EU-funded cancer research: towards personalised medicine

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DG Research and Innovation
European Commission

IMI Oncology Workshop
Madrid, 12 January 2017
Health research H2020 – what we do

- Fund international collaborative health research with EU-added value
- Initiate and support EU health policies
Horizon 2020: Three priorities

€24 billion
- European Research Council
- Future & Emerging technologies (FET)
- Marie Curie
- Research infrastr.

€17 billion
- Leadership in Enabling and Industrial Technologies (LEIT)
- Risk finance
- Innovation in SMEs

€29 billion
- SC1 Health (€7.4b)
- SC2 Food & bio eco
- SC3 Energy
- SC4 Transport
- SC5 Environment
- SC6 EU in the world
- SC7 Security
3 Os:
• Open Innovation
• Open Science
• Open to the World

Carlos Moedas, EU Commissioner for Research, Science and Innovation

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Health, demographic change and wellbeing

Our priorities 2014-2017

Healthy ageing (2014-2017)

Human biomonitoring (2016-2017)


Maternal and child health (2016-2017)

Personalised medicine

Call 2014-15: 1.3 B EUR

Call 2016-17: 1.4 B EUR

Call 2018-20: 1.8 B EUR

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- Incidence and prevalence are increasing
- Oncology is a global health priority (HICs versus LMICs)
- Changing oncology healthcare landscape
  - Rising costs, increasing pressure on European healthcare systems
  - Outcomes: insufficient comparative assessment of current practices and approaches
  - Molecular biology/profiling and risk classification approaches
- Hundreds of innovative drugs in the pipeline
- Stratified, personalised medicine can deliver cost savings and better outcomes for patients
- Quality-of-life, survivorship issues
EU cancer research – where in H2020?

Collaborative health research (SC1)

Public-private partnership

Frontier research

Support to innovation

Loans for de-risking R&I

Research Education Innovation

Public-public partnerships

Health research infrastructures

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EU cancer research

what’s being funded (FP7+HORIZON2020)

- **translational research**
  - tumour-host environment
  - risk factors, biomarkers, imaging
  - models
  - large data, technologies
  - prevention, early detection
  - all possible treatment options
  - immunobiology and therapy
- **investigator-driven trials**
- **palliative & end-of-life care**

€ 2.1 billion (2007-2016)

- focus on clinical solutions for patients, innovation, close-to-market
Synergy between cohorts

266 projects, > € 1 billion
55 collaborative projects ~ 3 million subjects

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Generating clinical evidence

> 340,000 patients recruited
165 Projects, 286 CTs, € 1.1 billion

Phase I: 16%
Phase I/II: 23%
Phase II: 21%
Phase II/III: 5%
Phase III: 6%
Phase IV: 1%
Interventional Study: 17%

FP7 Health Programme

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Towards personalised medicine

Prevention
  - Stratification and high risk groups

Aetiology
  - Molecular understanding of disease
  - Molecular classification of cancer sub-types
  - Molecular taxonomy

Diagnosis / Prognosis
  - Biomarker identification for:
    - Diagnosis
    - Prognosis
    - Prediction
    - Monitoring
  - Medical Imaging to optimize treatment options

Model Systems
  - Wide range of animal models
  - In silico models
  - In vitro & ex-vivo models (xeno patients)

Therapy
  - Targeted drug development via biology driven hypothesis
  - Bio-informatics for treatment decision making

Survivorship / QoL
  - Identification of sub-groups for better quality of life

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EU breast cancer research

199 projects

€ 260 million

- Risk factors
- Molecular pathogenesis
- Biomarkers
- Radio, chemo and targeted therapies
- Investigator-driven clinical trials
- Medical devices
- Quality of life research – therapy toxicity, palliative care, advanced care planning

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Leveraged funds: €43 million

2006: FDA approves Mammaprint

Validation of the 70-gene signature

Interlaboratory reproducibility of Mammaprint

FP6, 2002-2006

FP7, 2007-2013

Horizon 2020, 2014-2020

Not legally binding
EU lung cancer research

39 projects

€ 44 million

• Risk factors
• Molecular pathogenesis
• Biomarkers
• Targeted therapies
• Investigator-driven clinical trials
• Medical devices:
  o Pulmonary stents
  o Molecular diagnostics chips
  o Biomarkers in breath
• Quality of life research – therapy toxicity, palliative care, advanced care planning

