

# Identifying the Levers of Cost-Effectiveness of Next-Generation-Sequencing-Based Liquid Biopsy for Colorectal Cancer in France, Spain, and Germany

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## Background & objectives

Next-generation-sequencing (NGS)-based liquid biopsy (LB) for the detection and surveillance of colorectal cancer (CRC) is a young and still expensive technology, as economies of scale have not yet materialized. Recently, sequencing costs have fallen, and the question arises whether cost-effectiveness (CE) has already been achieved from the perspective of European healthcare systems.

Objectives: This health economic study develops a cost-effectiveness model of next-generation-sequencing liquid biopsy for colorectal cancer based on direct treatment costs compared to standard care without liquid biopsy in France, Spain, and Germany.

## Methods

A structured literature search was used to collect evidence on the stage-dependent quality of life, efficacy, and total direct treatment costs (TDC) of NGS LB from 2009 to 2019. Published screening and treatment models for CRC were also reviewed. A decision-analytic Markov model was then programmed in TreeAge software. Over the remaining lifetime, cumulative life expectancy and quality-adjusted life years can be calculated with different assumed effects on progression-free survival, and recurrence-free survival. Health economic outcomes can be calculated as incremental CE ratios and net monetary benefits. As the main comparator to standard treatment, we used Plasma-SeqSensei Solid Cancer IVD Kit (Sysmex Inostics GmbH) for calculation, which is IVD-certified and it detects key CRC markers including KRAS, NRAS, PIK3CA, EGFR and BRAF.

## Results

The interim results show that certain scenarios exist where using LB tests can be cost-effective. Quality of life estimates were found to be 0.74 in stage I, 0.74 in stage II, 0.67 in stage III and 0.25 in stage IV CRC. Costs could be categorized into initial, follow-up and advanced TDC, the latter representing the last year of treatment in a stage. Relevant differences in TDC were found between the countries. Germany has the highest average costs that can amount to >80k Euros in the last treatment year.

## **Conclusion**

The total direct costs of treating colorectal cancer are high. Quality of life estimates are favorable compared to other systemic diseases but decrease sharply in stage IV. Further health economic research is ongoing.