Iranian Childhood Cacer BioBank (ICCBB)

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19 &20-06-1404


بسم الله الرحمن الرحیم


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WHAT'S NEXT 2009
Biobanks
By Alice Park Thursday, Mar. 12, 2009
Now that major banks in the U.S. are getting by on a government bailout, the idea of creating yet another repository to safeguard your most valuable assets might seem downright ludicrous. And even irresponsible. But that's exactly what some federal officials are hoping to do.
Relax — it's not your money they're after. It's your blood. Folks at the National Cancer Institute (NCI) are heading up an effort to establish the U.S.'s first national biobank — a safe house for tissue samples, tumor cells, DNA and, yes, even blood — that would be used for research into new treatments for diseases.
8 of 10
VIEW ALL
Inside Huntsman Cancer Institute's vaults. Pancreatic
Lance W. Clayton for TIME

Biobank: Definition

- An organized collection of human **biological material**
- **The associated data**, stored in a readily **analysable format**
- for a **population** or a large subset of a population

Source: OECD - Creation and Governance of Human Genetic Research Databases, OECD. Paris – 2006

Different Types of Biobanks

- Human, microorganisms, animals, plants
- Biomedical research
- Medical archives
- Therapy
  - Blood banks
  - Bone marrow
  - Cord blood
  - Stem cells
  - Organs

Clinical Samples: Opportunities

- Tissues, blood, saliva, urine, feces, cells, hair, nail
  - Discovery of **gene function**
  - Identification of **disease relevance** of genes
  - Identification of new **targets for drug** discovery
  - Identification and **validation of biomarkers** for individualized therapy
- Biobanks as biological resources along with patient-related data are required for **personalized medicine ,basic, clinical and translational research**.

Biobank Formats

- Population-based
  - Random cohorts
  - Twin-registries
  - Population isolates
  - Entire cohort
- Disease-oriented
  - Disease-specific cohorts
  - **Tissue banks**

Childhood Cancer and Blood Research (CCBR) BioBank, BC Children's Hospital, Vancouver, BC

The aim of the CCBR BioBank is to provide researchers with high quality biospecimens from pediatric patients with blood disorders in an ethical manner.

The CCBR BioBank

The CCBR BioBank was established in September 2011 to collect and store biospecimens from pediatric patients with hematological disorders. The CCBR is governed by fo
a management
committee and

Patients who d
BioBank under
biospecimens
research proje
will be used i
board (REB) a
by a committe
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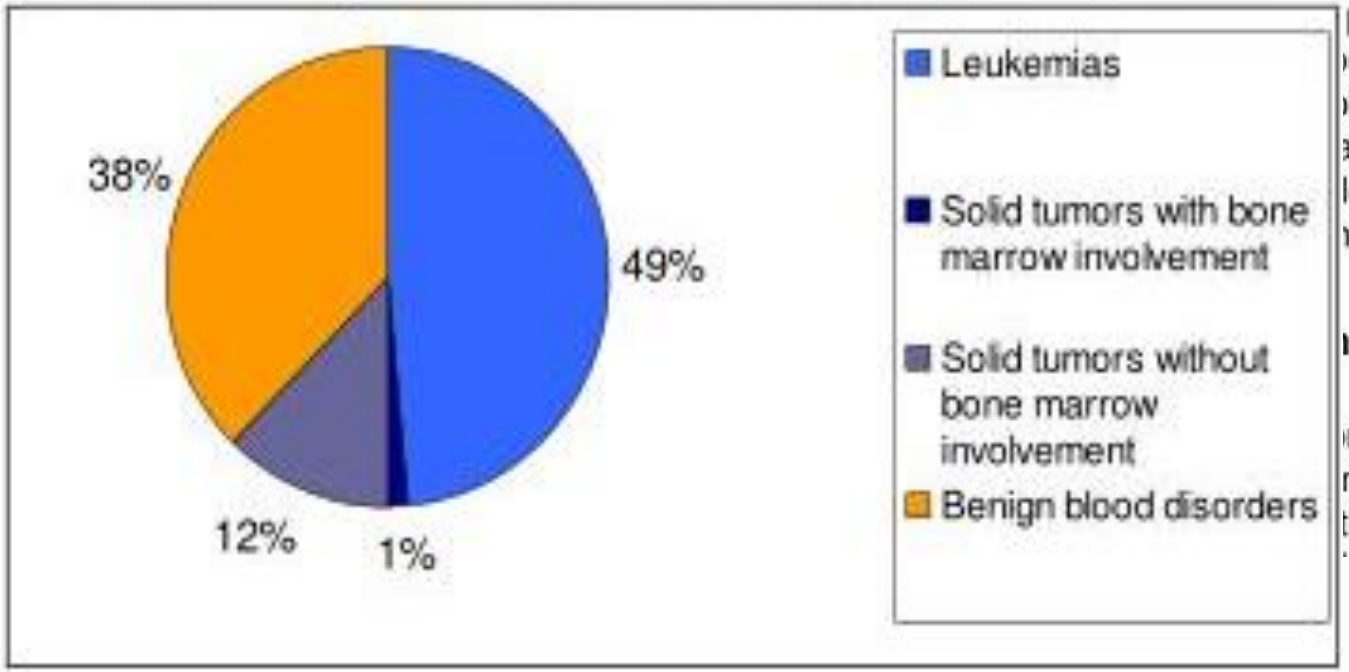

Mouse expansions

The CCBR BioBank has the ability to expand our acute lymphoblastic leukemia cells in immune deficient mice allowing us to generate >100 times the number of

purposes. This
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al evaluations,
low cytometry
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the application.

Why are **modern** Biobanks needed?

Traditionally, human biological samples are collected by individual researchers in academic organizations. Limitations include:

- Too **few number of patients**
- **Non-standardized :**
  - sample **collection and processing**
  - Storage space **quality and quantity**
- **Utilization** of samples usual suboptimal: consent that limits the use of samples
- **Heavy bureaucracy**, limited project time
- Limitations in **bioinformatics and biostatistics**

When biobanking professionally?

- **<u>Good quality</u> human biological samples, linked to a <u>up-to-date clinical database</u>, are a prerequisite for contemporary translational studies using** modern laboratory techniques :
  - **Sample collecting protocols** are **plain and reproducible**
  - You know **where** your samples are and **how many** you have
  - You know how much there is sample **left**
  - **Identification** of the tube is clear
  - **Sample quality** is being checked **during storage**
  - Sample processing and storage **steps are recorded**
  - Sample related **data is recorded**

Why biobank FRESH TISSUE?

