**Supplementary Table 1.** Patients characteristics (n=303)

| Patients characteristics | n  | (%)  |
|--------------------------|----|------|
| Age                      |    |      |
| Median (IQR)             | 65 | 55-71|
| Gender                   |    |      |
| Female                   | 121| 39.9 |
| Male                     | 182| 60.1 |
| Cohorts                  |    |      |
| 1- MATCH-R Global        | 159| 52.5 |
| 2- EGFR/ALK              | 12 | 4.0  |
| 3- Immunotherapy         | 57 | 18.8 |
| 4- Prostate Cancer       | 75 | 24.8 |

**Supplementary Table 2.** Feasibility of the development of patient-derived xenograft models per cancer type.

| Cancer Type            | Tumor implanted (n) | PDX models developed (n) | Success rate (%) |
|------------------------|----------------------|--------------------------|------------------|
| Lung                   | 59                   | 18                       | 30.5             |
| Prostate               | 60                   | 16                       | 26.7             |
| Cholangiocarcinoma     | 15                   | 3                        | 20               |
| Bladder                | 11                   | 8                        | 72.7             |
| Bellini Tumor          | 3                    | 2                        | 66.7             |
| Endometrial            | 4                    | 2                        | 50               |
| Ovarian                | 3                    | 2                        | 66.7             |
| Head and Neck          | 3                    | 2                        | 66.7             |
|          |     |     |     |
|----------|-----|-----|-----|
| Colon    | 3   | 1   | 33.3|
| Adenoid Cystic Carcinoma | 1   | 0   | 0   |
| Total    | 163 | 54  | 33.1|
Supplementary Figure 1

Circuit and logistics of sample and treatment tailoring

- CRF Monitoring
- Inclusion (Consent Signature)
- Eligibility Validation
- Tumor Biopsy
- Treatment decision
- PDX models
- Molecular Tumor Board
- Histology and purity validation
- Next-Generation sequencing

Molecular Tumor Board
Supplementary Figure 2

Example of PDX growth, with or without drug treatment, established from stable disease site (SD) or progressive disease site (PD). MR15 was a patient with FGFR3-S249C driven urothelial cancer with acquired resistance to erdafitinib.