Tumorb ank@ UZA into practice

E. Smits, A. De Wilde, B. Peeters, K.J. Cheung, K. Lesage, E. Meulemans – Working group Tumorb ank@ UZA
Framework of Tumorbank@UZA

E. Smits, Project manager
New challenges in healthcare
Translational research bridges the gap between academic and industrial research… to avoid the disappearance of good projects crossing the “valley” from one side to the other…

→ sustainable benefits for patients and society
Translational biomedical research

Biomedical basic research

Clinical research
- Diagnostics
- Therapy
- Prevention

Clinical practice
TRANSLATIONAL AND CLINICAL RESEARCH TOWARDS BIOMEDICAL INNOVATION IN ANTWERP

• Multidisciplinary
• Supportive
• Integration with patient care
• Collaboration
Clinical Research Center Antwerp

Translational & Clinical Research

Biomedical Imaging

Biobank & Pathology

Biomedical informatics
A biobank as a key tool

Human biological samples and data
- Serum
- PBMC
- DNA
- FFPE tissues
- Frozen tissues
- Cells
- Fam. history
- Lab. param.
- Treatm. outcome
- Lifestyle

Analysis tools
- Antibodies
- Affinity binders
- Recomb. proteins

Infrastructure
- Sample storage
- Data storage
- Biocomputing

Application
- Basic research
- Life sciences
- Targets for Drug discovery
- Biomarkers for Drug development
- New diagnostics
- Personalized medicine
- Public health

*: ESFRI BMS report but not funded
Governmental funding Tumour biobank

- **Federal government:**
  - National Cancer Plan, Initiative 27

- **Flemish government:**
  - Advice 120 Flemish Science Policy Council
  - Actions for biobank infrastructure
  - Center for Medical Innovation
Initiatives pillar 3: Research and innovative technology

- 27. Tumourbank
- 28. Structural financing coordination translational research in university hospitals
- 29. Support for translational research
Tumorbank@UZA

- Project started in 2010
  - 3-weekly project meetings
    - Working group
    - Strategic steering committee
  - 300K€ /year for local tumourbank
    - 10% for central management
    - Belgian Cancer Registry

Knowledge / Experience / Care
Framework

- Pilot project started in January 2010
- MOCA: Multidisciplinary Oncological Center Antwerp
- Focus on Tumorbank
- Major stakeholders involved
Organization chart MOCA

Oncologisch zorgprogramma
Multidisciplinaire Commissie Oncologie

Klinische stuurgroep
Coördinatiecel MOCA
Wetensch. stuurgroep

Patiënten-begelei- ding + diëtiek
Werk- groepen
Psycholo- gische begelei- dingscel
Oncover- pleegkun- dig team
Cel kanker- registratie
Cel datama- nagement

Tumorclusters
MOCA Kernteam

TB Adviesraad
Tumorbank & celbank

U.A.
Organization chart Tumorbank@UZA

Steering committee tumorbank@UZA
Chairmen: M. Peeters, P. Pauwels

Project coordinator
E. Smits

MOCA
M. Peeters
Data managers:
K.J. Cheung
E. Meulemans

Pathology
P. Pauwels
Tumourbank managers:
A. De Wilde
B. Peeters
Clinical Biology
V. De Vroey

ICT
Geert Smits
ICT project leaders:
K. Lesage
T. Van Den Bulcke

Clinical Biology
H. Goossens
V. De Vroey

Medical director
Medical ICT:
L. Luyten

Medical Board
P. Jorens
Tumorbank@UZA: goals

- Pilot studies
- ICT platform
- QA / QC
- Organisation and management

Translational Research
Tumorbank@UZA: goals

- Storage and management of biological samples
  - Tissue,
  - blood products,
  - DNA
  - ...

