# Cost-Effectiveness Analysis of a Large (FOUNDATION MEDICINE) Versus a Home-Based Medium Gene Panel for Exome Sequencing: Results of the Profiler 02 Randomized Clinical Trial

Perrier L[1], Tredan O[1], Morelle M[1], Penel N[2], Fournel P[3], Greillier L[4], Ghiringhelli F[5], Tosi D[6], Bertucci F[7], Campone M[8], Delord JP[9], Pouessel D[9], Garin G[1], Chabaud S[1], Gomez-Roca C[9], Pannier D[2], Brahmi M[1], Fabbro M[6], Garcia ME[4], Ray-Coquard I[1], Viala M[6], Italiano A[10], Cassier P[1], Dufresne A[1], Attignon V[1], Treilleux I[1], Viari A[1], de la Motte Rouge T[11], Durando X[12], Perol D[1], Blay JY[1]

[1]Cancer Centre Léon Bérard, Lyon, France, [2]Centre Oscar Lambret, Lille, France, [3]CHU de Saint-Etienne, Saint-Etienne, France, [4]APHM, Marseille, France, [5]Centre Georges-François Leclerc, Dijon, France, [6]Institut Régional du Cancer Montpellier, Montpellier, France,[7] Institut Paoli Calmette, Marseille, France,[8] Institut de Cancérologie de l'Ouest, Nantes, France, [9] Institut Claudius Régaud, Toulouse, France, [10] Institut Bergonié Comprehensive Cancer Centre, Bordeaux, France, [11] Centre Eugene Marquis, Rennes, France, [12] Centre Jean Perrin, Clermont-Ferrand, France.

## Objective

We undertook a cost-effectiveness analysis (CEA) to compare a large Next-generation sequencing (NGS) panel (FOne panel, 324 genes) *versus* a 87 gene home-based NGS panel (CTRL) in cancer patients.

## Methods

### Study population

- The CEA was designed as part of the multicenter, randomized, prospective Profiler 02 study.
- Patients with advanced/metastatic solid tumors without known targetable gene alteration were randomized during their 1st or 2nd line therapy in the metastatic setting. Both panels were performed for each patients, the randomization arm defined the first panel to be reviewed by dedicated molecular tumor board (MTB) at time of progression while the 2nd panel remain blinded.

### Comparative interventions

- Tumor-based genomics according to the 324 cancer related genes NGS panel from Foundation One (Arm A) vs. Tumor-based genomics according to Control NGS panel 87 cancer related genes (Arm B).

### Collection of the cost data

- Costs were assessed from the French National Health perspective limited to expenditures in cancer centres and teaching hospitals (n = 11) until 12 months after initiation of a new anti-cancer treatment.
- Updated data were available since abstract submission.
- Individuals consumptions were provided by local hospital Discharge database.
- Costs were expressed in 2020 euros using the international Classification of Individual Consumption by Purpose (COICOP 06.3.0.0 - Hospital services).
- Multiple imputations (m = 30) were used to handle missing data. The results were provided using all covariates (patients characteristics and outcomes).

### Incremental Cost-Effectiveness Ratios (ICERs)

- ICERs were expressed in cost per life year gained and in cost per % of patients for which a molecularly-targeted therapy was initiated.

### Uncertainty

- Uncertainty around the ICERs was captured by a probabilistic sensitivity analysis (PSA) using a non-parametric bootstrap method.

## Results

### Patients characteristics

- Among the 339 patients randomized, 163 patients (79 for Fone and 84 for CTRL) were eligible for the economic analysis (failure of analysis n = 18, death before MTB n = 58, no new treatment line post-MTB#1 n = 100). (*cf. Table 1)*.

### Costs assessment

- In the final analysis, mean total cost was €22,472 (std: 10,885) for FOne panel vs €21,098 (std: 15,900) for CTRL panel. (*cf. Table 2*).

