Press Conference

President of JST

June, 2012

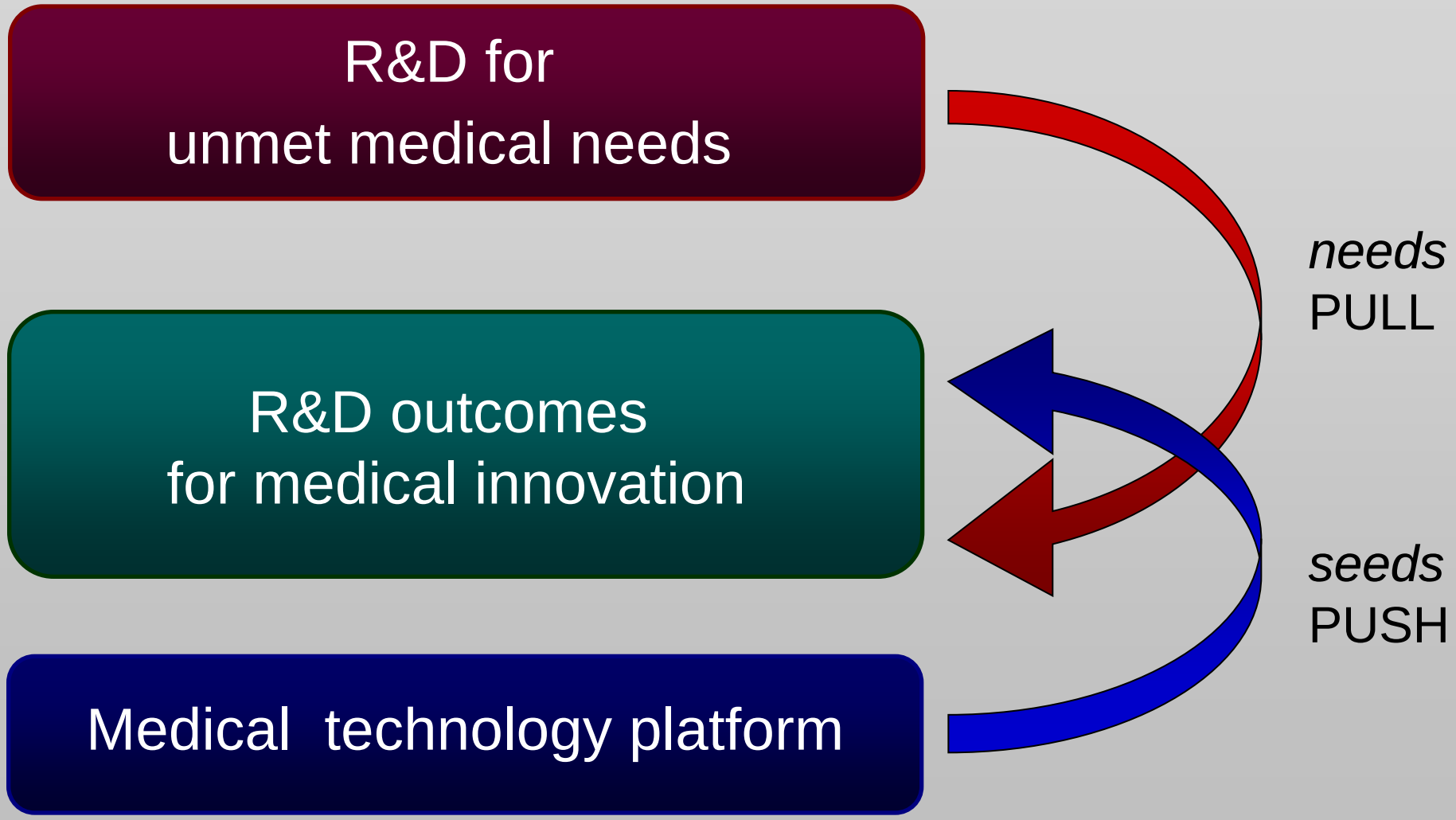
Agenda

1. JST Life Innovation Strategic Program Package
2. “Life-saving cancer research” MANO, Hiroyuki
3. Topics
   - Development of Power Outage Prevention Contact Network in the Kansai Region
   - Results of the survey on science education in elementary schools, FY 2010
   - On the opening of the Japan Link Center (JaLC)

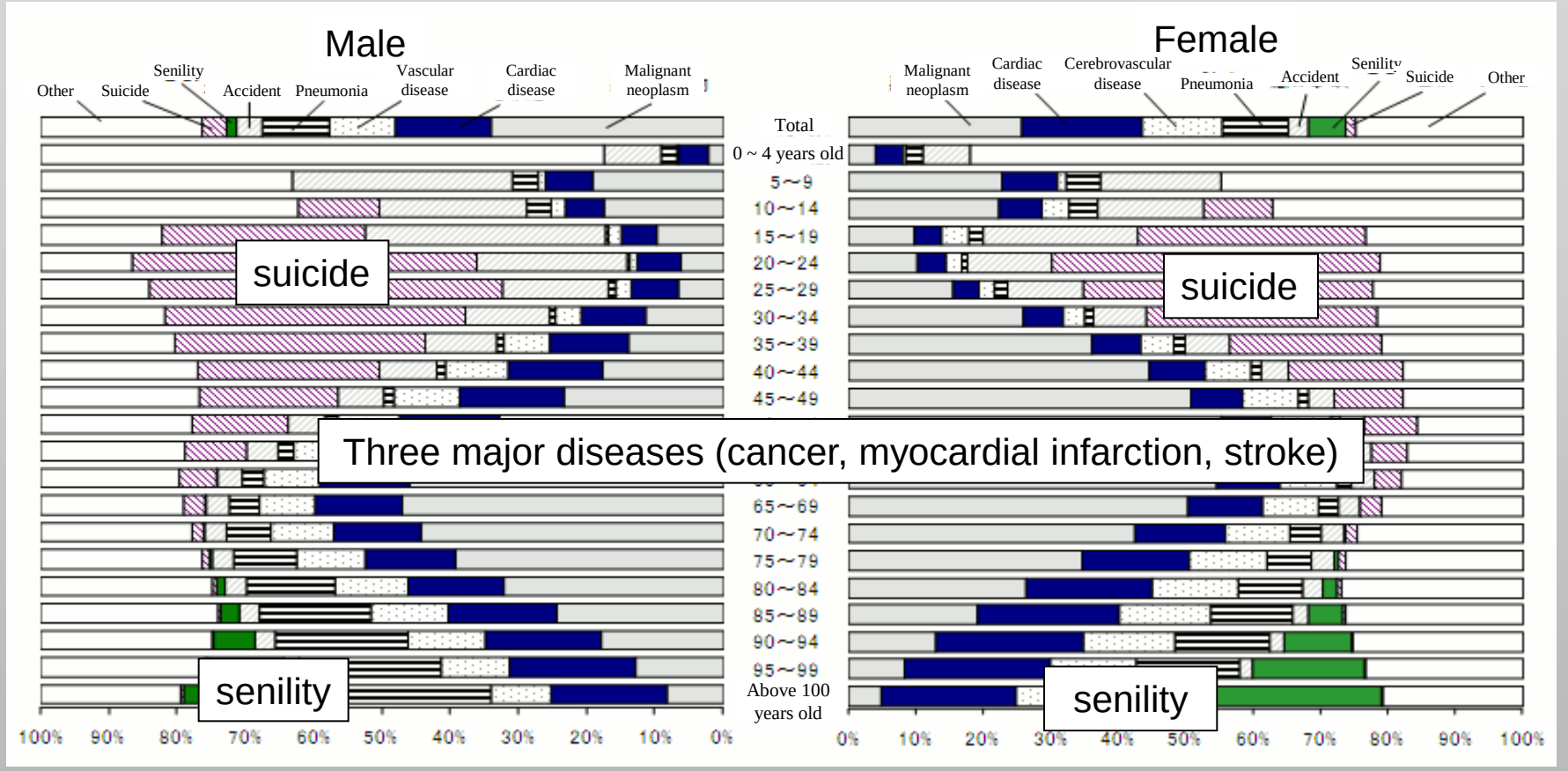
JST Life Innovation Strategic Program Package

