Biobanking in the German Centers for Health Research

P. Schirmacher
Institute of Pathology
University of Heidelberg
Coordinator Biobanking

DKTK, DZIF, DZG-Working Group Biobanking/IT
The German Centres for Health Research

• Fighting major disease challenges
• Coordination of competences → Translational Research, Core infrastructures
• Six centres:
  • Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE, 2009)
  • Deutsches Zentrum für Diabetesforschung (DZD, 2009)
  • Deutsches Zentrum für Herz-Kreislauf-Forschung (DZHK, 2012)
  • Deutsches Zentrum für Lungenforschung (DZL, 2012)
  • Deutsches Zentrum für Infektionsforschung (DZIF, 2012)
  • Deutsches Konsortiums für Translationale Krebsforschung (DKTK, 2012)

Different organisational and decision-making structures!
Aims of the DZGs

- Sustainable partnerships between Universities, University Hospitals and external Research Institutions (coordination by Helmholtz Center)
- Bundling of competences → Translational Research
- Development of infrastructures (IT, Biobanks, Data management etc.)

Cooperation of the DZGs:
- Public Relation
- Drug design
- Biobanking, IT & Data management

Reviewed by Joint Steering Board
DZGs

Common:
– One coordinating Helmholtz-Centre
– Incremental funding over 1st period
– Sustainability concept
– Review after 1st funding period (ongoing)
– Strong structural/core concept

Differences:
– Multiple partly overlapping locations (5-9)
– Different internal structures (governance)
– Different time lines (2009-12)
– Different challenges (entities)

Using (local) synergies and cooperative potential
Positioning of DZG-Biobanking

- DZGs
- cBMBs/GBN, TMF (WG Biobanking)
- WG CCCs (WG Tissue banking),
- Other Research Networks (SFBs, Epidemiology (NatKo))

Most powerful supportive structure for biobanking (focus, user network/outreach, sustainability)
German Center for Lung Research (DZL)

Achievements (2012-2015)

• Implementation of a DZL-biobanking portal: searchable data base for existing (retrospective) biomaterials

• Harmonization of documents and procedures related to biobanking: broad IC form, SOPs, by-laws regulating use & access to biomaterials/data

• Development of a data management structure: data protection concept, centralized DZL-data warehouse, software solutions for DZL centralized Pat- and Lab-ID generation, Data harmonization pilot projects
German Center for Lung Research (DZL)

Goals (2016-2020)

• Full implementation of a centralized, automated, pseudonymized patient data warehouse and decentralized biospecimen repository

• Full setup and operation of the DZL central DWH

• Prospective sampling of biospecimen from all types of pulmonary patient cohorts

• Integration and harmonization of already existing phenotyping tools, clinical registries, cohorts and biomaterial collections

• Integration of biomaterial-based "omics data, linkage of imaging to phenotyping data

• Development and implementation of guidelines for quality management: SOPs, QM measures/biobanking standard, site-specific teaching of biobank issues

• Network activities with other DZGs and biobank structures within Germany
Biobanking Challenges

- Decentral (inhomogeneous) structures at the partner sites
- -> Standardization and Harmonization:
  - DZHK Infrastructure
    - Use & Access Rules
    - Data Protection
    - Ethical approval
    - SOPs
    - IT-Infrastructure
Scientific Infrastructure for Clinical Research

- Post hoc concept (developed in first period)
- Strong central coordination; decentral storage
- Prospective/trial-based concept
The German Center for Diabetes Research (DZD)

Research for a Future without Diabetes

- Founded 2009
- > 250 Scientists
- Excellently evaluated in 2014

**Biobanking Activities**

- Preexisting Biosamples > Biobanks in the BBMRI catalogue
- Novel study-derived Biosamples

**IT Activities**

- Data and Knowledge Management
Novel Study-derived Biosamples

1st Phase: Centralized Management – Local Storage
(On-going clinical studies)

