# The place of TIVA in cancer surgery

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In 2010 the estimated number of patients requiring surgery for cancer was approximately of 9 million patients and is expected to increase. In USA only, the number of new cases of colon cancer was approximately 97000. Surgery still remains the main procedure in the multimodal approach for many types of cancer.

Taking in consideration these numbers, questions have been raised if the outcome of these patients may be improved, not only from surgical procedure point of view but from anesthetic point of view (e.g. chronic pain, fast track approach, etc). Thus, in the last years, a number of studies focused on those anesthetic interventions that may ameliorate postoperative outcome in cancer patients.

Apart from well-known endpoints like fast track recovery after surgery, the incidence of chronic pain, nutrition, etc., the incidence of recurrences was the endpoint of many in vitro and animal studies published in the last years and of a number of clinical studies that were published or are on the way.

Attention was focused on the best anesthetic protocol that may ameliorate the incidence of recurrences and if such a protocol can, at the moment, be defined. The key question is if there are differences between total intravenous anesthesia and inhalation anesthesia and if regional anesthesia/analgesia added to general anesthesia may change the postoperative outcome.

A number of studies have shown that propofol has certain anticancer properties in vitro and in animal studies. Proposed mechanisms include indirect effects on immunity (interleukins' profile, high ratio of IFN-γ/IL-4, NK activity stimulation of macrophages to overexpress miR-142-3p, etc) and direct effects on tumor cells including inhibition of tumor cell proliferation, of angiogenesis and inhibition of MAPK/ERK pathways. Anti-inflammatory and anti-oxidative effects that may contribute to anticancer properties of propofol have also been described.

In the mean time it has been demonstrated that regional analgesia/anesthesia added or not to general anesthesia may change postoperative outcome (recurrence- free interval and survival), but in some studies results were not conclusive.

Recently more retrospective clinical studies have shown that TIVA ameliorated postoperative mortality when compared with inhalation anesthesia in cancer patients. A number

of randomized clinical trials in different types of cancer are now on the way: NCT03005860, NCT02839668, NCT0278632, NCT 2335151, NCT, 1854021, 01975064 and their results will definitely bring more light into this issue.

In conclusion at the moment, based on in vitro, animal and retrospective studies published, there seems to be a place for TIVA in cancer surgery as compared with inhalation anesthesia, but more large randomized controlled studies are definitely needed to recommend a change in clinical practice. It will be a matter of these future studies to conclude on the magnitude of the effect of TIVA on survival or recurrence-free interval and if this effect is cancer-type dependent.

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