The concept of the strategic program package

JST's stance on the life innovation strategy in the 4th S&T basic plan



Death by cause in Japan



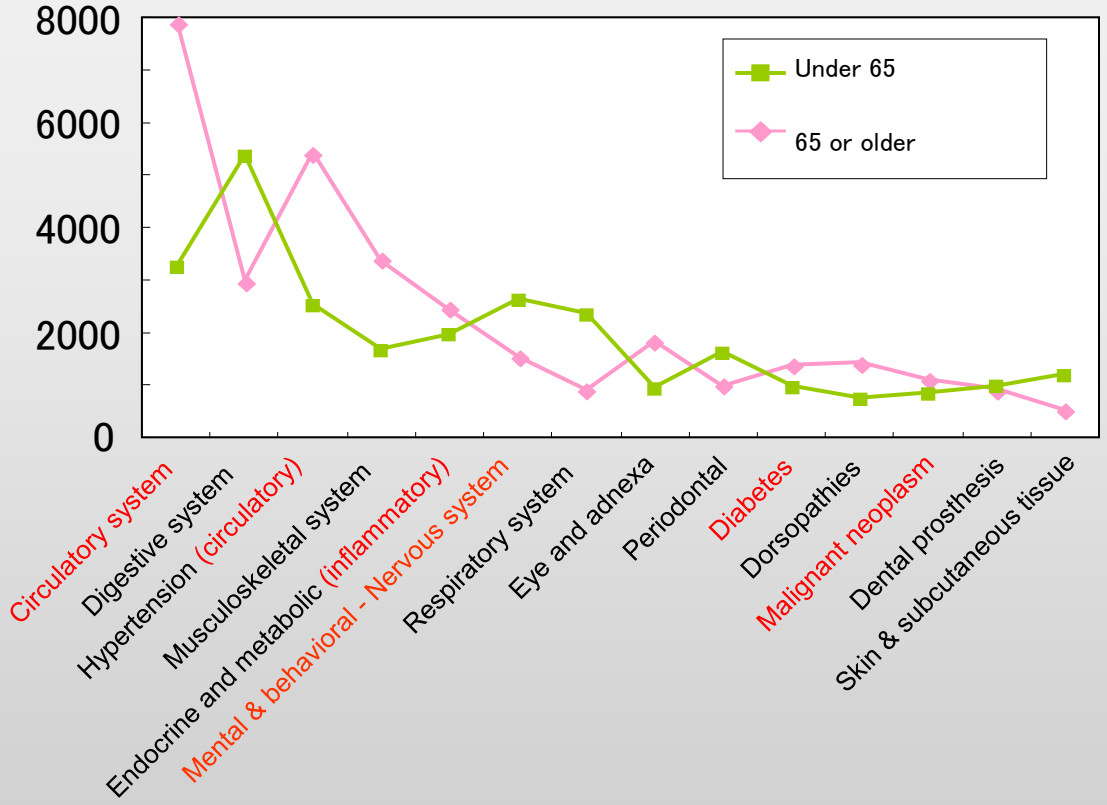
Majority of the senior citizens die of the three major causes.
Suicide is prominent in younger and middle-aged generation.

http://quality.seesaa.net/archives/201101-1.html From the website of Ministry of Health, Labour and Welfare

Patients in Japan

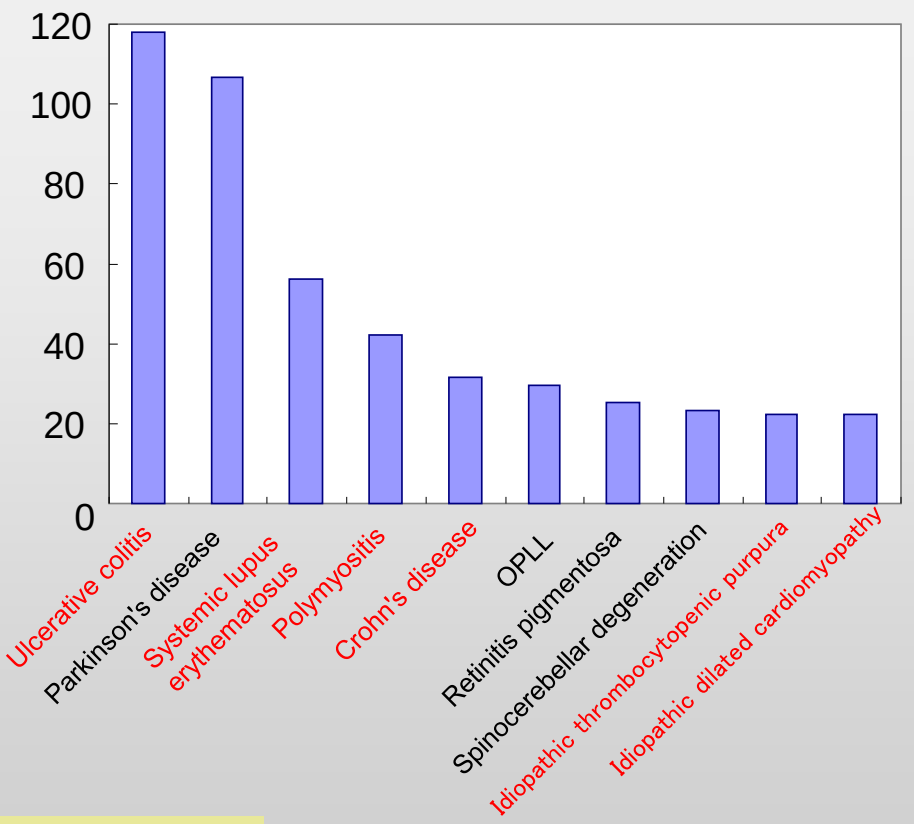
(thousand people)

Common disease types



(thousand people)