1. Samples taken locally at DZD clinical study sites
2. Storage and sample management (LIMS) at the leading study centers (Tübingen, Düsseldorf)
3. Project management of applications at the Head Office
Novel Study-derived Biosamples

2nd Phase: Centralized Biobank and Data Management
(Future clinical studies)

1. **Samples** taken locally at DZD clinical studies

2. **Storage** and sample management (LIMS) centralized at the Helmholtz Zentrum München (service provider)

3. **Project management of applications** at the Head Office in Munich
Data and Knowledge Management - *Added value by sharing knowledge (under development)*

Aim: building up knowledge management environment that offers the big picture of locally available data at DZD partner sites. Established e-infrastructures and communication structures will be linked with novel IT solutions.
German Center for Neurodegenerative Diseases (DZNE)

- **2009** 3 April: Foundation of DZNE
- Single Helmholtz center, 9 sites

**Mission:**
understand causes and risk factors leading to predisposition for neurodegeneration and develop new therapeutic and health care strategies.

**Fields of research:**
- major neurodegenerative diseases (Alzheimer and other dementias, Parkinson disease)
- rare conditions (prion or Huntington disease).
Biobanking activities: next steps
• Central storage (biorepository) for all research areas in DZNE
• Storage: liquid N\textsubscript{2}

IT:
• DZNE-wide LIMS (Nautilus) for clinical and epidemiological biobanking

Translational by design:
• Basic research
• Clinical research
• Population research: epidemiology
• Health care research
DZIF Biobanking platform (2013-2015)

- Translational Infrastructure (TI)
- Decentral storage
- 3 main locations
- 3 columns: tissue, liquid, pathogens & microbial producer (until 2015; separated in 2016 (pathogens in TTU EI))

German Center for Infection Research (DZIF)
Key Achievements TI Biobanking:

- Establishment of **functional and active biobanking infrastructure** within DZIF; fully integrated within the **national** (GBN, TMF, other DZGs) and **international** (BBMRI) biobanking community.
- Support of >100 projects
- Compilation of **key disease collectives**; integration of focussed preexisting collectives (e.g. hepatitis)
- Implementation of **information platform** (Biobanking website [www.dzif-biobanking.de](http://www.dzif-biobanking.de)), Biobanking catalogue with more than 31 biobanks, specific DZIF sub-catalogue on pathogens linked to the novel metadata in BacDive ([http://bacdive.dsmz.de](http://bacdive.dsmz.de))
- Development of a **cost-calculation model**, and an **ethical and data protection concept**
- active support of DZIF **Tx-cohort development**.
- Selection of **central DZIF LIMS system** for DZIF-wide administration of common data sets for all prospective biomaterial collections (pilot project: Tx-cohort)
- Initiation and organization of the regular meetings within the **DZG Biobanking & IT working group**.
• Comprehensive votes (Heidelberg and Munich sites)
• Standardized Patient consent
   (informed, broad, retraction possible at any time)
• Standardized ethical vote(s)
   (Altruistic: no promise for further diagnostic use, feedback information, reimbursement)
• Data protection issues (see IT)

☐ Generic template for DZIF purposes available
☐ Cooperation with TX-Registry, TTU HIV, TTU Hepatitis
☐ Support & information

→ High effort to respect patient will
→ Basic frame for interchange of biomaterial (nationwide/international)
DZIF Biobanking Website:

- Representatives of partner sites
- Participating biobanks/partners
- Detailed information on available samples in biobanking catalogue
- Internal module of biobanking platform (exchange of information, protocols, quality management, ethical/legal issues)

Quality management
Liquids

- **Aim:** harmonized SOPs for biomaterials in DZIF

- **For liquids:**
  SOPs of German National Cohort:
  → worked out by expert group
  → used by other DZGs: DZL, DZHK, DZD

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DZIF Biobanking Catalogue

- Website
- >30 registered biobanks
- Accessible collectives, representatives, features
- Promotion
- Project management (application)
- Conformity with German Biobank Catalogue and BBMRI