- **Fresh-frozen tissues** provide **a long time molecular 'snap shot in time'** of what is happening in a cancer or other pathological tissues to identify the underlying cause of the disease :
  - Histopathological data from Formalin Fixed Parafin Embded (FFPE)
  - DNA,
  - RNA and
  - Proteins,Enzymes,etc.
- **The material is very valuable as it is from real life human illnesses** and usually is in very short supply.
- A good specimen is qualified as having **over 75% cancer cells** , **without effect on patient diagnosis**

A selection of fresh tissue preservation techniques

Parameters considered	Celluar morphology	Biomolecule preservation/ extraction	Ease of use	Cost
Snap freezing	Poor/temp cycling	Initially excellent, limited rounds of freeze/thaw Poor morphology	Pathologist, liquid N_2 Local -80°C freezer	High
OCT embedded	Poor/temp cycling	Proteins not Available for mass spect	Same as above	High
Paxgene (Qiagen)	Literature says good	Literature says good, patiented extraction kit	Two vials of solution required	Very high
RNA later (Ambion)	Poor/not used For diagnostics	RNA good DNA extraction phen:chloro	Good RNA Poor DNA	High

Biospecimen Vacuum System

Your choice of fixation protocols

Formalin fixation? ☑ **Yes**
Selected blocks are inserted in cassettes for fixation in formalin under controlled conditions (eg. FixSTATION)

Molecular studies? ☑ **Yes**
Specimen can be fixed in an ethanol based molecular fixative (eg. FineFIX).

Tissue banking? ☑ **Yes**
Selected blocks can be frozen for tissue banking.

Standardization and documentation of the pre-analytical step

MILESTONE
HELPING PATIENTS

FORMALIN-FREE

TissueSAFE
High vacuum biospecimens transfer system

An integrated hospital biobanking needs to know/control/document all of these processes

Measure in Minutes

Measure in Years

Pre-acquisition

- Antibiotics
- Other drugs
- Type of anesthesia
- Anesthesia duratior
- Arterial clamp time
  - Warm Ischemia
  - Cold Ischemia

Acquisition

- Processing Time
- Temperature
  - Warm Ischemia
  - Cold Ischemia
- Fixation Agent
- SOP's / Workinstructions

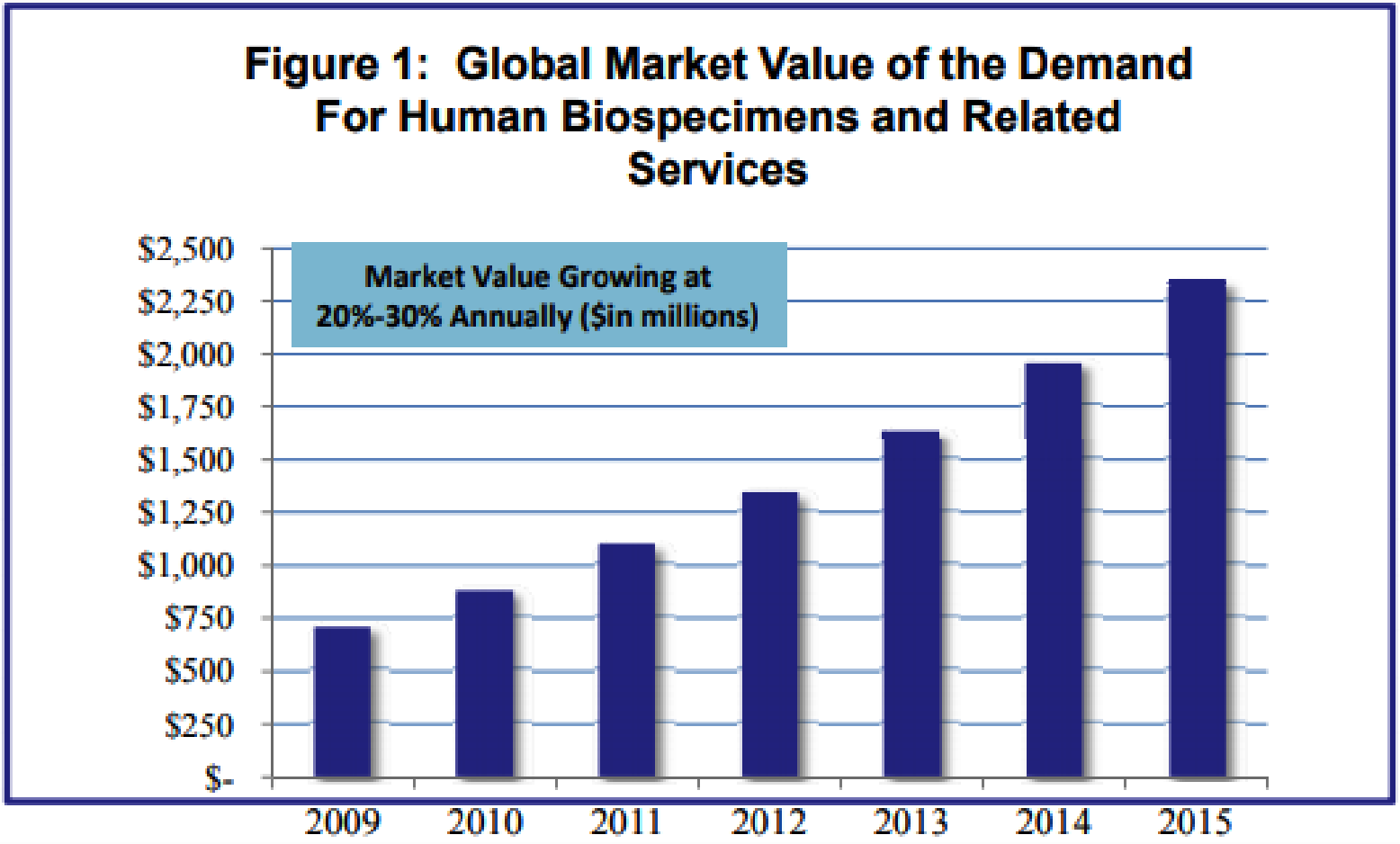
Post Acquisitior

- Storage Media
- Storage Method
- Storage Temperature
- Quality Controls
- Pathology Review
- Disease Site
- Clinical Data
- Data Standards
- SOP's / Workinstructions