Intractable diseases

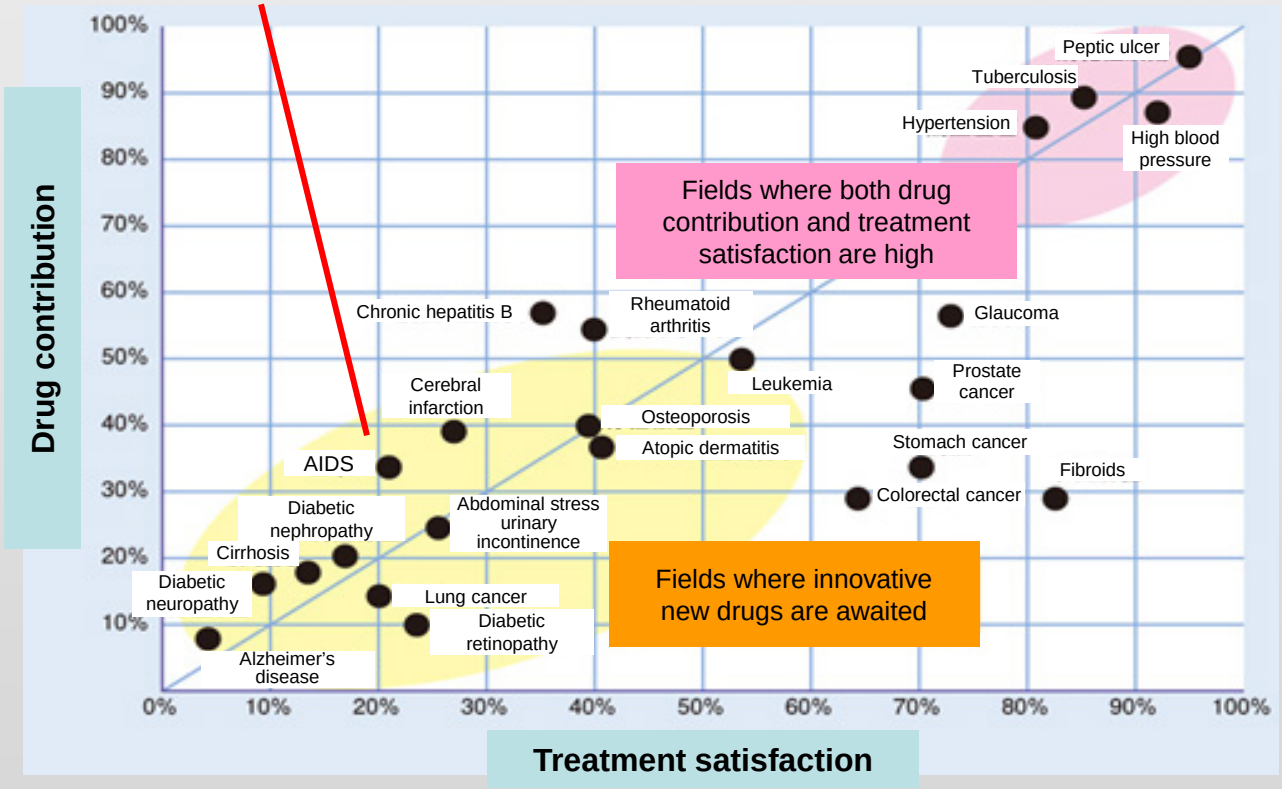


- Recently increasing diseases of the circulatory system*, neuropsychiatric disorders, lifestyle diseases ranked high on the list.
  (* Of the three major diseases, cardiac & cerebrovascular diseases are of the circulatory system.)
- Many intractable diseases are immune or inflammatory or of the circulatory system.

（MHLW FY2008 survey on patients ICD-10 major classifications Table no. 63 By total no. of patients, sex, age, and affliction Computed and partially revised based on the statistical charts
（MHLW FY2010 Public health administration reports Table no. 67 No. of holders of certificate for patients receiving treatment for special diseases (intractable diseases) Computed and partially revised based on the statistical charts

Satisfaction with treatment (unmet medical needs)

Alzheimer's disease
Three major complication of diabetes (nephropathy, retinopathy, neuropathy)
Some cancer (such as lung cancer)



Circulatory, mental disorders, nervous system diseases , in addition to cancer, need attention.

Source: JPMA guide (http://www.jpma.or.jp/about/issue/gratis/guide/guide10/10guide_06.html)
Correlation between Treatment Satisfaction and Drug Contribution (2005, respondents: medical doctors)

Healthcare expenditure and scale of the industry

National healthcare expenditure in FY 2009 = **36 trillion yen**

Hospitals (18.1) + medical centers (8.6) + dentists (2.5) + pharmacies (6.7)

	Medical device	Drug
Scale in Japan	2.3 trillion yen (approx.)	9 trillion yen (approx.)
Variety	300,000 items	17,000 items
Company size	Approx. 80% are small/mid-sized companies	Mainly large companies (incl. foreign capital)

Nursing care cost (incl. preventive care)
Total cost: 6.3 trillion yen

At-home nursing care services 645 bn. yen

Fee-charging nursing home operators 425 bn. yen

Welfare & nursing care device production (beds, wheelchairs, etc.) 1.2 trillion yen

Health check & screening 868.5 bn. yen

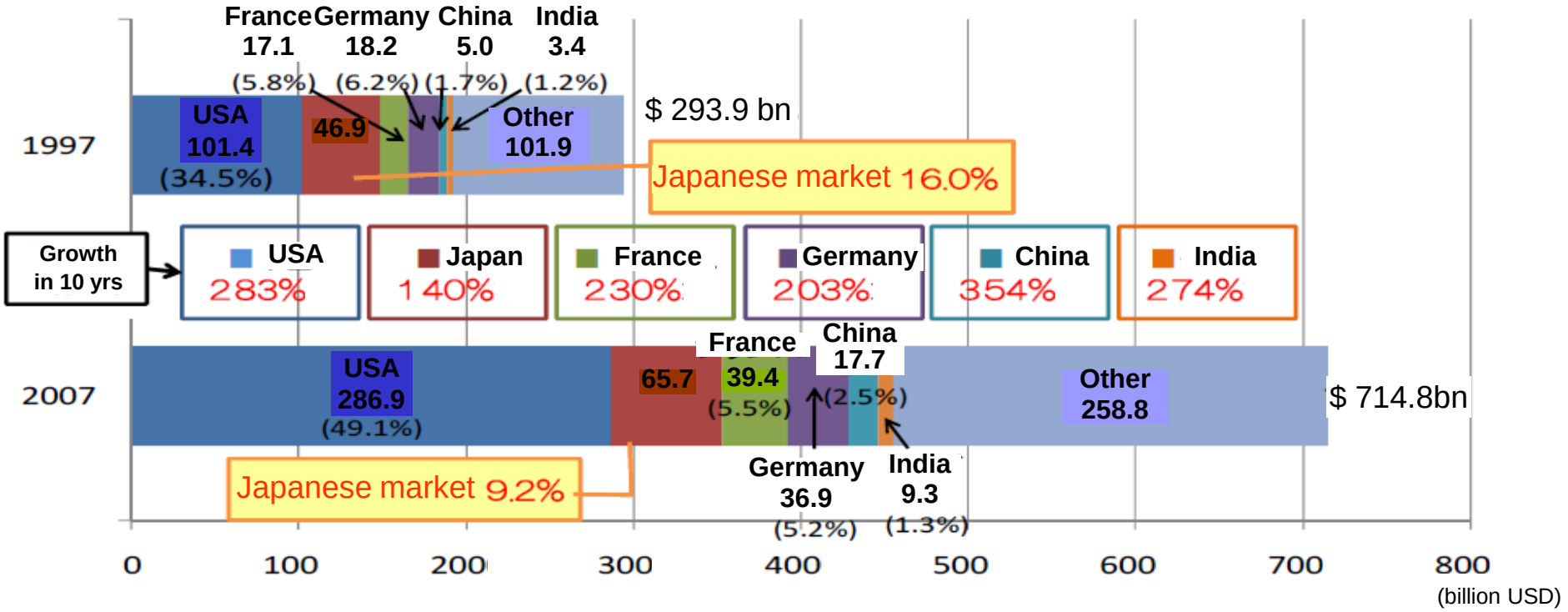
Esthetic clinic & products 407 bn. yen

IT-based healthcare 180.9 bn. yen

The global drug market is expanding

○The pharmaceutical industry is a high-potential industry with 240 % growth in the decade ending 2007. Further growth is expected due to advanced drug discovery and progressive aging.
○Strong growth is seen not only in the emerging countries but also in the developed countries.

