated and our hospital is easily accessible during any time of the year.

Temperature fluctuations pose various physiologic responses in an individual that can be directly or indirectly related to cancer.[5] Moreover, seasonal temperature fluctuations are related to the propensity of humans toward various infective agents, thus posing different immunologic responses throughout the year.[6] This may influence the course of immunity-related diseases, such as cancer.

Ethics

This study was approved by the University of Patra Research Ethics Committee. Patient consent was deemed exempt by the University of Patra Research Ethics Committee as the study was retrospective and most of the patients were not alive at the time the study.

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Disclosure

All authors declare no conflicts of interest in this communication.

References

1. Koutras A, Sakellakis M, Makatsoris T, et al. Seasonal variability in the incidence of carcinomatous meningitis. *J Neurosurg*. 2015;9:1–4.
2. Balm M, Hammack J. Leptomeningeal carcinomatosis: presenting features and prognostic factors. *Arch Neurol*. 1996;53:626–632.
3. Hellenic National Meteorological Service. Patra. Available from: http://www.hnms.gr/hnms/english/climatology/climatology_region_diagrams_html?dr_city=Patra. Accessed January 8, 2016.
4. Moan J, Lagunova Z, Bruland O, Juzeniene A. Seasonal variations of cancer incidence and prognosis. *Dermatoendocrinol*. 2010;2(2):55–57.
5. Tromp SW. *Medical Biometeorology*. New York: Elsevier; 1963.
6. Tang JW. The effect of environmental parameters on the survival of airborne infectious agents. *J R Soc Interface*. 2009;(6 Suppl):S737–S746.