- Resource for scientific research
  - Virtual connection of biobank with hospital and patient data
Tumorbank@UZA: sample management

A. De Wilde, Tumorbank manager
Tumorbank@UZA: goals

- Organisation and management
- ICT platform
- QA / QC
- Pilot studies

Translational Research
Analyse van lichaamsmateriaal:

“Conform artikel 20 van de wet van 19 december 2008 op het menselijk lichaamsmateriaal wordt u hierbij op de hoogte gebracht van de mogelijkheid dat uw lichaamsmateriaal, dat overblijft na de uitvoering van een diagnostisch onderzoek of na een ingreep (restweefsel) voor wetenschappelijk onderzoek kan gebruikt worden. Daarom beschikt het universitair ziekenhuis Antwerpen over een biobank, waarin overblijvend lichaamsmateriaal en bijhorende verzamelde gegevens gecodeerd worden en enkel voor wetenschappelijke onderzoeksdoeleinden bewaard worden. Het ethisch comité van het UZA waakt over de naleving hiervan. Als u dit niet wenst, heeft u of uw vertegenwoordiger het recht dit gebruik te allen tijde te weigeren. Deze weigering kunt u meedelen aan de arts onder wiens verantwoordelijkheid de wegneming van het lichaamsmateriaal valt of aan de medisch directeur.”
Standard workflow for frozen tissue

Inform patients

Surgery

Snap freeze

- 80°C storage

Access & transport

Research
Content of Tumorbank@UZA

- **Sample types**
  - Fresh frozen
  - Formalin fixed paraffin embedded (FFPE)
  - Reference tissue
  - Residual serum

- **Patient data**
  - Demographic data
  - Clinical data
Overview: sample quantity per year
Tissue sample quantity per anatomical location

Distribution of Sample Origin

- Dermatology
- Haematology
- Gynaecology
- Head and Neck
- Thorax
- Neurology
- Gastroenterology
- Musculoskeletal
- Urology
- Endocrine
- Ophtalmology
- Unknown

Knowledge / Experience / Care
ICT Platform

K. Lesage, ICT
Tumorbank@UZA: goals

- Organisation and management
- ICT platform
- QA/QC
- Pilot studies
- Translational Research
ICT: Software selection procedure

• Comparison of 5 software systems
  • Architecture
  • Functionality
  • Price
  • License model
• Shortlist of 2 systems
  • One use case during 1 day
• Proof of concept with 1 system (SLims – Genohm)
  • Several use cases
• Approval by steering committee
• Purchase
ICT: Proof of concept: SLims

- Upload historical data
  - No relabeling
  - No re-allocation.

- Real time registration
  - 01-08-2011 Fresh frozen & FFPE tissue
  - 01-02-2012 Serum samples

- Export Minimal Data Set to Belgian Virtual Tumourbank
  - 2009 – 2010
  - 2011 – 2012
ICT: SLimsGate – Data connections

- Webservices
  - HIS-pathology
  - Patient Demographics
  - Laboratory aliquot times (MOLIS)
- HL7
  - Laboratory results
- LDAP – Active Directory
- PACS – Dicom (anonymous)
- No connection with C2M: no anonymous information
- Analysers: Nanodrop/bioanalyser

➢ reduction of errors, data quality improvement
ICT: SLims – characteristics (I)

- Web based system – no local installation needed
- Sample management system
  - Sample localization and labeling
  - Sample tracking and shipment
- Customizable
  - Locations, content type, custom fields…
ICT: SLims – characteristics (II)

- Derivations tree (2-way traceability)
- Electronic Laboratory Notebook (ELN)
 ICT: SLims – characteristics (III)

- Full Audit
- Communication with other systems (SLimsGate)
Spin-Off: Serumbank@UZA

K.J. Cheung
Tumorbank@UZA: goals

- Organisation and management
- ICT platform
- QA/QC
- Pilot studies
- Translational Research
Overview: Serumbank@UZA

- Introduction
- Objectives
- Material & Methods
- Results
- Conclusions & Future Perspectives
• Serum
  • Blood derivative
    • Proteins
    • Metabolites
    • Electrolytes

• Usability
  • Routine biochemistry
  • Scientific purposes

• Accessibility
  • Readily, easily
  • Residual material
Objectives

• To establish an **oncological serumbank** consisting of residual sera integrated within the existing hospital infrastructure and workflows.