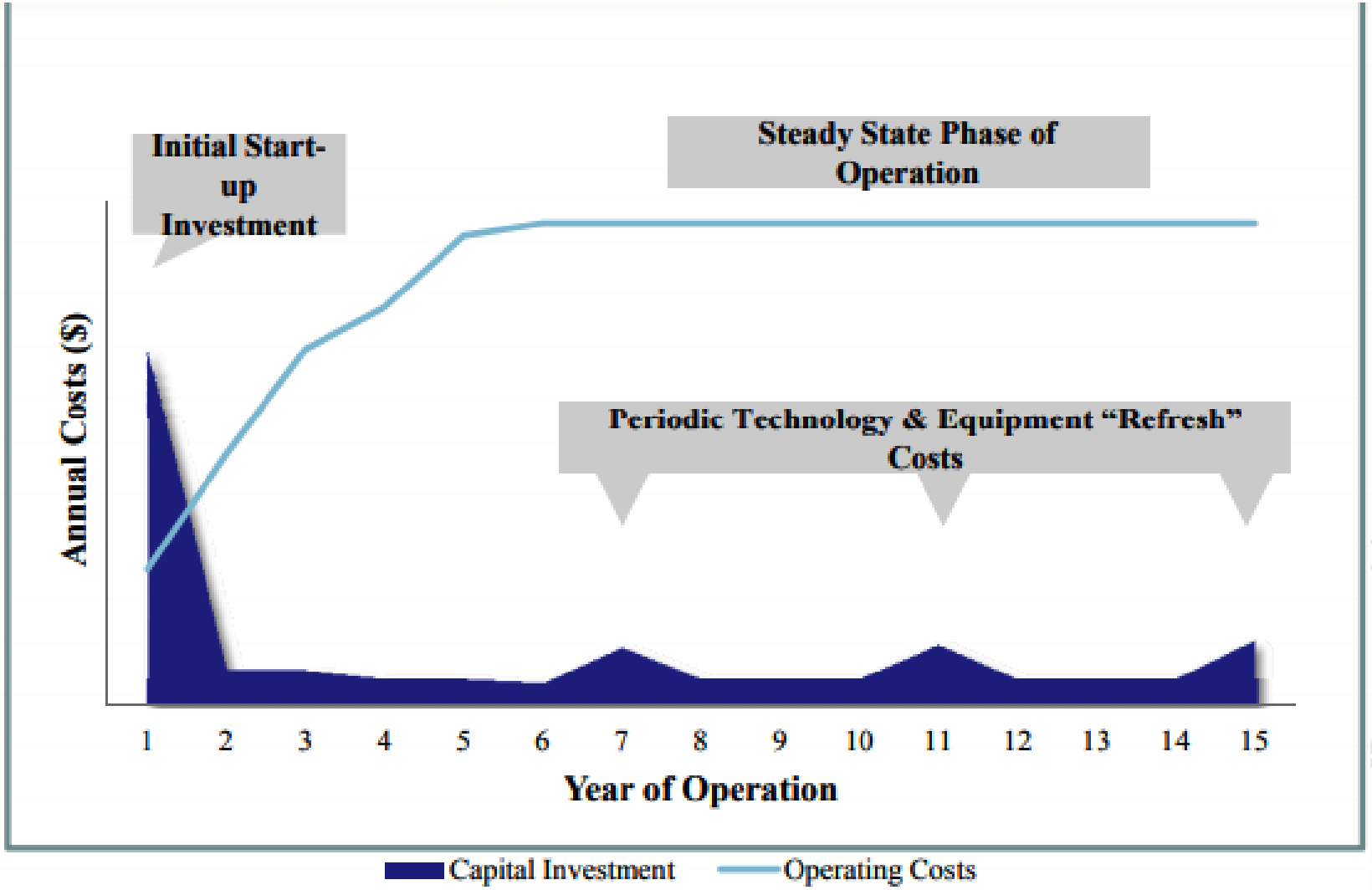
Release

- Study Design
- Multidisciplinary
- Ethics
- Statistics
- Equipment
- Cohort Definition
- SOP's / Workinstructions
- Material Transfer Agreement

