In breast cancer, numerous molecular therapeutic compounds will be investigated in clinical trials in the near future. This development is promising but carries potential dangers, which are closely linked to our incomplete knowledge of the pathophysiology of breast cancer and fragmentary understanding of the activity of those drugs. The inadequate tumour-biological (molecular) classification of breast cancer, the broad definition of treatment targets and the lack of translational subprotocols within clinical trials is dangerous, since several potentially highly effective targeted drugs may be falsely considered to be ineffective, even though they may be highly effective in appropriately selected patient cohorts. For this reason, it is mandatory in future to create an alliance between basic science, molecular diagnostics, and clinical practice. Moreover, for the successful application of targeted drugs it is crucial to understand the molecular interactions of such compounds. This is of particular importance because treatment durations (including long durations of treatment) and the spectra of side effects can be expected to change substantially. Thus, continuous education about the molecular basics of breast cancer is indispensable - at present and in future - to create a close dialogue between translational research and clinical practice.