Project Work

96 projects (8/2015):
- Tissue: 32
- Liquid: 40
- Pathogens: 24

Key support of TX-cohort (ongoing)
80 strains Mouse-Microbiome (Thomas Clavel, TUM) description of new taxa
50 *Clostridium difficile* strains (clinical isolates)
Testpanel for compound screening (TI Natural Compound Library)
key strains: MRSA, MRSE, *Arthrobacter mysorens*, *Streptococcus suis* (Gießen) genome sequencing
key strains: *Serratia marcescens*, *Enterobacter* sp., *E. coli* (Gießen)
pulmonary Microbiome: *Pseudomonas aeruginosa* strains (Hannover)
DZIF LIMS-next steps

- Fine-concept preparation with the provider and first test system ready by mid of 2016
- Definition of common minimal data set
- Interface to Tx-partner sites (blue) available in Q3 / 2016
- Catalogue and search function ready in Q4 2016
- Interface to residual DZIF partner sites with biosample collections (green) in Q1/ 2017

Provider: Kairos CentraxX
DZIF Biobanking -future

Priority project:
Support of the Tx-cohort with the focus on

- **Data management**: implementation of a central LIMS catalogue at the Munich site; Munich is in charge of the development of the infrastructure and implementation as well as the roll-out to the Tx-cohort sites; in a second step all other DZIF sites collecting biomaterials and the TTUs with cohort activities will be integrated

- **Quality management**: development of common and harmonized standard operating procedures (SOPs) and/or common minimal standards for sample retrieval especially avoiding pre-analytical artefacts, sample processing, transport and storage of biosamples

- **Tissue banking**: support of all biobanking activities and further set up special tissue specimen collections (annotation and ELSI support)
DZIF Biobanking -future

Estimated sample collection and utilization of the DZIF Tx-cohort 2016-2020
The German Consortium for Translational Cancer Research (DKTK):

Translational research program

Structural platforms
The German Consortium for Translational Cancer Research (DKTK):

DKTK CCP

- Steering Board
- Trial Board
  - Ad Hoc Committees
  - Scientific Working Groups
  - Disease Task Forces
  - CCP Bureau
    - 1 Coordinating Representative
    - Dresden Trial Center
    - Dresden Trial Center
    - Freiburg Trial Center
    - Heidelberg Trial Center
    - Tübingen Trial Center
    - Essen Trial Center
    - München Trial Center
    - Frankfurt Trial Center

CCP-Data

Biobank Platform
The German Consortium for Translational Cancer Research (DKTK):

The DKTK IT Concept

- **ZeBanC**
  - Klinische Daten
  - Krebsregister-Daten

- **TÜBINGEN**
  - Klinische Daten
  - Krebsregister-Daten

- **Standort 1**
  - Brückenkopf

- **Standort 2**
  - Brückenkopf

- **Standort 3**
  - Brückenkopf

- **Standort X**
  - Brückenkopf

**Zentrale Suche**

- **BMBH**
  - Klinische Daten
  - Krebsregister-Daten

- **Stakeholders**
  - **Klinische Daten**
  - **Biomaterial-Daten**
  - **Krebsregister-Daten**
The German Consortium for Translational Cancer Research (DKTK):

Mission of the biobanking platform:

- High quality biomaterials
- Enable research projects within DKTK
- Project quality and good scientific practice
- Trustee of users and partner biobanks
Biobanking Platform

**Coordinative Activities**

- Detailed site evaluations
- Biobanking-IT/Coordination with CCP-IT/Integration in CCP concept
- Harmonization of DZGs Biobanking
- Biobank Catalogue (BBMRI & German Biobank Catalogue conformity)
- Interaction with other national and international activities
The German Consortium for Translational Cancer Research (DKTK):

**Detailed Site Evaluations**

- **Biomaterials**: storage, degree of utilization, performance indicators, special collections...
- **Datamanagement**: Which data are available? How are they administered?
- **Qualitymanagement**: Is there an existing QMS? Which standards?
- **Projectmanagement**: Available? Standardized? Performance indicators?
- **ELSI**: ethical vote, informed consent & data protection rules