Global market demand for biospecimens

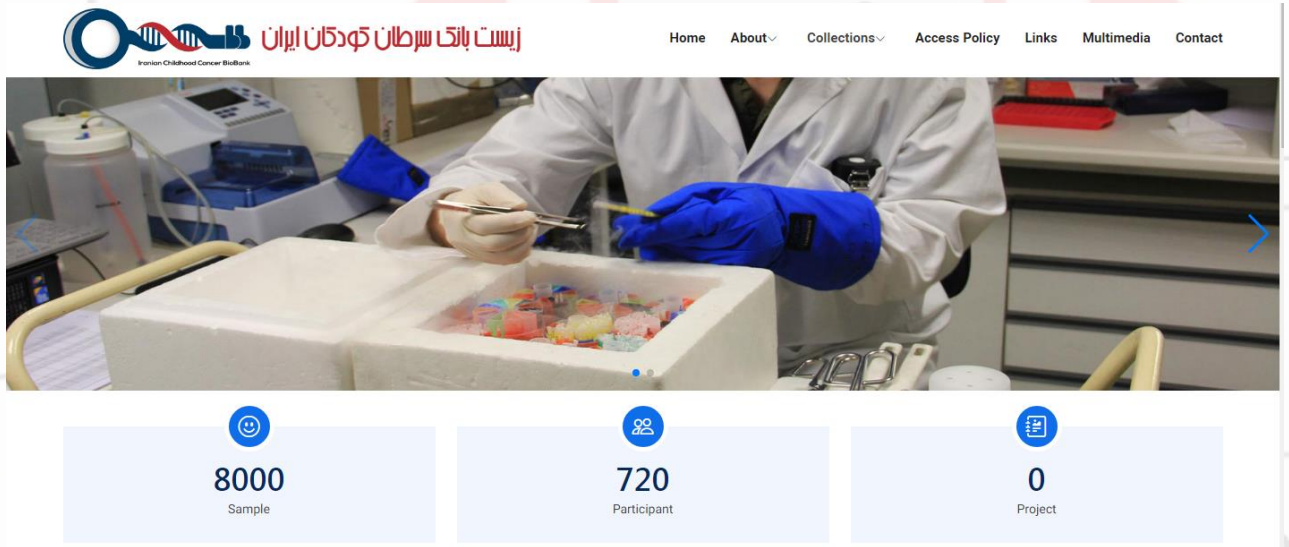


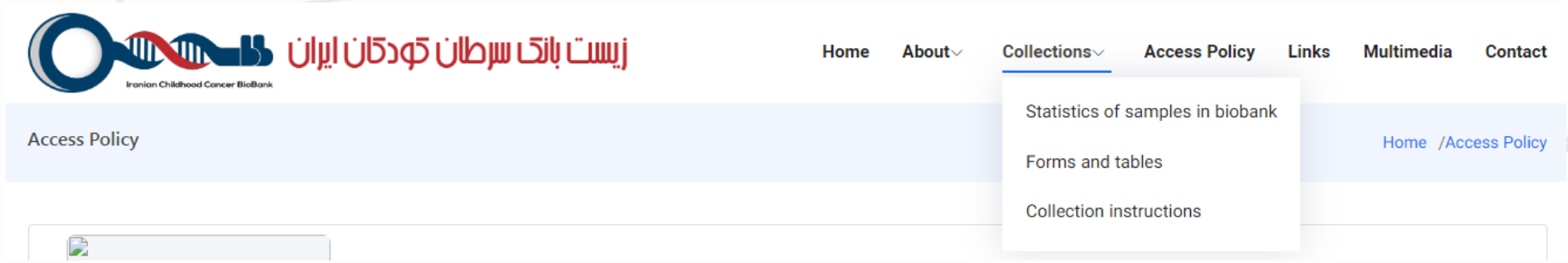
Biobank Total Cost of Ownership



Iranian Childhood Cacer BioBank (ICCBB)

https://iccbb.ir/En





Introduction

- Iranian Children's Cancer Biobank (ICCBB) is **the first pediatric biobank center in Iran** aims to set up a **centralized biobank** to collect a variety of biological samples and associated clinical data in children with **newly diagnosed or relapsed in the age range of 0 to 18 years**

- Special challenges of pediatric cancer biobanks:
  - Low incidence in comparison with adult cancer
  - the need for a long-term collection of rare tumors,
  - high tumor diversity,
  - the difficulty of working with children, as well as the limited volume of samples (blood and tissue) in children

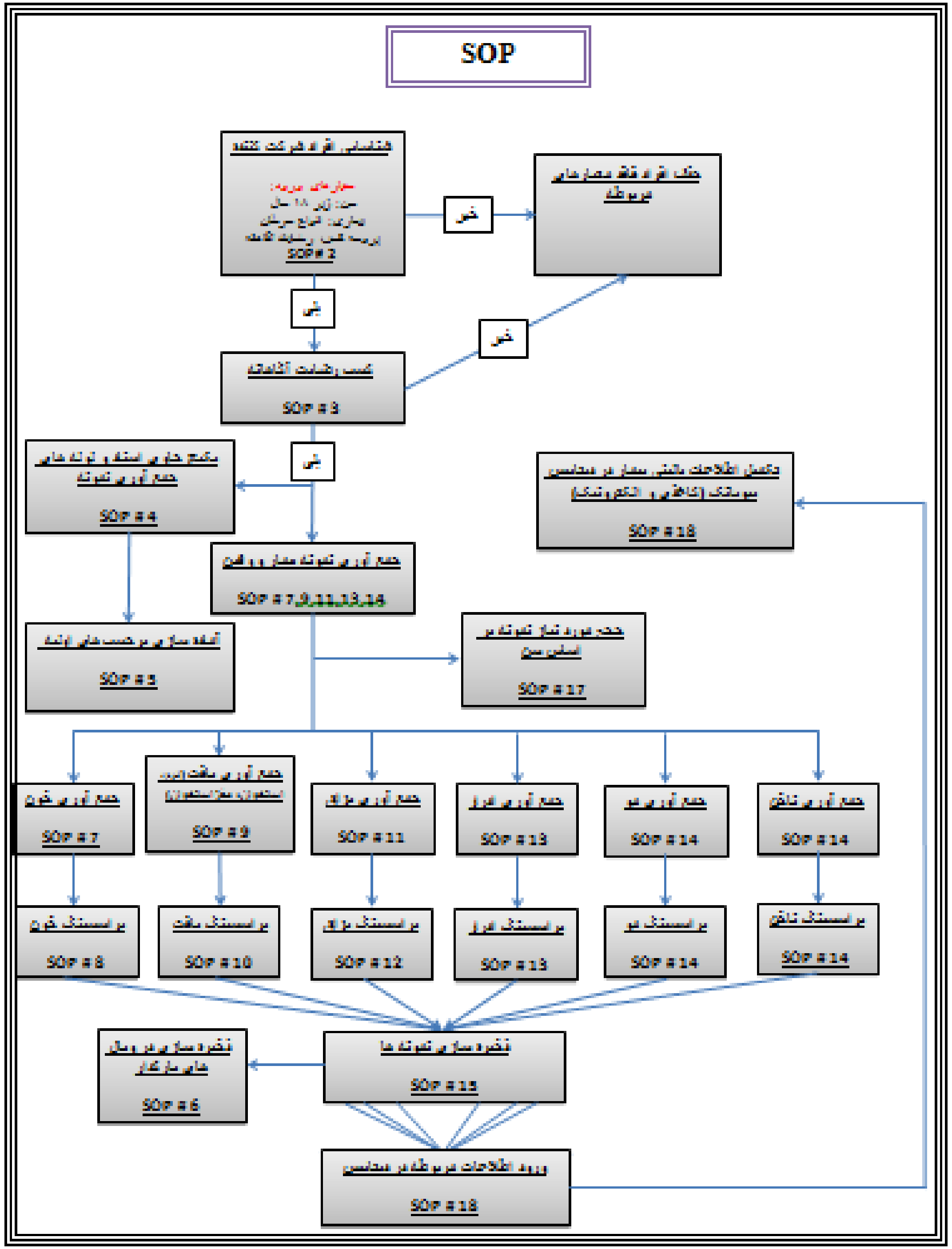
Requirements & Activities
(Sept.2016 to July 2022)

