

## Radiation Therapy in Organ Preservation Therapy

Yong Chan Ahn, M.D.

*Department of Radiation Oncology, Samsung Medical Center, Sungkyunkwan University,  
School of Medicine, Seoul, Korea*

The limited success by traditional 'standard' fractionation radiation therapy (RT) in some head and neck cancers has led to a few modifications. These include the altered fractionation, the combination of RT with chemotherapy, and the newer RT techniques that can deliver more conformal radiation dose around the targets and the organs at risk. During the recent 3 decades, many clinical trials were performed to test these modifications. Two most popular altered fractionation schedules are the 'acceleration' and the 'hyperfractionation'. The accelerated fractionation mainly shortens the overall RT duration to overcome the accelerated repopulation, and the total RT dose in this regimen usually has to be reduced to avoid the unacceptable acute toxicity while maintaining the same level of local control. This usually fails to connect to the improvement in survival. The hyperfractionation exploits the radiobiologic differences between the early and late reacting tissues and delivers higher total dose during the same total RT duration without increased risk of late dose-limiting toxicities. Based on several large-scale randomized trials and a few meta-analyses, these altered fractionation schedules seem beneficial with respect to the improved local-regional control and, less consistently, the overall survival compared with traditional 'standard' fractionation.

The technique of intensity-modulated RT (IMRT) has the advantage of increased conformality allowing sparing of the radiation sensitive normal structures surrounding the tumor. The early results with IMRT suggest that the local control is equivalent while the late complications are less frequent and less severe. However, no reduction of the acute side effects like mucositis was achievable with IMRT, partly because the

threshold of mucositis is rather low, and partly because IMRT commonly employs accelerated fractionation schedule. As a result, the need for feeding gastrostomy approaches around 40%. IMRT has the inherent dose inhomogeneity issue and makes it possible to employ the differential fractionation schedules of the standard and the accelerated fractionation simultaneously even with once-daily treatment. The trials using IMRT and concurrent chemotherapy are undergoing and their results are awaited.

Before 1980s there was some hesitancy regarding the use of chemotherapy in addition to RT in fear of the increased toxicity and the lack of evidence. Since the trials using induction chemotherapy began to report the impressive response rates and compliance, this strategy became the 'fashion' that was widely adopted temporarily as a nonsurgical organ preserving method, even though many induction trials showed no survival benefit. The initial trails of concurrent chemoradiation using bleomycin and methotrexate was considered prohibitive because of the price of severe acute mucosal toxicity. The recent concurrent chemoradiation trials, mainly employing platinum-containing regimens, unanimously report the improvements both in the local control and the survival for many locally advanced head and neck malignancies. There is still little consensus on the optimal regimen and dose schedules of chemotherapy, the optimal technique and fractionation schedules of RT, or the optimal patient selection criteria. Concurrent chemoradiation strategy, however, has become the standard of care that is widely adopted for most locally advanced head and neck cancers.