[Checkboxes indicating finished and date fixed]
## The German Consortium for Translational Cancer Research (DKTK):

### Biomaterial Availability

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Collection: ☐ = yes; ☐ = no
The German Consortium for Translational Cancer Research (DKTK):

Quality Management

- Freiburg
- Berlin
- Essen/Düsseldorf
- Dresden
- Frankfurt/Mainz
- München - TUM
- Tübingen
- München - LMU
- Heidelberg

DIN EN ISO/IEC 17020 planned
DIN EN ISO/IEC 17020 installed
DIN EN ISO 9001 installed
DIN EN ISO 9001 planned
The German Consortium for Translational Cancer Research (DKTK):

Biobanking Platform - Future

• Reach sustainability (2nd funding period)
• Complete harmonisation of all sites
• Complete integration in CCP-IT concept (bridgeheads)
• Harmonisation with other activities (DKH-CCCs; joint board)
• Increase project work
The German Centres for Health Research – Coordinative Biobanking (and IT) Issues

- Common ground on biobanking and IT in DZGs
  - Need for local and Meta-IT-Systems
  - Need for coordinated DZG-adapted biobanking
  - Lack of respective preexisting structures – need for implementation
  - Need for information and best practice exchange
  - Need for perception and sustainability
- Avoid conflicts and use synergies at multi-DZG sites
- Avoid unnecessary implementation work/mistakes – learn from the others
- Coordinate similar activities (lobbying, PR, training)

Need for coordination between DZG biobanking and IT structures
DZG WG Biobanking & IT

- 1st coordination meeting in (Munich; Nov 13)
- DZG management board (Frankfurt; Dec 2013)
- Consent on biobanking structures and interaction
- Defined Activities:
  - QM/SOP collections
  - Biobanking Catalogue
  - PR
  - Regular communication
  - DZG Boards statements (Controlling and reviewing parameters)
DZG Biobanking Catalogue

• Good DZG-wide documentation /overview
• Individual but harmonized BBMRI-compatible format

Laboratory Information Management System (LIMS)

• Different systems → interoperability challenges
• Using/expanding local synergies
Quality management for Biobanking

- Indispensable: comprehensive and structured quality management considering future certifications/accreditations
- SOP-collection
- Project management harmonisation
Statements of DZG WG Biobanking
Example Controlling and Reviewing of Biobanks

- 2014/15 First draft statement by WG
- 4-11/15 Adaptation, evolution, and interdisciplinary consent by German Cancer Aid (DKH) working group biobanking
- 11/15-2/16 Acceptance by
  - CCC Board of DKH
  - All 13 CCCs
  - DKTK Board
The German Centres for Health Research – Differences in Biobanking

- Preexisting biobanking structures?
- Sufficient prospective probes and data acquisition?
- Need/acceptance of centralisation
- Extent of interaction/interference with clinical structures
- Need for human bioprobes
- Different DZG organisational structure
- Different core structures concepts

Different organisational and decision-making structures!
The German Centres for Health Research – Biobanking

- Most powerful and sustainable biobanking support network
- Efficient implementation of biobanking in all DZG
- Different structures and aims due to inherent DZG differences
- Efficient internal harmonisation and information activity (DZG WG Biobanking and IT)
- Efficient work share with other national activities (GBN, TMF, WG CCCs)
- Clear future perspectives
The German Centres for Health Research – Biobanking Perspectives

- Assure sustainability of biobanking in DZGs (organisational & financial)
- Harmonisation of assessment and controlling rules
- Harmonisation of IT solutions (limited)
- Maintain coordinative platform (biobanking & IT WG)
- Joint activities
  - Catalogues
  - Outreach
  - International networking
Thank you!

DZGs
Coordination
Biobanking

DZG WG Biobanking & IT

BioMaterialBank
Heidelberg (BMBH)

L. Glück
E. Herpel
R. Kirsten