- **Proposal** accepted and the financial support provided by the National Institute of Medical Sciences and Research Development (**NIMAD) in 2016**
- **Ethical issues** was approved by the National Ethical Committee of the Ministry of Health and Medical Education of Iran **(IRnNIMAD REC 1396 061) in 2017**
- Well designed **Standard Operating Procedures (SOP)** for all aspects of the biobank procedures, including sample collection, processing, storage, and clinical data recording.
- Human power:
  - Enough , Expert and Cooperative
  - Coordination with surgeons, oncologists, and pathologists, nurses and all of the stalk holders of the centers in in three cities in Iran :Tehran,Mashad,Urmia

- **Setting up the ICCBB laboratory:**
  - Standard space and location for site (ICCBB is located at Mofid Hospital in Tehran, Iran)
    - Safe,**24H/7days** supervised and controllable
    - Good and **easy access for handling** of all of the equiepments
  - Purchase and Instalation of equipment: two (-80°C) freezers, a refrigerator, four liquid nitrogen tanks, four small portable transfer LN tanks, a class II biosafety cabinet, a centrifuge machine, a barcode scanner and label printer, a freezer temperature alarm system ,Tissue-safe vaccume transfer system.
- Recruiting patients and collecting samples, began in January 2017
- **Collection of samples** :Buffy coat PBMCs , serum and plasma, Bone marrow and tissue samples, hair and Urine from patients ,and blood samples from parents.
- **Storage of samples** :
  - All plasma, serum, and urine samples were stored in -80°C ultra-freezers located in the biobank room,
  - PBMC samples were stored at -80°C for 24 hours and then transferred to liquid nitrogen tanks (-196°C) for long-term storage.
  - Tissue samples were snap-frozen in liquid nitrogen and later transferred to -80°C freezers.
- **Online database of clinical data and another database for tracking the location of each sample in freezers**

Special measures of ICCBB

- Collecting and storing a variety of biological samples from patients (including plasma, PBMC, serum, urine, and hair) and their parents (plasma and PBMC),
- Cooperation with inter-university centers outside of Tehran (Mashhad and Uremia)
- Using the vacume system (TissueSAFE® device) to preserve the tissue in a fresh way for the first time in Iran,
- launching an online database to recording medical data
- Finally setting up a bilingual website for announcing at the national and international levels


SOP
SOP# 2
SOP # 3
SOP # 4
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SOP # 17
SOP # 7
SOP # 9
SOP # 11
SOP # 13
SOP # 14
SOP # 14
SOP # 8
SOP # 10
SOP # 12
SOP # 13
SOP # 14
SOP # 14
SOP # 15
SOP # 6
SOP # 18

یافته های آزمایشگاهی

نوبت ویزیت : اول

WBC (count) :			
PMN :		L :	
MONO :		EOS :	
Blast :			
Others :			
RBC :		HB :	
Pr :		Glu :	
Hct :		MCV :	
MCH :		MCHC :	
PLT :		RDW :	
MPV :		Ferritin :	
LDH :		Alpha-fetoprotein :	
B-HCG :		VMA 24 hr urine :	
HVA 24 hr urine :		Fibrinogen :	

☐ تجمع مایع در پریکارد

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Original article

The Iranian Childhood Cancer Biobank

Peyman Eshghi [1], Nasrin Dehghan-Nayeri [1*], Maryam Kazemi Aghdam [2], Yalda Nilipour [2], Mohsen Rouzrokh [3], Zahra Badiei [4], Hamid Farhangi [4], Mehran Noroozi [5], Hasan Reza Mohammadi [6], Ehsan Moradi [6], Samin Alavi [1], Leily Mohajerzadeh [3], Shahin Shamsian [1], Ahmad Khaleghnejad Tabari [3], Javad Ghoroubi [3], Nader Momtazmanesh [1], Mehdi Sarafi [3], Reza Shojaeian [7], Paria Dehghanian [8], Parastoo Molaei Tavana [9]

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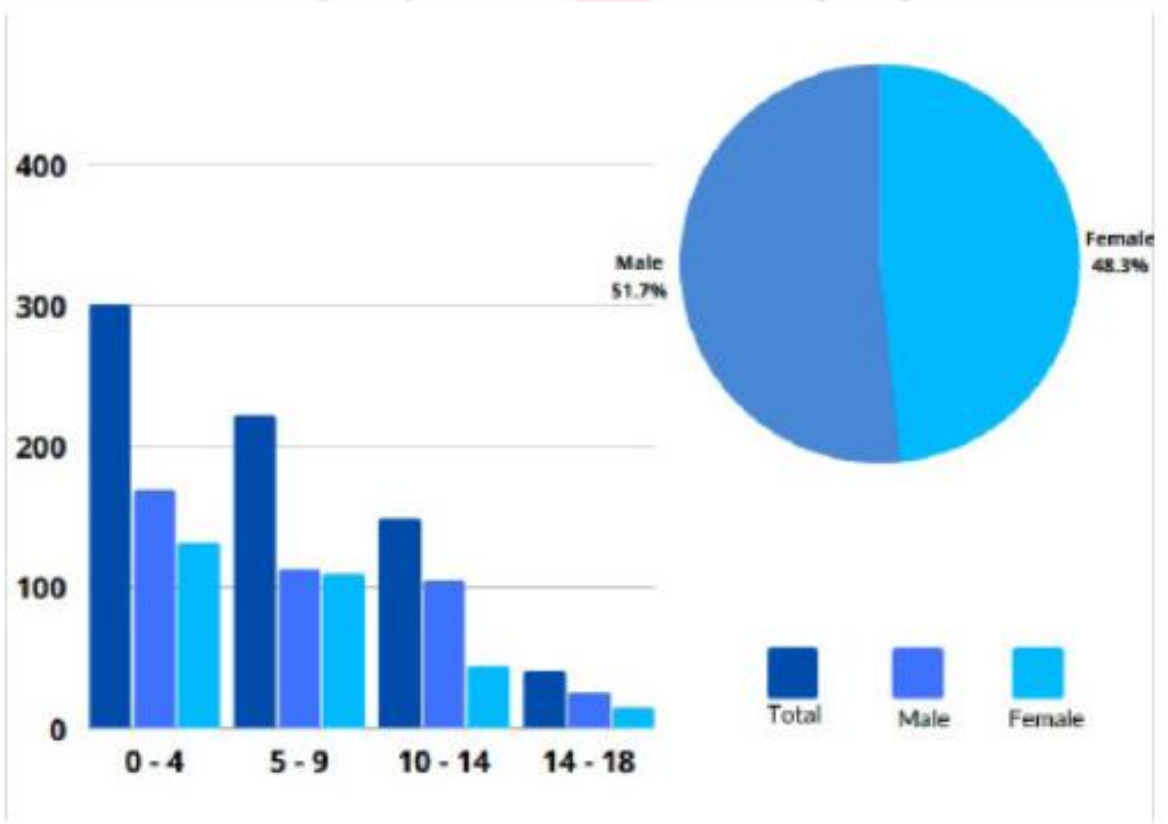


Figure 2 The umber and age-related percentages of collected samples

Totally, from January 2017 to July 2022 (three and a half years), 8,000 aliquoted samples from 720 patients and their parents have been processed and stored.