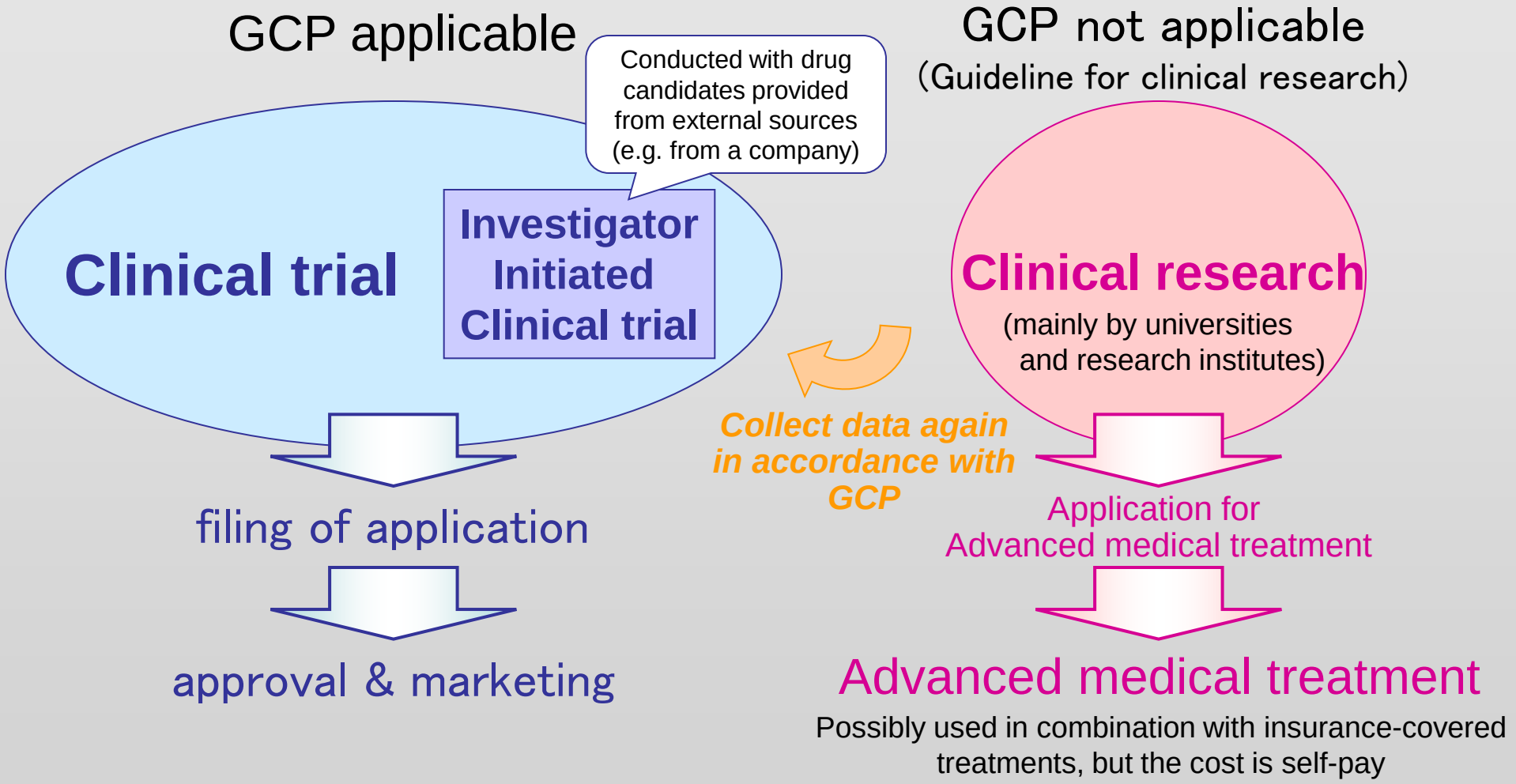
Size of the global drug market



From the website of Ministry of Economy, Trade and Industry (Nov. 2009)
http://www.meti.go.jp/committee/materials2/downloadfiles/g91116b05j.pdf

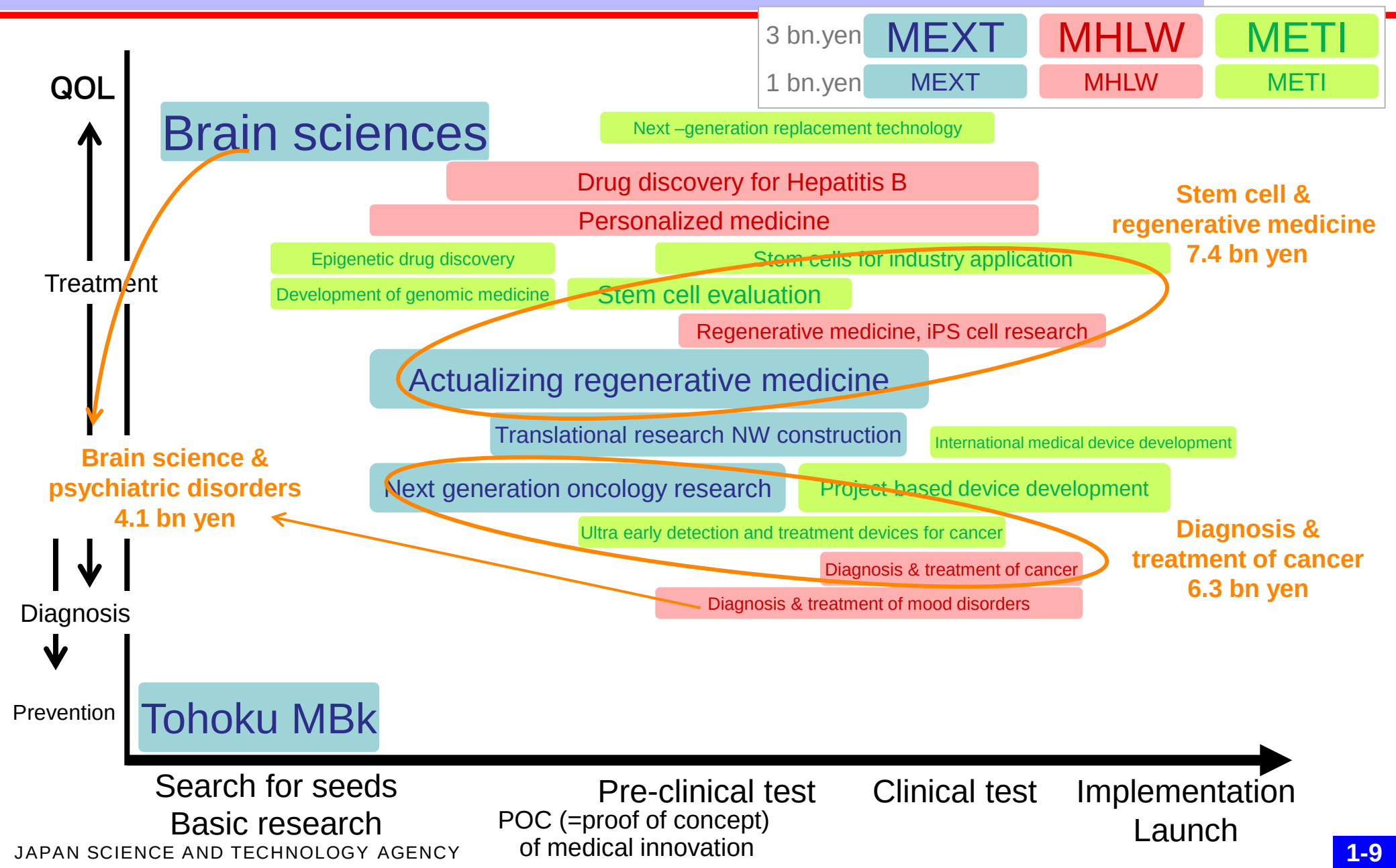
based on IMS world Review
Source：Office of Pharmaceutical Industry Research

Regulation for drug development



Two processes must be used depending on type of the new technology.

Ministerial budget for FY 2012



JST Life Science budget execution for FY 2010

Project	Program	Expense (million yen)	Basic science/ genomics	Neuro-science	Development/ Regeneration biology	Immuno-logy	Cancer
Total		**27,483**					
Life science DB	Bioinformatics	1,472					
Promoting basic research by research personnel in private-sector business		131					
Technology transfer and Innovation	**A-STEP**	4,913					
	(Former) Comprehensive Support Programs for Creation of Regional Innovation	1,620					
	Advanced measurement and analysis	2,186					
	S-innovation	617					
Promoting a career path for research personnel of academia and accelerate technology transfer		85					
International	SATREPS	585					
	SICP	355					
Venture business creation for young researchers		30					
Strategic Basic Research	CIRM	21					
	CREST	7,719					
	ERATO	3,207					
	ICORP	201					
	SORST	245					
	PRESTO (Sakigake)	3,187					
	Research Seeds Quest	50					
	Research acceleration and enhancement system	539					
	RISTEX	105					
	ALCA	215					

JST Life Innovation Strategy

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Vision：Fulfill unmet needs with medical innovation

Strategic priority areas

①Prevention, diagnosis, and treatment of key diseases in the aging society
②Medical device to further improve the quality of lives of the elderly, disabled, and patients
③Key technology to accelerate the creation of opportunities for life innovation

Unfulfilled medical requests (unmet needs)

psychiatric/neurological diseases　lifestyle diseases　cancer　immune/inflammatory intractable diseases　etc.

