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Pathologic Classification of Pulmonary Carcinoid Cell Lines

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Background: The scarcity of available pulmonary carcinoid cell lines and the difficulty in creating new ones from patient tumor samples hinders efforts to identify new drugs and understand the biology of this rare type of lung cancer.

Methods: We searched cell line repositories throughout the world for pulmonary carcinoid cell lines. Board-certified anatomic pathologists (IL and LMS) then reviewed the original pathologic specimens to confirm whether tumor samples met the most current diagnostic criteria for pulmonary carcinoid tumors.

Results: Using the definition established by Travis, et. al. in 1998 we reviewed the original pathologic specimens for five cell lines previously reported as being derived from pulmonary carcinoid tumors (NCI-H720, NCI-H727, NCI-H835, NCI-H1770, and UMC-11). Notably, two cell lines (NCI-H720 and NCI-H835) were derived from aggressive atypical pulmonary carcinoids, with 14 and 20 mitoses/HPF, respectively, as the tumor specimens lacked the morphology seen in large cell neuroendocrine carcinoma or small cell lung cancer. Two cell lines (NCI-H727 and UMC-11) were derived from specimens best characterized as large cell neuroendocrine carcinomas, with 20 and 22 mitoses/HPF, respectively. The NCI-H1770 cell line was derived from a poorly differentiated neoplasm that was positive for chromogranin, negative for TTF-1, and had weak keratin expression, which was most consistent with a poorly differentiated carcinoma with neuroendocrine features.

Conclusion: Applying the most current diagnostic criteria to original tumor specimens, none of the existing "pulmonary carcinoid" cell lines can be strictly categorized as atypical carcinoid. However, despite a high mitotic index, NCI-H720 and NCI-H835 demonstrate carcinoid morphology and thus may assists efforts to discover new drugs and understand the biology of this rare form of lung cancer. These findings also reinforce the need for ongoing efforts to develop novel cell culture and xenograft models of carcinoid tumors.