Commentary

Meningiomas are predominantly benign neoplasms derived from meningothelial cells, which exhibit a broad spectrum of differentiation potency corresponding to different histological subtypes.[1] As per recent, the World Health Organization classification (Grades I, II, and III) of meningiomas, the Grade I meningiomas consist of nine subtypes, namely, meningothelial, fibrous, transitional, psammomatous, angiomatous, microcystic, secretory, lymphoplasmacyte-rich, and metaplastic.[2] Metaplastic meningiomas, being one of the rarest subtypes, account for 3% of all meningiomas,[3] and contains focal or widespread mesenchymal components such as osseous, cartilaginous, lipomatous, myxoid, or xanthomatous components singly or in combination.[2] Lipomatous meningiomas account for 0.3% of all meningiomas;[4] as regards their frequency among metaplastic meningiomas, 2 of the 15 metaplastic meningiomas reported by Tang *et al*.[5] contained fat-like tissue. Microscopically, lipomatous meningiomas represent meningothelial or transitional meningiomas containing variable proportions of mature adipocytes or lipoblasts.[6] Lipomatous meningioma has also been observed in association with secretory, microcystic, and chondroid meningiomas and this entity may be confused with pure microcystic meningiomas containing mucinous fluid and glycogen-rich clear cell meningiomas.[7]

The adipocyte-like *cells/mature* adipocytes of lipomatous meningioma are thought to result from true metaplastic change since the cap arachnoid-derived cells retain pluripotential capacity of differentiation; but alternatively, it has been suggested that they result from lipid accumulation in meningothelial cells.[7] According to Matyja *et al*.,[1] a secretory meningioma with extensive lipomatous component had whorls of meningothelial cells with numerous periodic acid–Schiff-positive hyaline inclusions (pseudopsammoma bodies) and numerous mature adipocyte-like cells which shared the features of meningothelial cells and adipocytes; the coexistence of these two components reflects the multipotency of phenotypic transformation of primary meningothelial cells. Even the nonmeningothelial mesenchymal tumor of central nervous system such as meningeal osteochondroma which simulates osseous metaplastic menigioma is considered to have origin in the multipotent primitive mesenchymal stem cells of the dura.[8] In a study of 18 xanthomatous meningiomas, Roncaroli *et al*.[4] observed an admixture of xanthomatous meningothelial cells (with vacuolated lipid-filled cytoplasm) and adipocytes in six cases, and a transition between the two components in some cases, these authors suggested that these changes may result from a metabolic abnormality of the neoplastic meningothelial cells. The expression of epithelial membrane antigen (EMA) and progesterone receptor in meningothelial cells, *adipocyte/adipocyte*-like and lipoblast-like cells, suggests that lipid accumulation in meningioma should be considered a transformation of meningothelial cells rather than a true metaplasia.[6] Although both the components of lipomatous meningiomas retain reactivity for EMA, there is a variable expression of S100 protein and differences in expression of progesterone receptors (40% in meningothelial cells and rarely in adipocytic cells) and Ki67 levels (5% of meningothelial cells and negligible in the adipocytic component).[4,7] The differences in progesterone receptor expression and Ki67 labeling between the two components of lipomatous meningioma suggest that the adipocyte-like cells may represent some quiescent form of meningothelial neoplastic cell, characterized by metabolic abnormalities, leading to lipid accumulation, and very low proliferative activity.[5] This is supported by the lack of calretinin expression (a sensitive marker for adipocytic tumors)[9] and ultrastructural findings indicating the presence of desmosomes and interdigitating cell membranes and the absence of lipid droplet binding to cell membranes.[4]

As per the report on lipomatous meningioma by *Yüksel et al*.[10] published in this issue of "Journal of Neurosciences in Rural Practice," the case under consideration had not only morphological features of lipomatous meningioma with a mixture of typical meningothelial cells including those with fat vacuoles and mature adipose tissue, but immunohistochemical support in the form of coexpression of EMA, vimentin, and progesterone receptor as well as low proliferation activity (1–2% Ki67 positivity). The review of literature by the authors highlights a panel of fat containing tumors under differential diagnoses which include lipoma, liposarcoma, teratoma, chordomas, and metastatic mucinous carcinomas and require further immunohistochemical parameters for their separation from lipomatous meningiomas.

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Access this article online	
Quick Response Code:	Website: www.ruralneuropractice.com
	DOI: 10.4103/0976-3147.193559

How to cite this article: Das DK. Commentary. J Neurosci Rural Pract 2017;8:143-4.