

**MJ Health Research Foundation**

**MJ Health Resource Center**

**Technical Report**



**Laboratory Equipment**

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**MJHRF**

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## Laboratory Equipment Myron Wang

### I. Foreword

Ever since the digitization of the MJ physical examination data in 1994, we have accumulated electronic records for over 1.5 million examination visits from 665,156 members by the end of 2015. Examination equipment were periodically upgraded in order to maintain the quality of health examination service and accuracy of the data. As equipment of different brands and models may utilize different unit systems, MJ Health Research Foundation prepared a technical report for the laboratory equipment. This technical report documents the equipment’s brand, model, and length of use, allowing researchers to use it as reference when analyzing health examination data. We will record each equipment separately in the following segments.

### II. Blood Analyzer

The main purpose of the blood analyzer is to perform routine inspection on blood samples. There are 14 items that we analyze: leukocyte, erythrocyte, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin amount, mean corpuscular hemoglobin concentration, RDW, blood platelet, neutrophils, lymphocyte, monocyte, eosinophils and basophils. Refer to the following charts for records of equipment usage and unit testing for each item:

#### 1. Equipment Use Record

Brand	Model	Dates Used
ABBOTT	Cell-Dyn 3000	1994/11-2010/05
ABBOTT	Cell-Dyn 3700	2007/01-currently in use
ABBOTT	Cell-Dyn Ruby	2014/07/16-currently in use

## 2. Analysis items and units

Item	Unit	Item	Unit
Leukocyte (WBC)	10 <sup>3</sup> /μl	RDW	%
Erythrocyte (RBC)	10 <sup>6</sup> /μl	Blood platelet(PLT)	10 <sup>3</sup> /μl
Heme (Hb)	g/dl	Neutrophils	%
Hematocrit (HCT)	%	Lymphocytes	%
Mean corpuscular volume (MCV)	fl	Monocytes	%
Mean corpuscular hemoglobin amount (MCH)	pg	Eosinophils	%
Mean corpuscular hemoglobin concentration (MCHC)	g/dl	Basophils	%

## III. Biochemical Analyzer

The examination items of the biochemical analyzer equipment include blood glucose, liver, gallbladder and kidney functions, uric acid test, blood lipid tests, calcium, phosphorus, serum iron tests, tissue inflammation screening, etc. There are 25 examination items total. Refer to the following charts for records of equipment usage and test unit for each item:

### 1. Equipment Use Record

Brand	Model	Dates Used
HITACHI	7150	1992-2005/01
TOSHIBA	C8000	2005/02-currently in use

## 2. Biochemical analyzer items and units

Item	Unit	Item	Unit
Fasting plasma glucose	mg/dl	Creatinine(CRE)	mg/dl
Fasting glucose recheck	mg/dl	Glomerular filtration rate	ml/min/ 1.73m <sup>2</sup>
Blood glucose two hours after meal	mg/dl	Uric acid(UA)	mg/dl
Total bilirubin	mg/dl	Triglycerides(T-G)	mg/dl
Direct bilirubin	mg/dl	Total cholesterol(CHOL)	mg/dl
Total protein	g/dl	High-density lipoprotein cholesterol(HDL-C)	mg/dl
Albumin amount	g/dl	Low-density lipoprotein cholesterol(LDL-C)	mg/dl
Albumin / globulin Compare	ratio	CHOL/HDLC	ratio
Globulin amount	g/dl	Calcium(CA)	mg/dl
Alkaline phosphatase (ALP)	IU/L	Phosphorus(P)	mg/dl
Bran serum amino acid transfer (SGOT)	IU/L	Serum iron(Fe)	μg/dl
Bran pyruvate serum amino transfer (SGPT)	IU/L	Total iron binding capacity(TIBC)	μg/dl
Propionic glutamate transferase (γ-GT)	IU/L	Iron saturation(%Saturation)	%
Lactate dehydrogenase (LDH)	IU/L	C-reactive protein(CRP)	mg/dl
Urea nitrogen (BUN)	mg/dl	Rheumatoid factor(RA)	IU/ml



#### IV. Immunoassay analyzer

The examination items for immunoassay analyzer equipment include hepatitis B, alpha-fetoprotein, carcinoembryonic antigen, thyroid hormone, etc. There are a total of 8 examination items. Refer to the following charts for records of equipment usage and test unit for each item:

##### 1. Equipment Use Record

Brand	Model	Dates Used
ABBOTT	IMX	1992-2002/12
ABBOTT	AxSYM	1995-2014/02
ABBOTT	I2000	2005-currently in use

##### 2. Immunoassay Analyzer Items and Units

Item	Unit	Item	Unit
Hepatitis B surface antigen values	IU/ml	Carcinoembryonic antigen(CEA)	ng/ml
Hepatitis B surface antibody value	mIU/ml	Thyroxine(T4)	µg/dl
Hepatitis B core antibody value	S/CO	Free thyroxine(FT4)	ng/dl
A method fetoprotein (alpha-fetoprotein )	ng/ml	Thyroid-stimulating hormone(TSH)	µIU/ml

## V. Urine Analyzer

The examination items of the urine analyzer include leukocyte, protein, glucose, bilirubin, urobilinogen, occult blood, ketone bodies, nitrite, urine specific gravity and urine pH. There is a total of 10 items. Refer to the following charts for records of equipment usage and test unit for each item:

### 1. Equipment Use Record

Brand	Model	Dates Used
<b>AMES</b>	E1000	1990-1996
<b>ROCHE</b>	Miditron	1997-2009/06
<b>ROCHE</b>	Cobas U411	2008/10-currently in use

### 2. Urine Analyzer Items and Units

Item	Unit	Item	Unit
Urine leukocyte	Negative / positive	Occult blood	Negative / positive
Urinary protein	Negative / positive	Ketone bodies	Negative / positive
Glucose in Urine	Negative / positive	Nitrite	Negative / positive
Bilirubin	Negative / positive	Specific gravity	ratio
Urobilinogen	Negative / positive	Urine pH	pH

## VI. Fecal occult blood analyzer

The fecal occult blood analyzer examines the hemoglobin concentration in feces. Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
<b>EIKEN</b>	OC-Sensor	1995-2000
<b>WAKO</b>	JIA-HB2010	2001-2005/12
<b>Kyowa</b>	HM-JACK	2006/01-currently in use
<b>Kyowa</b>	HM-JACK arc	2016/07/01-currently in use

### VII. Body Composition Analyzer

The body composition analyzer examines the percentage of body fat. Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
TANITA	TBF-105N	1997/1/31-2006/07/18
TANITA	TBF-202	1997/1/31-2006/07/18
TANITA	TBF-105	1997/01/31-currently in use
TANITA	GBF531	2000/09/07-currently in use
TANITA	TBF531	2000/09/07-currently in use
TANITA	TBF-410GS	2002/03/05-currently in use
TANITA	TBF-410	2010/07/12-currently in use

### VIII. Blood Pressure Monitor

The blood pressure monitor examines the systolic blood pressure and diastolic blood pressure (mmHg). Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
SANKEN	SM-100	?-2010/08/02
YAMASU	600	?-2010/08/02
KENLU	K300	1993/09/15-2010/05/24
HICO		1993/09/15-2010/05/24
GE	Dinamap Procare 100	2010/08/11-currently in use
DINAMAP	Procare NIBP V100	2010/09/23-currently in use
OMRON	HEM-7201	2014/08/14-currently in use

### IX. Electrocardiogram

The ECG measurement mainly examines the pulse and electrocardiograph. Refer to the following chart for equipment usage records:

Brand	Model	Dates used
FUKUDA	501-BX	1992/09/14-2006/09/05
CARDISUNY	7000A	1993/11/15-2011/12/26
CARDISUNY	7000AX	1993/11/15-currently in use
CARDISUNY	A-7000AX	1994/11/01-currently in use
CARDISUNY	L-7000AX	1995/05/30-currently in use
GE	Mac 3500	2010/08/11-currently in use

### X. Ultrasound Scanner

The examination items for ultrasound scanner include echocardiography, arteriosclerosis ultrasound, abdominal ultrasound (including liver, intrahepatic bile duct, common bile duct, gallbladder, kidney, hepatic portal vein, pancreas, spleen and prostate) and thyroid gland. Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
ATL	UM-4P1US	1992/09/30-2006/09/05
TOSHIBA	SLA-240A	1993/12/14-2007/12/28
TOSHIBA	SSA-350A	2003/02/27-currently in use
TOSHIBA	SSA-550A	2004/12/20-currently in use
TOSHIBA	SSA-580A	2007/12/25-currently in use
GE	Logiq P5 Premium	2010/08/11-currently in use
GE	Vivid 7 Dimension	2010/08/11-currently in use