Strategic program packages

Needs

R&D to achieve Proof of Concept of medical innovation

- Identifying drug targets
- Identifying diagnostic biomarkers
- Developing prototype medical devices

Virtual network

Open innovation

Psychiatric/Neurological diseases Preemptive Medical Technology	*Lifestyle diseases* Early Intervention	*Cancer* Molecular-Targeted Regulation	*Immune/Inflammatory intractable diseases* Regulatory Technology
Disease-defining Epigenome	*Stem cell* Control Technology	*Materials with new functions* Nanomedicine	*Plausible medical scenario-based* Diagnosis

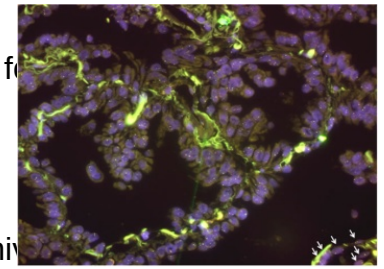
Seeds

Resources from the existing basic research

Molecular-Targeted Technology of Cancer

This is a form of disease control technology aimed at meeting unmet needs in the field of cancer. Creation of regulatory compounds through the identification of molecules that will serve as the target for drug development, based on the discovery of formation mechanisms for cell proliferation and tumor microenvironments.

○ Social background: Cancer has been the top cause of mortality in Japan since 1980.
○ Economic background: The cancer drug market is an expanding market, and many domestic companies are f
○ Current state of research and development in Japan: Despite achieving breakthrough results, there are insufficient links to drug development.



● Examples of JST achievements
Identification of lung cancer gene EML4-ALK (CREST, acceleration of research: Prof. Mano, Jichi Medical Uni
Development of breakthrough anti-cancer drugs using bifidobacteria
(joint research between private sector and academia: Anaeropharma Science, Inc. / Shinshu University)
Development of technology for the rapid production of monoclonal antibodies (CREATE: Saitama Industrial Development Corporation)

Research Contents

Seeds Quest → POC → Preclinical

◆Elucidation of cancer pathogenesis
- Mitogenic signals
- Microenvironments
- metastasis, drug resistance

◆Validation of cancer regulation concepts
- Identification of drug targets
- Search for control substances (compounds, vaccines, monoclonal antibodies, RNA aptamers)

◆Evaluation through animal testing
- toxicity tests
- efficacy

- **Securing cancer clinical specimens**
- **Utilizing next generation sequencers**
- **Cooperation with drug development bases (MEXT)**
- **Active utilization of the International Cancer Genome Consortium**

JST R&D Programs

☐ **Existing typical programs**

Research acceleration:
Professor Mano (‘07-’14)
“Project on the identification of new oncogenes”

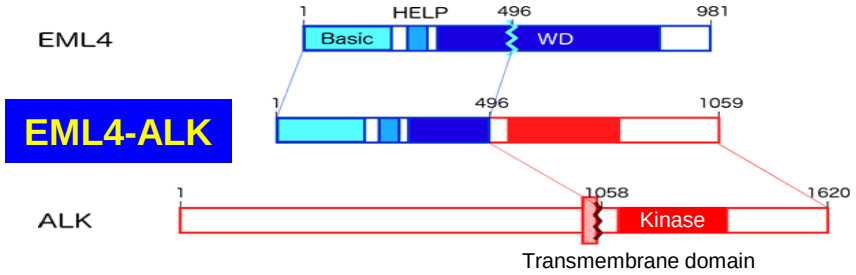
Aiming for the validation of cancer regulation concepts in the areas of lung, pancreatic, and liver cancer.

Outcome: Discovery of molecular-targeted drug for lung cancer

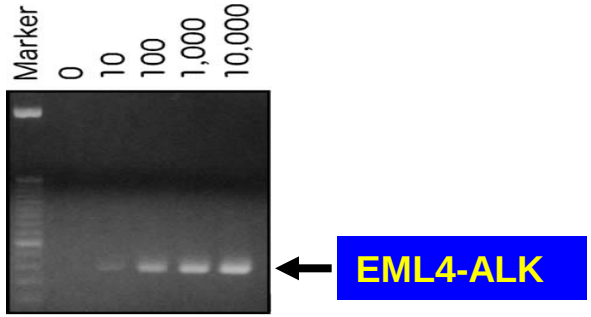
Identification of the transforming EML4-ALK fusion gene（Nature, 2007）

Research acceleration

Identification of drug target (anaplastic lymphoma kinase)



High-sensitivity diagnosis through PCR



CREST research area “Basic Technology to Establishing Tailor-Made Medicine by Utilizing Genome Information”
(Research supervisor: National Center for Global Health and Medicine, President Emeritus Takehiko Sasazuki)
Research theme: “Characterization Human Disorders with a High-throughput Analysis of the Regulatory Mechanism for Gene Expression”
Research team: Jichi Medical University, Nagasaki University, The University of Tokyo

FDA approves crizotinib (by Pfizer, 2011)
- Fastest ever in the history of drug development for cancer disease -

- ALK-positive metastatic non-small cell lung cancer (NSCLC) therapeutic agent
- Approved in Japan (Mar. 30, 2012); undergoing application for new drug approval in South Korea, Europe, and Switzerland.
- Diagnostic kit to identify ALK fusion gene was approved at the same time

Preemptive Medical Technology for Psychiatric/Neurological Diseases

Development of technology to aid intervention for early onset patients. In addition, development of technology to prevent deterioration, based on the analysis of pathologic mechanisms.

○ Social background:

Psychiatric: One in four patients with schizophrenia has difficulties reintegrating into society. Suicide is the leading cause of death among the young generation, and 22% of it owes to depression.

Neurological: Alzheimer's disease appears and develops in patients from their 40's. The incidence of Parkinson's disease is one in 1000.

○ Economic background: Declining workforce. Innovative new drug is awaited in the aged society.

○ Current state of research and development in Japan: Despite progress in fundamental research, it is ineffective for medical field. Improvement in cohort studies. Conditions of genes and environments are come to be integrated for proper diagnosis.

● Examples of JST achievements

Nerve regeneration strategies through the activation of endogenous neural stem cells (SORST: Prof. Okano, Keio University)
Research on the integration of human brain diseases image databases (NBDC: Prof. Iwatsubo, The University of Tokyo)

Research Contents

Early diagnosis of neurological diseases, progressive inhibition, improvement technologies for symptoms

Fundamental research for pathogenesis
- Functional analysis of related factors
- Creation of animal/cell models

Collecting & analyzing patient information
- Analysis of pathogenesis using patients' brain images, etc.
- Extraction of aging factors/ pathogenesis-related environments

Mathematical and correlation analysis
- Correlation of genetic/environmental factors

Scientific diagnosis of Psychiatric disorders

JST R&D Programs

☐ Existing typical programs

CREST: *Neuropsychiatry* ('07-'14)
PRESTO: *Brain Information* ('08-'13)
CREST/PRESTO: *Cerebral Nerve Circuit* ('09-'16)
CREST: *Epigenome* ('11-'18)

NBDC: *Image Database of Human Brain Disorder* ('11-'13)
Large-Scale Genomic Epidemiologic Research ('11-'13)

Co-creation: *Human Living Body Imaging* ('11 -'21')

・Developing noninvasive diagnostic technique/technology for psychiatric disorders
・Identifying target for neurological drug development

Early Intervention into Lifestyle Diseases

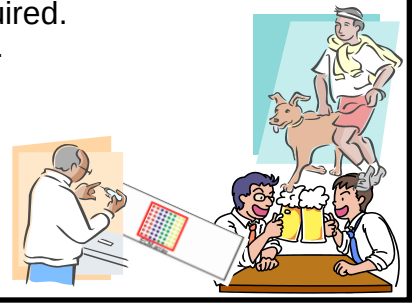
Development of early diagnosis technologies based on the comprehensive analysis of biomolecules, and identification of druggable targets.

○Social background: Need for the development of early diagnosis methods for arteriosclerosis and chronic complications such as diabetes.
40% of the 300,000 dialysis patients in Japan have diabetic nephropathy. The annual dialysis cost is 5 million yen/patient; a total of 1.5 trillion yen nationwide.