39 projects

€ 44 million

Not legally binding
Advancing targeted therapies development

141 projects
254 million EUR

- T-CAR cells
- DNA vaccines
- RNA vaccines
- Peptide vaccines
- Dendritic cells
- Antibodies

FP7 preclinical
88 projects
EUR 109 million

H2020 preclinical
34 projects
EUR 38 million

FP7 trials
9 projects
EUR 53 million

H2020 trials
10 projects
EUR 54 million
Rare cancers: EU-wide impact

- Epidemiology, clinical registries
- World’s largest sarcoma biobank
- phase I/II-III IDCTs: treatment and care,
- predictive and prognostic markers
- Prognostic CINSARC sarcoma signature

- A first line treatment phase III IDCT to define standards of care for adjuvant chemotherapy (EuroEwing 2012)

- A second line treatment phase II/III IDCT which establishes a standard and will serve as a platform for testing new agents (rEECur)

- Companion studies - response, toxicity, biomarkers

- virtual sarcoma biobank
- translational research (pathology, gene expression, immunology, signalling)
- translational biomarkers
- Early phase IDCTs
- ESMO clinical practice guidelines

- 8 innovative IDCT (phases I to III)
- methods for histological and molecular diagnosis of sarcoma
- translational research
- Patient involvement

INTEGRATION AND long-term COLLABORATION

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PanCare Studies in Fertility and Ototoxicity to Improve Quality of Life after Cancer during Childhood, Adolescence and Young Adulthood

Validating predictive models of radiotherapy toxicity to improve quality-of-life and reduce side-effects in cancer survivors

Advance Care Planning; an Innovative Palliative Care Intervention to Improve Quality of Life in Cancer Patients - a Multi-Centre Cluster Randomized Clinical Trial

Randomised controlled trial to evaluate electronic Symptom Management using the Advanced Symptom Management System (ASyMS) Remote Technology for patients with cancers

Children’s Liver Tumour European Network
<table>
<thead>
<tr>
<th>Cancer indication</th>
<th>Project</th>
<th>Beneficiary</th>
<th>EU funding</th>
<th>What it will deliver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple</td>
<td>NO-META</td>
<td>Cytofind</td>
<td>€ 50,000</td>
<td>Liquid biopsy using a new method to count and isolate CTCs based on single cell determination of the anomalous metabolic properties of tumour cells (Warburg effect)</td>
</tr>
<tr>
<td>Multiple</td>
<td>MAINTRAC-Auto</td>
<td>SIMFO GmbH</td>
<td>€ 50,000</td>
<td>Automatization and validation of a liquid biopsy assay “Maintrac-AUTO CTC-analyser”</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>CYTOPRO</td>
<td>CYTOTRACK APS</td>
<td>€ 50,000</td>
<td>A device to identify and isolate metastatic cancer cells from a blood sample based on CTC KRAS analysis</td>
</tr>
<tr>
<td>Multiple</td>
<td>ONCOCHECK</td>
<td>LIFE LENGTH</td>
<td>€ 50,000</td>
<td>Prognosis and monitoring test based on the determination of telomere length in peripheral blood</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>SENSITIVITYMARKERS</td>
<td>NTRC</td>
<td>€ 50,000</td>
<td>Clinical validation of prognostic biomarkers of chemotherapy response in liquid biopsies</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>CELLETEST</td>
<td>STEM SEL</td>
<td>€ 50,000</td>
<td>Medical device for non-invasive diagnosis and prognosis of metastatic lung cancer</td>
</tr>
</tbody>
</table>


Not legally binding
Oncology interventions: examples

- Drugs/combinations
- Quality of life (PROs)
- Surgery
- Radiotherapy
- Chemotherapy
- Immunotherapy
- mHealth devices
- Biomarkers/diagnostics/prognostics

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Coordination of national research policies - Stronger together

- Linking national/regional cancer registries and bio-banks to improve quality of data collection, optimise cancer control in Europe and evaluate therapy effectiveness

- Linking 28 national/regional funding organisations in 20 countries working on translational cancer research. TRANSCAN mobilised 33 million EUR
  - 1st joint call on 'Tumour heterogeneity' (17.4 million EUR)
  - 2nd joint call on 'Immunotherapy' (8.9 million EUR)
  - 3rd joint call on 'Early detection and/or progression' (16.3 million EUR)
EIB supports Bavarian Nordic’s development of Ebola and cancer vaccines

The European Investment Bank (EIB), the world’s largest multilateral bank, today reaffirmed its firm commitment to respond to the Ebola pandemic. The Bank has provided a EUR 50 million loan to Bavarian Nordic, an international biopharmaceutical company, for accelerated development of an Ebola vaccine with long-term efficacy. The financing is also backing research into vaccines for treating other infectious diseases and multiple cancer indications.

