Anaplastic oligodendrogliomas (AOs) are rare brain tumors responsive to chemotherapy with procarbazine, lomustine (CCNU) and vincristine (PCV), especially when harboring 1p19q codeletion. However, with the emergence of temozolomide as an easier to administer and less toxic alternative regimen, PCV fell out of favor. Now, long-term results of two Phase III studies conceived in the 1990s, Radiation Therapy Oncology Group (RTOG) 9402 and European Organisation for Research and Treatment of Cancer (EORTC) 26951, resurrected debate about the potential role of PCV. No adequately powered prospective trial has compared chemotherapy alone with PCV versus temozolomide for newly diagnosed 1p19q codeleted AOs. Available data suggest responses may be both more frequent and more durable with PCV, and survival may be longer. Which regimen is 'better', therefore, depends on the importance of different metrics (i.e., toxicity, complexity, efficacy), and await definitive results from the important ongoing and recently redesigned CODEL international Phase III trial.