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Feasibility and clinical impact of routine molecular testing of gastrointestinal cancers at a tertiary centre with a multi-gene, tumor-agnostic, next generation sequencing panel

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Abstract

Background: High-throughput sequencing technologies are increasingly used in research but limited data are available on the feasibility and value of these when routinely adopted in clinical practice.

Material and methods: We analyzed all consecutive cancer patients for whom genomic testing by a 48-gene next-generation sequencing (NGS) panel (Truseq Amplicon Cancer Panel, Illumina) was requested as part of standard care in one of the largest Belgian cancer networks between 2014 and 2019. Feasibility of NGS was assessed in all study patients, while the impact of NGS on the decision making was analyzed in the group of gastrointestinal cancer patients.

Results: Tumor samples from 1064 patients with varying tumor types were tested, the number of NGS requests increasing over time ($p < .0001$). Success rate and median turnaround time were 91.4% and 12.5 days, respectively, both significantly decreasing over time ($p \leq .0002$). Non-surgical sampling procedure (OR 7.97, $p < .0001$), tissue from metastatic site (OR 2.35, $p = .0006$) and more recent year of testing (OR 1.79, $p = .0258$) were independently associated with NGS failure. Excluding well-known actionable or clinically relevant mutations which are recommended by international guidelines and commonly tested by targeted sequencing, 57/279 (20.4%) assessable gastrointestinal cancer patients were found to have tumors harboring at least one actionable altered gene according to the OncoKB database. NGS results, however, had a direct impact on management decisions by the treating physician in only 3 cases (1.1%).

Conclusions: Our findings confirm that NGS is feasible in the clinical setting with acceptably low failure rates and rapid turnaround time. In gastrointestinal cancers, however, NGS-based multiple-gene testing adds very little to standard targeted sequencing, and in routine practice the clinical impact of NGS panels including genes which are not routinely recommended by international guidelines remains limited.