○ Economic background: The field of preemptive medicine is where the outcome of basic research is most required.
Symptomatic medication such as for high blood pressure or hyperlipidemia is fulfilled to some extent due to the blockbuster drugs.

○ Current state of research and development in Japan: Continuous support for inflammation-related diseases.
Pre-emptive medicine can be realized through integrating results of basic research.

● Examples of JST achievements
Adipocyte differentiation, transformation, and control (CREST: Prof. Kadowaki, The University of Tokyo)
Iwata human membrane receptor structure project (ERATO: Prof. Iwata, Kyoto University)



Research Contents

Pathogenesis using animal models
- Pathological analysis at the individual/organ level
- Search for early diagnosis biomarkers and treatment targets
- Omics analysis

Collection and analysis of patient information
- Clinical samples/findings
- Lifestyle habits/environmental stress

Integrated understanding through mathematical analysis
- Integration of multi-organ/pluralistic phenomenon

JST R&D Programs

☐ **Existing typical programs**

ERATO: *IWATA Human Receptor Crystallography* ('05-'11)
CREST: *Metabolism* ('05-'12)
ERATO: *SUEMATSU Gas Biology* ('09-'14)
ERATO: *TAKAYANAGI Osteonetwork* ('09-'14)
CREST/PRESTO: *Chronic Inflammation* ('10-'17)
CREST: *Epigenome* ('11-'18)
CREST/PRESTO: *Dynamic Homeostasis* ('12-'19)
NBDC: *Developing the Metabolome Database* ('11-'13)
Large-Scale Genome Epidemiological Research ('11-'13)

Identification of new biomarkers based on Omics analysis

Regulatory Technologies of Immune/Inflammatory Intractable Diseases

Uncovering the mechanisms of chronic inflammatory diseases and developing regulatory technologies for these diseases, aimed at the establishment of new therapeutic technologies for immune/inflammatory intractable diseases.

○ Social background: Large number of patients; out of every 10 intractable diseases, six are immune/inflammatory diseases.

○ Economic background: Growing efforts by corporations with regard to rare diseases, including intractable diseases.

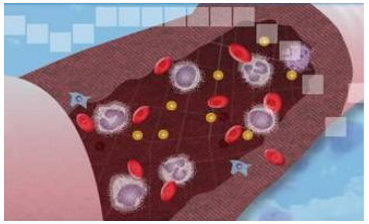
○ Current state of research and development in Japan:
Fundamental research in Japan in the field of immune and inflammatory diseases is more competitive than in other fields.

● Examples of JST achievements

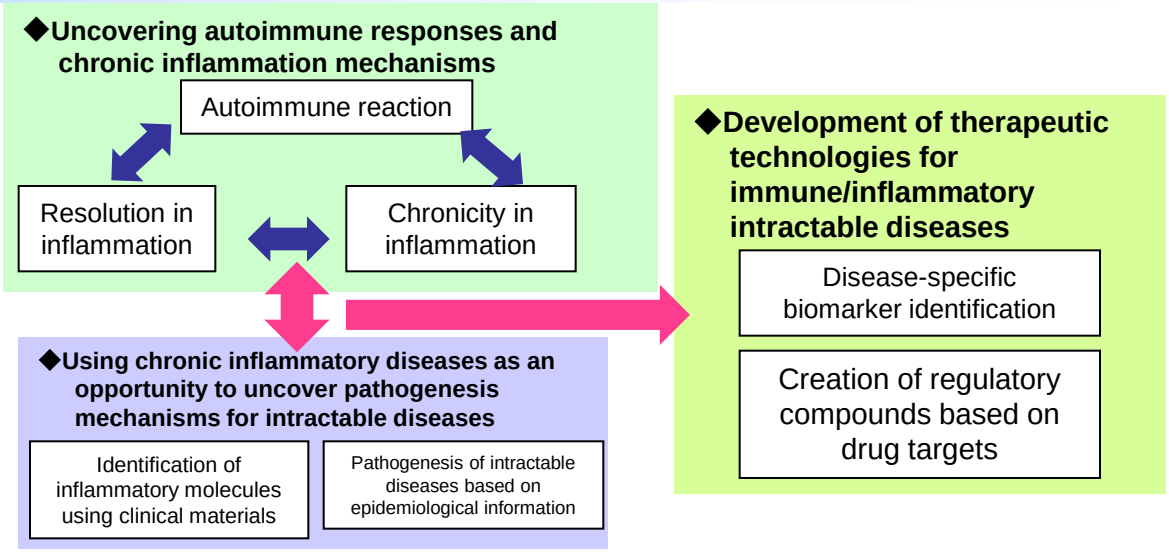
Uncovering pathogen identification mechanisms through natural immunity
(CREST, etc.: Prof. Akira, Osaka University)

Discovering entry route to the central nervous system of immune cells
(CREST：Asso. Prof. Murakami, Osaka University)

Regulatory technologies for intestinal immune diseases targeting at the natural immunity system
(CREST： Prof. Takeda, Osaka University)



Research Contents



JST R&D Programs

☐ Existing typical programs

CREST: *Immune Mechanism* ('08-'15)
CREST/PRESTO: *Chronic Inflammation* ('10-'17)
CREST/PRESTO: *Dynamic Homeostasis* ('12-'19)

- **Elucidating the pathogenic mechanisms of intractable diseases triggered by chronic inflammation**
- **Establishment of therapeutic technologies for immune/inflammatory intractable diseases**

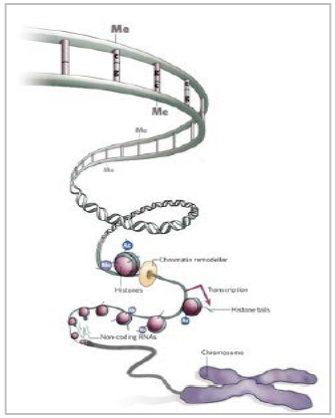
Epigenome-Based Medical Technology

Analysis of epigenome in diseases that takes into consideration environmental changes and ageing, identification of abnormalities among diseases, and provision of technological infrastructure that is connected to medical treatment technologies, such as breakthrough prevention, diagnosis, and treatment methods.

- ○ In recent years, this field has seen rapid development, and the number of academic papers has been on the rise.
  Japan comes in second (10%) following the United States.
- ○ High precision and large-scale analysis technologies were developed, and epigenome analysis has been achieved in the research laboratory.
- ○ The development of epigenome-based medicine is expected to expand.
  e.g.) DNMT inhibitor *Azacytidine* (for myelodysplastic syndrome), HDAC inhibitor *vorinostat* (for cutaneous T-cell lymphoma)

● Related JST research

Overcoming pervasive developmental disorder with epigenomic medicine (CREST: Prof. Hagiwara, Kyoto University)
Deciphering epigenomic abnormalities associated with progressive renal impairment, and its application (CREST: Prof. Fujita, The University of Tokyo)



Research Contents

◆ **Epigenomic analysis of disease states**
- DNA methylation
- Non-coding RNA
- Chromatin complex
- Histone modification

Linkage

◆ **Analysis of model organisms**
- Pathogenic mechanism
- Environmental/Drug effect
- Aging effect
- Stem cell functions

◆ **Bioinformatic support**
- Efficient and effective processing of the next generation sequencer data
- Construction of databases

JST R&D Programs

☐ **Existing typical programs**

CREST/PRESTO: *iPS Cells* ('08-'15)
PRESTO: *Epigenetics* ('09-)
ERATO: *SAITO Totipotent Epigenome* ('12-'16)
SICORP: *Japan-Canada* ('12-)
CREST: *Epigenome* ('11–'18)
NBDC ('11-)

IHEC International Human Epigenome Consortium

- **Promoting inter-program collaboration**
- **Contribution to International Human Epigenome Consortium (IHEC)**

Stem cell at-will control technology

Development of technology to freely control cell proliferation and differentiation in vivo, and the aim at the application of disease-specific cells to drug development and at replacement of cellular functions.

○ Approximately 200 varieties and 60 trillion cells that are responsible for human life and activity are produced through the proliferation and differentiation of stem cells.