France: EIB lends EUR 20m to Transgene

Today, 28 January 2016, the European Investment Bank (EIB) and Transgene announced that they have entered into a EUR 20m financing agreement. The event organised to mark the granting of this loan will take place at Transgene’s headquarters in Illkirch-Graffenstaden, in the presence of Ambroise Fayolle, EIB Vice-President responsible for innovation, Alain Mérieux, Chairman of Institut Mérieux, Transgene’s leading shareholder, and Philippe Archinard, Transgene’s Chairman and CEO.
Health - research and innovation policy
### Commission policies

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<tr>
<th>Directorate General</th>
<th>Subject</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUSTICE</td>
<td>General Data Protection Regulation</td>
<td>Enhance personal data protection, increase business opportunities</td>
</tr>
<tr>
<td>SANTE</td>
<td>Cancer prevention (MS)</td>
<td>ECAC (risk factors), EU breast, colorectal, cervical cancer screening guidelines</td>
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<tr>
<td>JRC</td>
<td>Cancer registration, harmonise breast cancer services (MS)</td>
<td>ECIS, ECIBC</td>
</tr>
<tr>
<td>SANTE</td>
<td>Tobacco Products Directive (MS)</td>
<td>Regulate tobacco sales, labeling</td>
</tr>
<tr>
<td>EMPL</td>
<td>Occupational cancer (MS)</td>
<td>Carcinogens/mutagens at workplace</td>
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<tr>
<td>RTD</td>
<td>Personalised medicine</td>
<td>Promote personalised medicine, demonstrate healthcare benefit</td>
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</table>
Timing up with global partners

International Rare Disease Research Consortium
- 200 new therapies by 2020
- 43 international partners, funders so far
- Commitment to allocate $10 million over 5 years

International KO Mouse Consortium
- Mutate all protein-encoding genes in the mouse
- NIH, EU Commission, Genome Canada
- Total investment > $100 million; EU: €13 million

International Cancer Genome Consortium
- Full molecular fingerprint 50 tumours
- NIH, EU Commission, and 11 other countries
- Total investment > $250 million; EU: €21 million

International Human Epigenome Consortium
- Identify genome-wide DNA methylation patterns of all human genes
- NIH, EU Commission, CA, DE, UK, IT, Korea
- Total investment > $120 million

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**International Consortium for Personalised Medicine (IC PerMed)**

**WHAT**

Collaboration of research funders and policy makers from EU Member States and beyond

- Establish Europe as a global leader in PM research
- Support PM science-base via coordinated research approach
- Provide evidence to demonstrate the benefit of PM to citizens and healthcare systems
- Pave the way for PM approaches for citizens

**WHY**

✓ Implementation based on PerMed Strategic Research Agenda
✓ IC PerMed roadmap: being developed, will be updated


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IC PerMed Challenges and facilitators

1. Citizens and Patients
   - Policy, Patients/Citizens, Industry, Funders, Researchers

2. Data and ICT
   - Policy, Funders, Researchers, Industry, Ethics/Data committees, Patients/Citizens

3. Research efforts
   - Innovations in Diagnosis, Therapies, Prevention & ICT with economic value and fair access.
   - Industry, Policy, Regulators, Funders, Researchers, Patients/Citizens

4. Market Access
   - Policy, Industry, Health Technology Assessment, Providers, Researchers, Patients/Citizens

5. Health Systems
   - Policy, Providers, Health Technology Assessment, Insurances, Patients/Citizens

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What EU offers

- A network of collaborative projects throughout Europe and beyond, addressing the continuum of cancer research-care
- Established public-private partnership to accelerate the delivery of innovative therapies
- Established public-public partnerships to boost research coordination between EU countries
- Close-to-market solutions provided by SMEs
- A strong experience in international/global cooperation, via a flexible model
Conclusions

- Lot of potential for collaboration, knowledge and data across disciplines and sectors, including public-public and public-private partnerships, building on existing projects and schemes

- Accelerating innovative research for the benefit of patients: prevention, risk reduction, early diagnosis, treatment, care

- Strong support to international efforts, including the development of research plans and policies

Horizon 2020 provides many opportunities to rapidly deliver in the field of cancer research!