• To evaluate the **sample coverage and quality** by means of comparative analysis.
Material & Methods (I)

- **Stakeholders**
  - MOCA / Oncology
  - Clinical Biology
  - Tumorbank@UZA

- **General requirements**
  - Integration
  - Communication
  - Indicators

- **General restrictions**
  - Workload
  - Capacity
  - Routine
Material & Methods (II)

1. Patient visits department of medical oncology
   - Blood analyses and tumorbank in UltraGenda: NO STOP
   - 'tumorbank' on application form: NO STOP
   - YES Collect blood tubes and form
     - Transport tubes and forms to clinical laboratory
       - Scan tubes and forms
         - MOLIS contains tube and analyses information
           - Routine blood/serum analyses
             - MOLIS checks for 'tumorbank' task: NO STOP
               - YES Fractionation of residual serum
                 - Transport to the tumorbank
                   - Data-transfer from MOLIS to Sims: NO STOP
                     - YES Create sample aliquots and snap-freeze
                       - Storage in serumbank
Results (I)

- Oncological patient visits (n = 9226)

Control with Blood  
(n = 1685)

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<th>Month</th>
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<td>100</td>
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<tr>
<td>Dec</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>
Results (II)

- Serumbank@UZA (n = 3683)
Results (III)

- Processing duration (n = 1712)

![Pie chart showing sample distribution](chart.png)

- 44% < 4 hrs
- 31% 4 - 8 hrs
- 25% > 8 hrs
- 0% N/A
Results (IV)

- Sample coverage (n = 1369) ~80%
• Conclusions
  • Successful integration with 80% coverage
  • Sample stability at -80°C after 2, 4 and 6 months

• Future perspectives
  • Further evaluation after 1 year
  • Addition of minimal clinical information (i.e. tumour type)
  • Research-oriented expansion of residual human body material
Acknowledgement

• Groups / committee
  • Tumorbank@UZA working group and steering committee

• Departments / people
  • MOCA
  • Medical oncology
  • Medical Information
  • IT
  • Clinical Biology
  • Statistician Dr. Kristien Wouters (Dep. Medical Director)

• External organizations / institutes
  • Ministry of Health and Belgian Cancer Plan
13:15h – Workflow of Tumorbank@UZA (part 1)

- Framework of Tumorbank@UZA
  E. Smits – Project manager

- Tumorbank@UZA: sample management
  A. De Wilde – Tumorbank manager

13:45h – Coffee break

14:15h – Workflow of Tumorbank@UZA (part 2)

- ICT platform
  K. Lesage – ICT Project leader

- Spin-off: Serumbank@UZA
  K.J. Cheung – MOCA data manager

- Project-based Biobanking
  E. Meulemans – MOCA data manager

- Access to Tumorbank@UZA
  B. Peeters – Tumorbank manager
Project-based biobanking

E. Meulemans, MOCA data manager
Tumorbank@UZA: goals

- Organisation and management
- ICT platform
- Pilot studies
- QA / QC

Translational Research
Project-based biobanking: Cachexia

- Project (01/07/2011-01/07/2013)
  - Initiative of the Belgian Cancer Plan (FOD)
  - Pilot - Multicentric study

- Cachexia in Oncology
  - Weight loss and loss of muscle mass
  - (Pro-) cachectic mechanisms are unknown
  - Lack of definition, diagnostic criteria, and classification

- Goals
  - Classification and early detection of Cachexia by usage of uniform screening methods (Nutrition)
  - Serum biomarkers in collaboration with tumorbank@uza
Project-based biobanking: Cachexia

Precachexia
- Weight loss ≤5%
- Anorexia and metabolic change

Cachexia
- Weight loss >5%
- BMI <20 and weight loss >2%
- Sarcopenia and weight loss >2%
- Often reduced food intake/systemic inflammation

Refractory cachexia
- Variable degree of cachexia
- Cancer disease both pro-catabolic and not responsive to anticancer treatment
- Low performance score
- <3 months expected survival

Death

Fearon et al., Lancet Oncol 2011
Project-based biobanking: Cachexia

Mechanisms of cachexia: cytokines

Cachexia study: material & methods

• Patient population
  • Ambulant cancer patients with metastases
  • Gastrointestinal and breast cancer

• Screening
  • Nutrition
  • Muscle metabolism
  • Functional and psychosocial effects
  • Biological marker study
    • Analysis of serum: routine and non-routine parameters

• Data analysis
Inclusion of patients (uniform procedures)

Oncology

Inclusion of the patient criteria

Patient consultation

Inform patient onco-nurse

Registration of the patient in database

Patient report

- Informed consent
- Information document

Appointment for consultations in day care hospital
5 x consultations (every 3 month)

- Patient registration
- Blood taking
- Consultation Nutrition
- Consultation Oncologist