## XI. Radiographic Systems

The examination items for x-ray include chest x-ray, abdominal x-ray and upper gastrointestinal series. Refer to the following chart for equipment usage records:

### 1. Chest and abdominal x-ray machine record

Brand	Model	Dates Used
TOSHIBA	DRX-1603B	1992/10/08-2014/03/27
TOSHIBA	KXO-12R/DT-13T-9	1992/11/09-2003/05/05
TOSHIBA	DXO-12/DT-13T-9	1993/11/22-2011/12/29
TOSHIBA	KXO-12R/DT-BT-9	1993/12/13-2013/11/14
SHIMADZU	ED125L	1994/06/29-2014/03/27
TOSHIBA	KXO-12R	1995/05/31-2013/11/14
TOSHIBA	KXO-15R	2003/04/28-2014/03/26
TOSHIBA	KXO32S/DST100S	2010/07/12-currently in use
TOSHIBA	MRAD-A32S/CXDI-401C	2013/07/03-currently in use
TOSHIBA	MRAD-A32S/single tube ball	2014/04/11-currently in use
TOSHIBA	MRAD-A32S/double tube ball	2014/04/11-currently in use

### 2. Upper gastrointestinal series usage record

Brand	Model	Dates Used
TOSHIBA	DRX-1725B	1994/06/21-2014/03/27
TOSHIBA	KXO-15C/DFW-10B	1992/11/09-2013/11/1
TOSHIBA	KXO-32XC	2003/04/28-2014/03/26
TOSHIBA	KXO-50XM/K2/DFX1000A	2005/04/29-2013/11/14
TOSHIBA	KXO-50XM/DFX-1000A	2006/08/01-currently in use
TOSHIBA	ZEXIRA-ZX80/W7	2010/07/12-currently in use
TOSHIBA	Plessart	2013/07/03-currently in use
TOSHIBA	Plessart DREX-W20PE8	2014/04/11-currently in use

## XII. Spirometer

The examination items for the spirometer mainly include forced vital capacity, one-second forced expiratory volume and maximal mid expiratory flow curve. Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
FUKUDA	MICROSPIRO HI-501	1992/09/14-2014/11/25
FUKUDA	HI-501	1994/11/01-2013/11/21
FUKUDA	CHESTGRAH HI-701	2004/02/05-currently in use
CHEST	HI-801	2015/04/09-currently in use

## XIII. Audiometer

The audiometer examines the hearing of both ears (dB). Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
RION	AA-92A	1993/12/07-2013/11/21
RION	AA-79	2003/03/26-currently in use
MAICO	MA30	2010/07/07-currently in use

## XIV. Tonometer

A tonometer is used to measure intraocular pressure (mmHg). Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
TOPCON	CT-20	1993/11/24-2010/09/15
TOPCON	CT-20/108	1992/10/01-2010/12/13
TOPCON	CT-80	2004/07/30-currently in use
NIDEK	NT-2000M3	2009/02/19-currently in use



**XV. Auto Chart Projector**

The auto chart projector is used to test for visual acuity of both eyes (naked eyes or corrected vision). Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
TOPCON	ACP-7	1993/11/22-currently in use
TOPCON	ACP-7EM	1993/11/22-currently in use
TOPCON	RM A3000	1995/07/10-currently in use
TOPCON	ACP-8EM	2010/07/12-currently in use

**XVI. Non-mydrriatic Retinal Camera**

The retinal camera is used to photograph the retina. Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
TOPCON	TRC-NW200	2005/02/28-currently in use
CANON	CR-2	2013/11/11-currently in use

**XVII. Ophthalmoscope**

The ophthalmoscope is used to examine the retina and strabismus. Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
<b>Welch Allyn</b>	REF11720	2005/06/30-currently in use



**XVIII. Bone Mineral Density Scanner**

The bone mineral density scanner is used to examine bone mineral density. Before 2000, the unit was mg/cm<sup>2</sup>. It was then changed to g/cm<sup>2</sup> between 2001 and 2005. Since 2006, T value was used to evaluate bone mineral density. Refer to the following chart for equipment usage records:

Brand	Model	Dates Used
<b>ALOKA</b>	DCS 600EX	1997/03/31-2010/12/15
<b>GE</b>	LUNAR	2007/12/25-currently in use