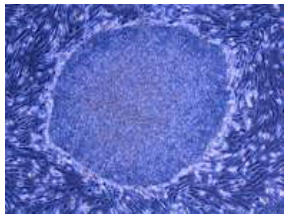
○ Even among cells that are useful in medical treatment, there are still many technologies that have not been developed for the control of cell culture, proliferation, and differentiation.

○ The arrival of a new era in cell treatment and the development of disease models, through iPS cell technologies.

● Examples of JST achievements:

Creation of induced pluripotent stem cells (iPS cells) (CREST: Kyoto University, Professor Yamanaka)

Regeneration of retinal functions using iPS cells (S-innovation : Foundation for Biomedical Research and Innovation, research leader: Takahashi)



Research Contents

Development of technology for cell culture and differentiation induction

- Functional analysis of proliferation and differentiation factors
- Stem cell preparation, maintenance and culture
- Inducing specific cells by differentiation

Medical applications of disease cells

- Disease-specific iPS cells, and genetic manipulation of pluripotent stem cells
- "Disease in dish" through the artificial induction of disease state
- Developing disease state monitoring technology

Development of cell transplantation treatment technology

- Safety & efficacy verification using animal model etc.
- Establishment of cell preparation methods for transplantation

JST R&D Programs

☐ **Existing typical programs**

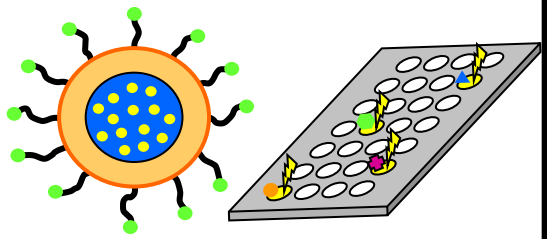
ERATO: *NAKAUCHI Stem Cell and Organ Regeneration* ('08-'12)
CREST/PRESTO: *iPS Cell* ('08-'15)
CREST/PRESTO: *Biosystem Dynamics* ('11-'18)
YAMANAKA iPS Cell Special Project ('08-'12)
ERATO: *TAKEUCHI Biohybrid Innovation* ('10-'15)
S-innovation: *Cell-Based Medical Industry* ('09-)

Establishment of stem cells technologies for drug development, through increasing cooperation with MEXT and MHLW.

Nanomedical Technology Using Materials with New Functions

Creation of diagnosis and treatment technology seeds using a nano-biotechnology approach, validation of efficacy and safety of this technology as a form of medical treatment, and the creation of linkages with corporations by turning this approach into a medical technology system.

- ○ The importance of nanotechnology is soaring in various fields including drug development, medical devices, and regenerative medicine
- ○ Japan has an emeriging nanomedical research community
  Sessions at the Chemical Society of Japan and the Japan Society of Applied Physics / the Japan Society of Drug Delivery System (about 1,100 members) / over 1,000 supported by Grants-in-Aid for Scientific Research
- ○ With advancements in cancer research, developments for other important diseases are also anticipated.
  Patent applications related to DDS are at about 30% for cancer, and about 10% each for contagious diseases, cardiovascular diseases, and central nervous system diseases.
- ● Examples of JST achievements
  Production of polymeric nanoparticle vaccines that have immunity control ability.
  (CREST: Osaka University, Professor Akaishi)
  Supramolecular nano-device production technology aimed at application in genetic treatment
  (CREST: University of Tokyo, Professor Kataoka)



Research Contents

Key diseases with unmet needs

Nanomedical device technology systems
High sensitive, high through-put screening tools for examination, diagnosis, and drug development (virus, biomarker, biomolecule array)

DDS technology systems
Enhancement of carrier functions
Expansion and optimization of applications
(antibody, nucleic acid, adjuvants, etc.)

Development of nanostructures for medical treatment
New concepts of nano particle treatment, nano biomaterials

Safety evaluation
new concepts, technology, and materials

JST R&D Programs

☐ **Existing typical programs**

- CREST: *Nanomanufacturing* (’06-’13)
- CREST: *Nanointerface* (’06-’13)
- CREST: *Nanostructures* (’08-’15)
- CREST/PRESTO: *Nanosystem* (’08-’15)
- ERATO: *AKIYOSHI Bio-nano* (’11-’16)
- CREST/PRESTO: *Molecular tech.* (’12-’19)

Transfer of nanomedical systems to the clinical development phase.

Developing Diagnosis Technology Based on Plausible Medical Scenarios

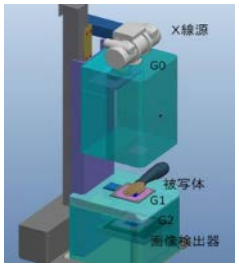
Development of sensitive, quick, simple, and less (minimally) invasive diagnostic methods/devices and equipment in cooperation with developmental and clinical parties, aimed at meeting the needs of patients and medical institutions.

○ Social background (1): While survival rates increase through the early discovery of diseases, the reception of screening is not a sufficiently widespread practice among the people.
Cancer makes up approximately 50% of the diseases that affect the Japanese people, and about 30% of the cause of death among Japanese people.

○ Social background (2): Despite advancements in the degree of sensitivity of technological development, there is a need to further reduce the burden to test subjects.

○ Economic background:There are powerful corporations in the area of diagnostic equipment in Japan, and it is possible to aim for the production of major products.

● Examples of JST achievements
High-sensitivity in-vitro diagnostic kit (contract development: Osaka University, Professor Tamiya)
Innovative X-ray imaging apparatus (advanced measurement & analysis: Associate Prof. Momose, The University of Tokyo)
Microcancer detection technologies (research acceleration: Prof. Urano, The University of Tokyo)



Research Contents

Development of quick, simple, and minimally invasive diagnostic technologies

Physicochemical measurement/identification of diseases
Spectral, X-ray, MS, MEMS…

Optimized detection
Simplified diagnostics

Selection of disease marker

Persistent introduction to meet the needs of patients and medical institutions

Putting effort into combining technologies, such as pharmaceutical products and diagnostic technologies.

Introduction of powerful diagnostic equipment into the market.
Expansion of the market.

JST R&D Programs

☐ **Existing typical programs**

A-STEP
- High-risk Challenge Promoting R&D

Advanced Measurement & Analysis
- Practical Application
- Component technology System development
- Software development Prototype verification / practical realization

Toward the completion of medical equipment prototypes in preparation for use on target diseases

Life-saving cancer research

MANO, Hiroyuki

Department of Medical Genomics, Graduate School of Medicine, The University of Tokyo

Division of Functional Genomic, Jichi Medical University

(presented separately)

Topics

Development of Blackout Prevention Network in the Kansai Region

KEPCO (The KANSAI Electric Power Co., Inc.) faces a power shortage crisis in summer 2012

Countermeasure

The blackout prevention network implemented in the region under TEPCO in the summer and winter of 2011 will also be implemented for the region under KEPCO from summer 2012.

Period of implementation：July 2 (Mon.) to September 28 (Fri.), 2012

※55 local governments participating (as of summer 2011)