Ultragenda

**Clinical Biology**
*Routine measurement of serum markers*
  - (pre-) albumin
  - (h)CRP
  - Molis (Vision4health)

**Tumorbank@UZA**
*Sera processing*
*Manual aliquoting and storage*
*Sampling*
Multicentric collection

**UA-LEMP**
Measurement of Specific biomarkers:
- TNF-α
- Adiponectin
- Leptin
- Interleukin 6
- Ghrelin

**Tumorbank@UZA**
- Serum storage
- Sampling and delivery

**Clinical Biology**
Measurement of hCRP and pre-albumin
Project-based biobanking: Cachexia

- **Conclusions**
  - Tumorbank@UZA facility for internal and external
    - Processing of blood $\rightarrow$ serum
    - Serum sample storage
    - Delivery of sera

- **Future perspectives**
  - Quality control
  - Marker analysis
Acknowledgement

• Groups / committee
  • Internal working group (MOCA, Medical Oncology, Nutrition)
  • External working group

• Departments / people
  • Nutrition
  • Clinical Biology
  • Tumorbank@UZA
  • UA-LEMP
  • Statistician Dr. Kristien Wouters (Dep. Medical Director)

• External organizations / institutes
  • Ministry of Health and Belgian Cancer Plan
  • FOD
Access to Tumorbank@UZA

B. Peeters, Tumorbank manager
Sample Request procedure

1. Principal Investigator
   - Aanvraag indienen

2. Tumorbank UZA (Adm. Wet. coördinator MOCA)
   - Voorleggen van de aanvraag

3. Tumorbank adviesraad
   - Goedkeuring projectaanvraag

4. Ethisch comité UZA
   - Goedkeuring projectaanvraag

5. Tumorbank UZA (Adm. Wet. Coördinator MOCA)
   - HMTA en aanvraagformulier

6. Rapportering aan wetensch. stuurgroep MOCA

7. Distributie materiaal

8. Principal Investigator
   - Advies tumorcluster verantw.
**Sample Request Form + HMTA**

**Define material:**

<table>
<thead>
<tr>
<th>Type of material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh frozen tissue (10µm slide)*</td>
<td>Central</td>
</tr>
<tr>
<td>FFPE tissue (5µm slide)*</td>
<td>Central</td>
</tr>
<tr>
<td>Serum (0.5 ml/tube)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of material</th>
<th>Amount of requested samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh frozen tissue (10µm slide)*</td>
<td>Central</td>
</tr>
<tr>
<td>FFPE tissue (5µm slide)*</td>
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</tr>
<tr>
<td>Serum (0.5 ml/tube)</td>
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</tr>
</tbody>
</table>

*Organ (‘ICD-O or CODAP’ coding): ...............................................................*

*Diagnosis (‘ICD-O or CODAP’ coding): ..........................................................

*Other specifications (i.e. RNA integrity): ..................................................

**Additional data needed?**.............................................................................
Members of advisory board

- Chairman (V)
- Medical Oncologist (V)
- Pathologist (V)
- 2 x surgical disciplines (V)
- 2 x non-surgical disciplines (V)
- Ethics committee (V)
- Medical board (A)
- Medical director (A)
- Biobank manager (A)
- MOCA admin. research assistant (D)
**Sample Request procedure**

**Evaluatiecriteria voor projectaanvraag met stalen uit Tumorbank**

Gelieve volgende criteria positief (+) of negatief (-) te advisereren

**Project titel:**

**Naam adviesgever:**

<table>
<thead>
<tr>
<th>Relevantie naar oncologie</th>
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<td>Haalbaarheid/Beschikbaarheid stalen</td>
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<td>Wetenschappelijke waarde en valorisatie</td>
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<td>Funding</td>
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**Overwegend advies**

**Motivatie advies:**
Information

- [www.uza.be/Research](http://www.uza.be/Research) → Tumorbank
- UZA intranet → Research → Tumorbank

Contact: [Tumorbank@uza.be](mailto:Tumorbank@uza.be)
Acknowledgement

Steering committee
M. Peeters          G. Smits
P. Pauwels          K.J. Cheung
P. Jorens           E. Meulemans
E. Smits            K. Lesage
V. De Vroey         L. Luyten
B. Peeters          A. De Wilde

MOCA
Thank you!