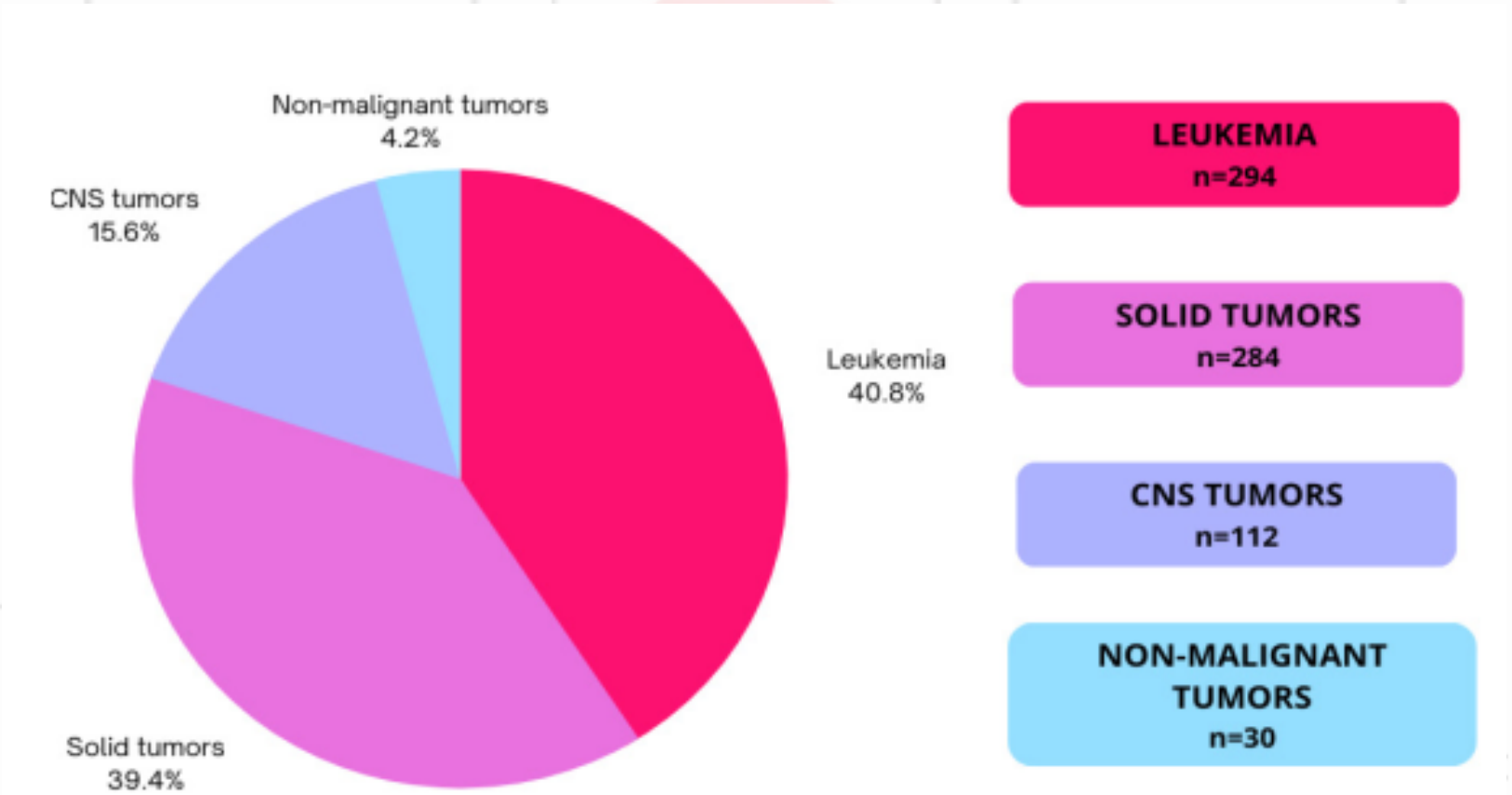


Figure 1. The number and percentage of collected samples

