After bone marrow toxicity, neurological toxicities are the second most common complications of cancer. They can be observed throughout the course of the disease or even after the end of treatment. Establishing the correct diagnosis may be a challenge but is of utmost importance to minimize the risk of long-term neurological deficits and to improve the quality of life of the patients. This review will focus on neurological complications induced by chemotherapeutic agents. As the life expectancy and number of treatment lines used in cancer patients increases, these complications are bound to become more frequent and should be aware to neurologists.