### ICERs

ICERs were €80,732 per Life Year Gained and €17,705 per % of targeted therapy initiated. *(cf. Table 3)*. The probability of the ICER belonging to each quadrant of the CE plane was the highest for the Northeast quadrant for which the Fone was both more costly and more effective than CTRL. *(cf. Figures 1a and 1b)*.

| Costs *(in €, 2020)* | Fone Arm *(n = 79)* | | CTRL Arm *(n = 84)* | | P-value |
|---|---|---|---|---|---|
| | *Mean* | *(SD)* | *Mean* | *SD* | |
| Complete hospitalisation[1] | 9,663 | *(6,506)* | 10,628 | *(10,463)* | |
| Hospital at home[1] | 2,216 | *(7,500)* | 3,281 | *(10,250)* | |
| Expensive drug[1] | 3,597 | *(6,848)* | 3,511 | *(6,176)* | |
| External consultations at hospital[1] | 274 | *(490)* | 300 | *(510)* | |
| NGS[1] | 5,469 | - | 2,206 | - | |
| Medical device[1] | 22 | *(131)* | 139 | (957) | |
| Transportation[1] | 1,183 | *(919)* | 1,325 | *(1,144)* | |
| **Total [1]** | **22,424** | **(11,651)** | **21,389** | ***(18,652)*** | **0.0475** |
| **Total [2]** | **22,472** | **(10,885)** | **21,098** | ***(15,900)*** | **0.0848** |

[1] Results for complete case analysis. missing data : n = 24 for Fone and n = 11 for CTRL.
[2] Results after multiple imputation for missing data.

*Table 2: Mean costs per patient*

| Patients characteristics | Fone Arm (n = 79) | CTRL Arm (n = 84) | P-value |
|---|---|---|---|
| **Clinical characteristics at inclusion** | | | |
| Male N (%) | 43 (51%) | 30 (38%) | 0.090 |
| Age median (min-max) | 60 (19-85) | 54 (25-81) | 0.154 |
| Incurable disease | 47 (56%) | 51 (65%) | 0.262 |
| De novo metastatic disease | 51 (61%) | 54 (69%) | 0.309 |
| **Management before inclusion** | | | |
| Prior radiotherapy | 44 (52%) | 44 (53%) | 0.920 |
| Prior systemic treatment | 37 (44%) | 32 (40%) | 0.647 |
| Prior surgery | 68 (81%) | 65 (82%) | 0.827 |

*Table 1: Patients characteristics*

| | Fone Arm *(n = 79)* | CTRL Arm *(n = 84)* | Mean difference in cost or effectiveness | ICERs |
|---|---|---|---|---|
| Mean cost (€, 2020) | **22,472** | **21,098** | **1,374** | - |
| Life year | **0.674** | **0.657** | **0.0170** | **80,732** |
| % of targeted therapy initiated | **0.304** | **0.226** | **0.0776** | **17,705** |

*Table 3: ICERs*

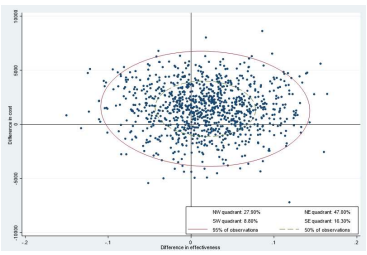

*Figure 1a: PSA (Life year)*

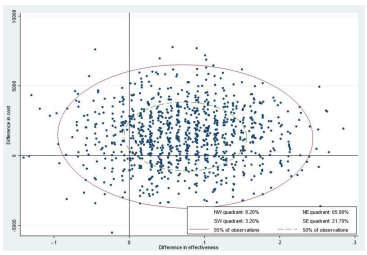

*Figure 1b: PSA (% of targeted therapy initiated)*

## Conclusions

- Updated data were available since abstract submission and conclusions are concordant: the ICERs belonging to each quadrant of the cost-effectiveness plane were the highest for the Northeast quadrant for which the Fone was both more costly and more effective. Results were robust at 50% for % of targeted therapy initiated.
- As expenditures were limited to cancer centres and teaching hospitals, an additional study have to be performed using the National Health Data System (SNDS) with longer time horizon to confirm our results.

COMPETING INTERESTS: the Centre Léon Bérard (CLB) received funding from Roche. ETHICAL APPROVAL: This study was approved by the French Ethics Committee (Comité de Protection des Personnes), the National Security Agency of Medicines and Health Products that applies for biomedical studies (Agence Nationale de Sécurité du Médicament et des produits de santé),