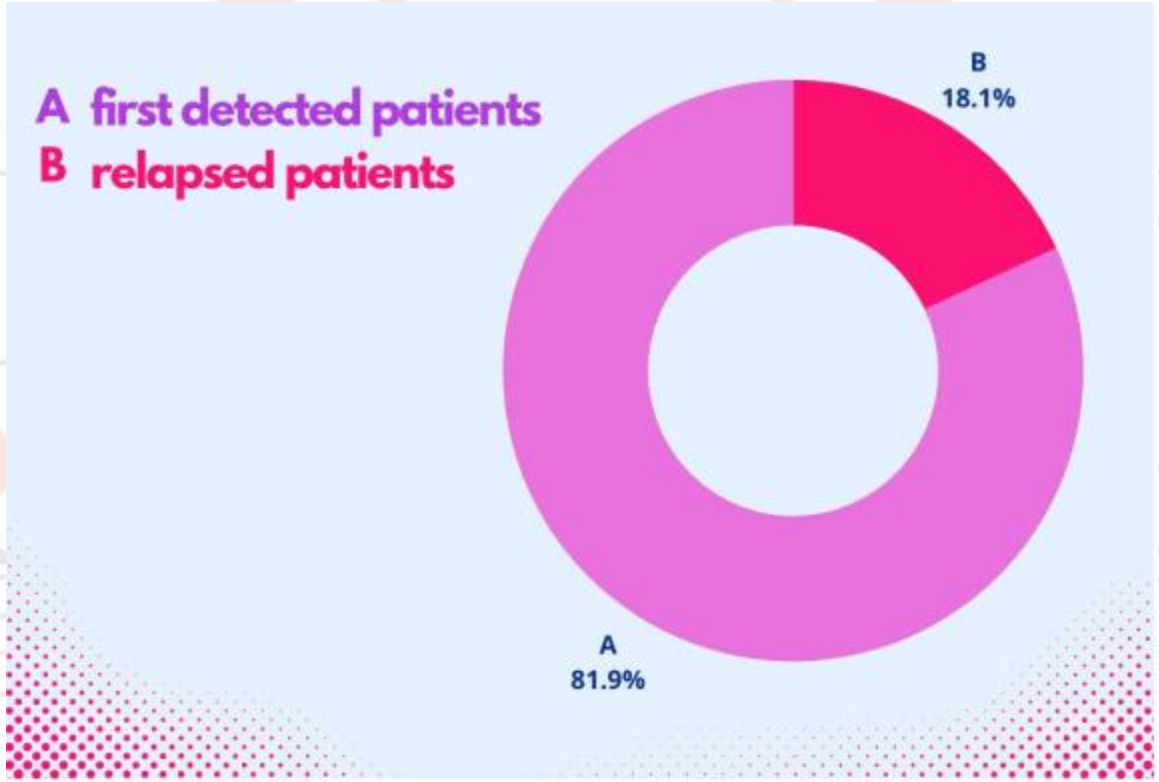
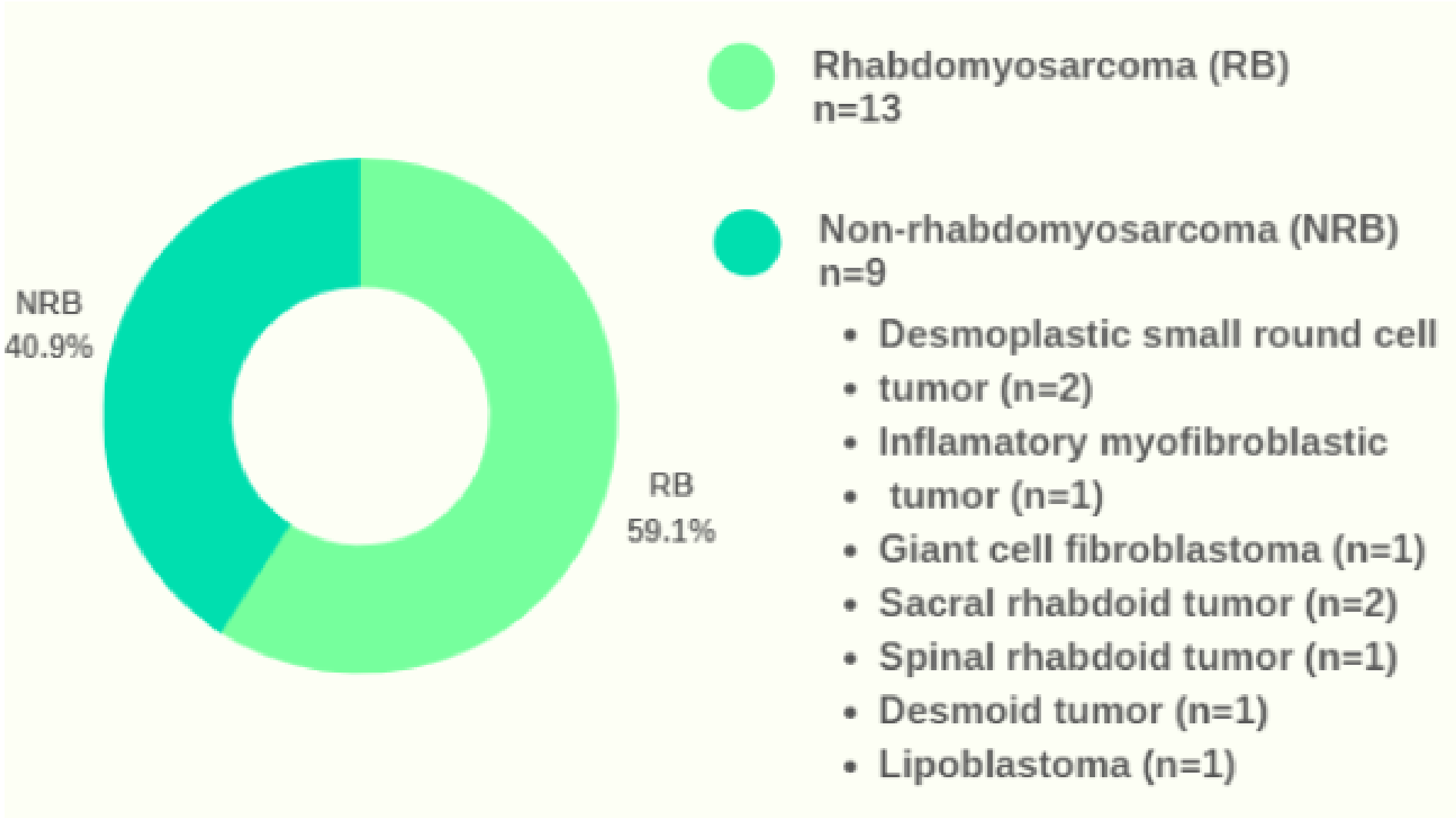
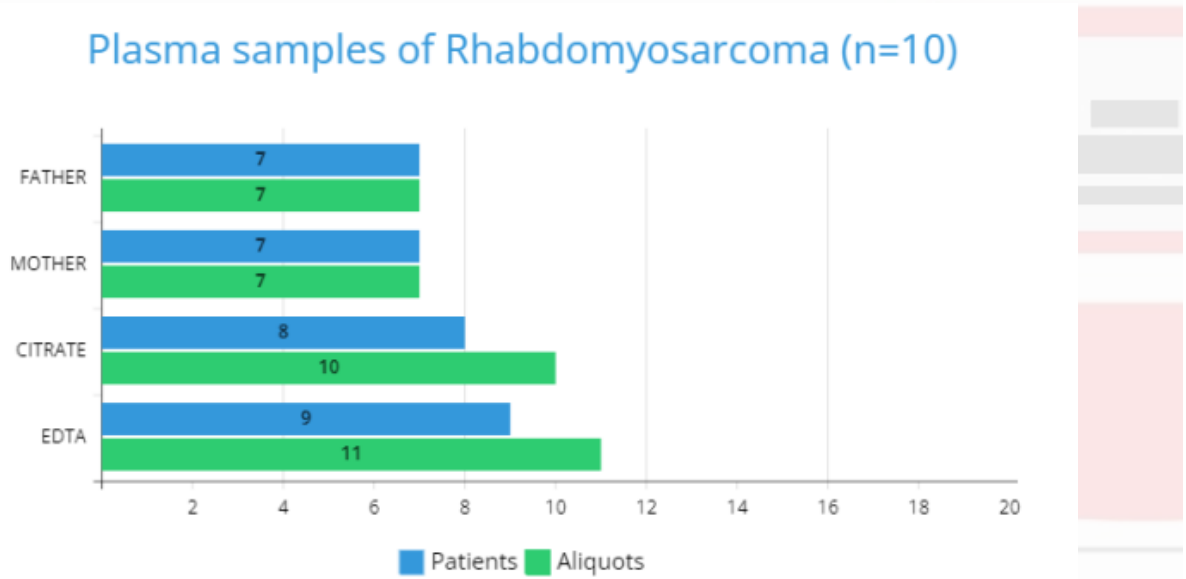