Participating municipalities

Cities of Kyoto, Sakai, Suita, Kobe, and Ikoma

***as of June, 2012**

Currently seeking applications from participating local governments

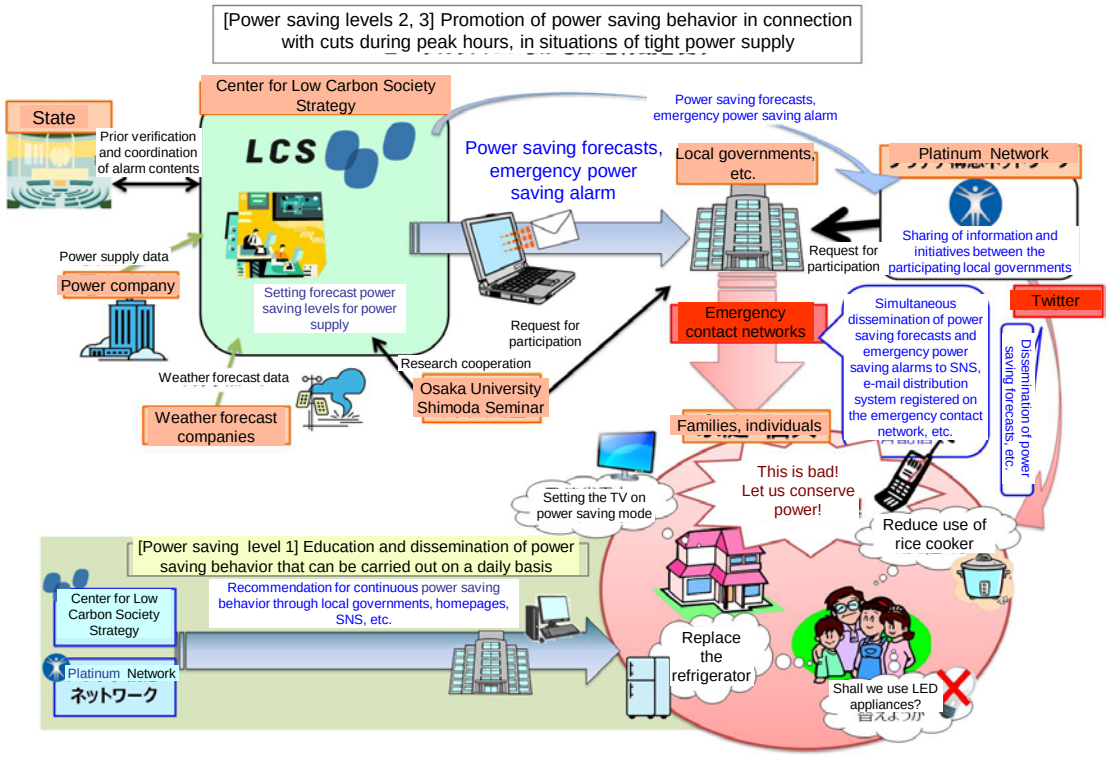


Diagram: Illustration of blackout prevention network system

Results of the elementary science education survey for FY 2010

JST Center for Promotion of Science Education

1. Background and purpose/objective

Based on the survey results obtained to date, the poor awareness of elementary school teachers toward the sciences, , the lack of time for preparation and clean up for observations and experiments, and the lack of time for conducting studies are issues that have been raised. By validating the efficacy of measures that are currently being implemented, including the deployment of dedicated science teachers as well as science education assistants, this survey was conducted with the aim of seeking better methods of providing assistance for elementary science education.

2. Respondents

Based on data on the deployment of science education assistants to schools for FY2008 to 2010, schools that have received science education assistants and those that have not were randomly extracted from among the public elementary schools nationwide. Responses were received from 969 schools, with 2,156 teachers teaching science in their position as homeroom teacher as well as 24,490 students (6th grade).

3. Methodology

In January 2011, in addition to conducting surveys on schools randomly selected from among the public elementary schools nationwide, as well as on the education committees that have jurisdiction over these schools, three questionnaires were sent to schools, teachers, and students, and collected directly from the target schools via post. The surveys were anonymous for both schools and individual respondents.

Release of results of the elementary science education survey for FY2010

4. Overview of analysis results

JST Center for Promotion of Science Education

(1) Comparison

School
Comparison for FY2008 and 2010

Despite an increase in the average expenditure on facilities and equipment per school and per student, the percentage of schools with zero budget was at a high of 40%.
- ○Average per school: 110,000 yen (vs. 90,000 yen in FY 2008)
- ○Average per pupil: 516 yen (vs. 391 yen in FY 2008)

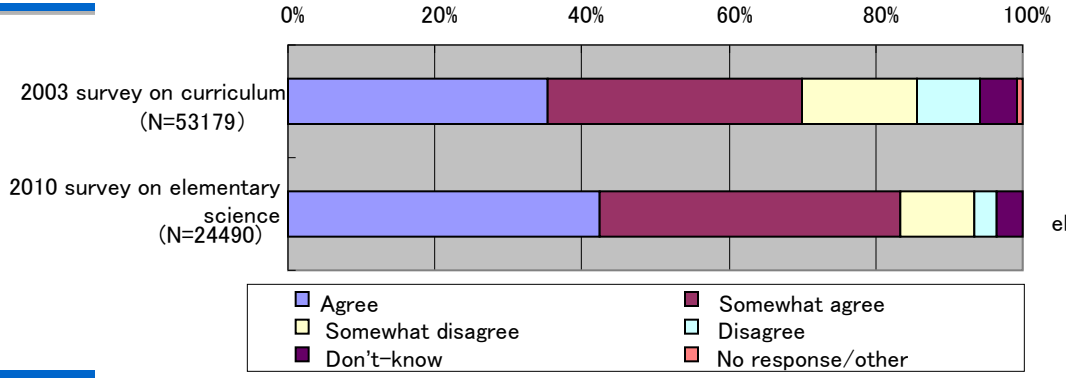
Despite an increase in the average expenditure on consumables per school and per student, the percentage of schools with a budget of below 50,000 yen was at a high of approximately 40%.
- ○Average per school: 80,000 yen (vs. 70,000 yen in FY 2008)
- ○Average per pupil: 367 yen (vs. 316 yen in FY 2008)

Teacher
Comparison for FY2008 and 2010

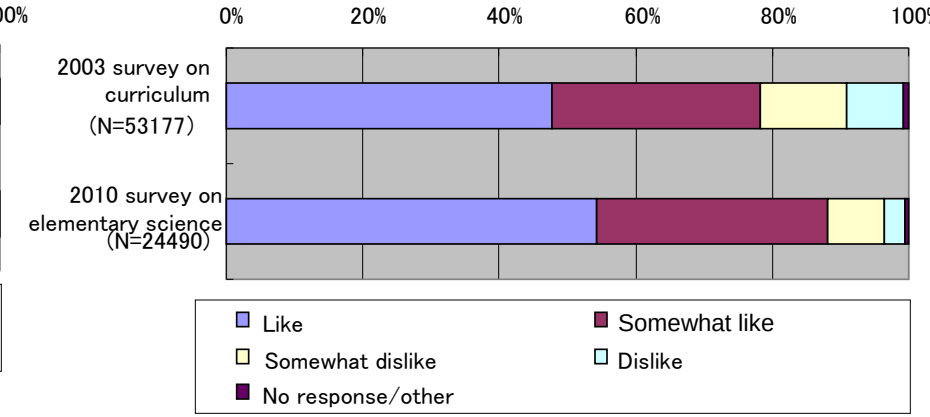
○With regard to science lessons, the proportion of teachers that responded “almost every hour” for the frequency of observations and experiments conducted by students increased from 22% to 28%.

Pupil
Comparison for FY2008 and 2010

○Those agreed that “science education is important” increased from 35% to 42%



○The proportion that responded “Like observations and experiments in the study of science” increased from 48% to 54%.



② Effects of science class aides

Comparing the students of schools with science education assistants and schools that do not have science education assistants , the statistical significance is high for the following four items.
- ○Studying science is useful for my daily life and my work life.
- ○Studying science gives me the ability to solve problems and verify hypotheses.
- ○To what extent do you understand science lessons?
- ○Do you think independently in making hypotheses, conducting experiments, and carrying out observations?

On the opening of the Japan Link Center（JaLC）

～Information distribution infrastructure in the “born digital era”: nationwide initiatives～

Merits of digitalized academic information & contents

1. Borderless and timeless access; 2. Easier searches;
3. Foreword/backward citation links; 4. Bibliometric analyses

The creation of innovation by new linking of data

Need for DOI (digital object identifier) which ensures persistent links and uniqueness of the electronic contents

DOIs assigned in Japan: approx. 1.5 million（Globally：60 million）
Concern of being left behind in the global flow of information

Japan Link Center (JaLC), a DOI registration agency, the ninth in the world and the only one in Japan, was established in April

JST, National Diet Library, National Institute of Informatics, and National Institute for Materials Science signed for a memorandum of cooperation of JaLC on May 28

Assigns DOIs to academic contents in Japan, and aims to drastically improve distribution and usage of the contents, with interoperable links based on persistent accessibility