Figure 3. Percentages of new case patients and relapsed patients

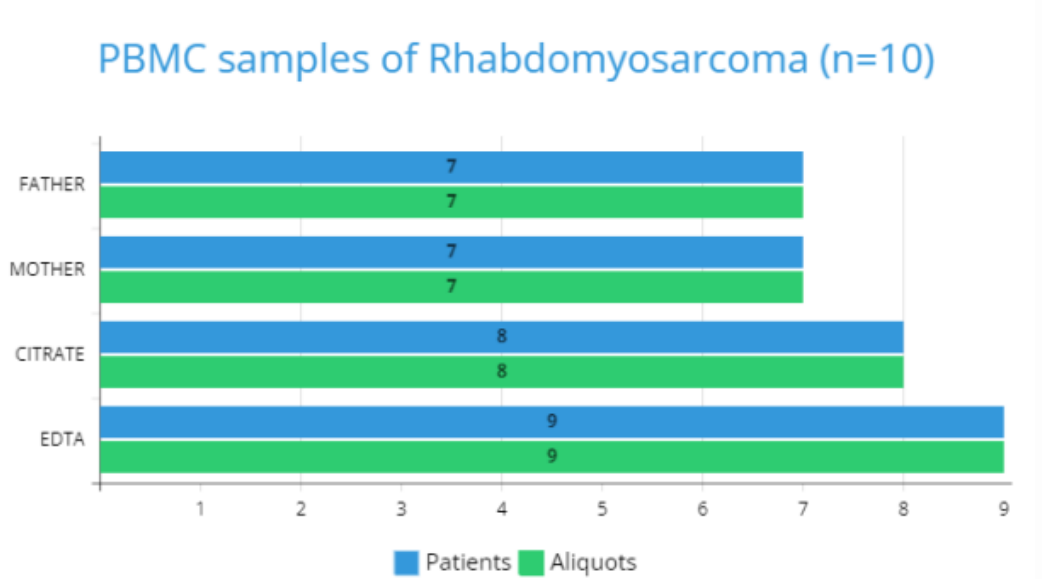
Table 1. The number and percentage of collected samples

Diagnosis		*Number of patients*	*Percentage of patients*
Leukemia		**294**	**40.83%**
	ALL	262	36.39%
	AML	28	3.89%
	CML	3	0.42%
	MPAL	1	0.14%
Solid tumors		**284**	**39.44%**
	Neuroblastoma tumors	88	12.22%
	Kidney tumors	77	10.69%
	Germ cell tumors	30	4.17%
	Liver tumors	23	3.19%
	Lymphoma tumors	22	3.06%
	Soft tissue tumors	22	3.06%
	PNET	7	0.97%
	Rare tumors	15	2.08%
CNS		**112**	**15.56%**
	Glioma	51	7.08%
	Ependymoma	17	2.36%
	Medulloblastoma	14	1.94%
	Craniopharyngioma	10	1.39%
	ATRT	9	1.25%
	Rare tumors	11	1.53 %
Other		**30**	**4.17%**
	Non-malignant tumors	30	4.17%


NRB
40.9%
RB
59.1%
Rhabdomyosarcoma (RB)
n=13
Non-rhabdomyosarcoma (NRB)
n=9
• Desmoplastic small round cell
• tumor (n=2)
• Inflamatory myofibroblastic
• tumor (n=1)
• Giant cell fibroblastoma (n=1)
• Sacral rhabdoid tumor (n=2)
• Spinal rhabdoid tumor (n=1)
• Desmoid tumor (n=1)
• Lipoblastoma (n=1)



شکل 31. تعداد نمونه های پلاسمای خون سیتراته و EDTA بیماران (و والدین) با تشخیص تومور رابدومیوسارکوما
(ستون سبز رنگ تعداد الیکوت های موجود و ستون آبی رنگ تعداد بیماران را نشان می دهد)



شکل 32. تعداد نمونه های PBMC خون سیتراته و EDTA بیماران (و والدین) با تشخیص تومور رابدومیوسارکوما
(ستون سبز رنگ تعداد الیکوت های موجود و ستون آبی رنگ تعداد بیماران را نشان می دهد)

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Review

The dispersion of pediatric cancer biobanks in the Middle East: a global review of available resources

Peyman Eshghi[1], Nasrin Dehghan-Nayeri[1]

[1]Pediatric Congenital Hematologic Disorders Research Center, Research Institute for Children's Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Table 1. The dispersion of pediatric cancer biobanks in the Middle East.

Biobank name	Country	Establishment year	Stored samples
KHCC biobank	Jordan	2011	tissue, blood, and bone marrow, tumor tissue
CCHEBBR	Egypt	2014	blood derivatives, CSF, and malignant/normal tissue samples
ICCBB	Iran	2017	fresh tissue (malignant), plasma, peripheral blood mononuclear cells from blood and bone marrow, serum, urine, and hair
SPCB	Qatar	2021	blood, tissue, and fluid samples


YDS-35
YDS-35B
YDS-35-L
YDS-35-80