



WebTHAL

An Electronic Health Record for Thalassemia



Intro

- Each hospital worldwide has some kind of EHR, but thalassemia needs a special treatment
- For chronic patients, therapy is based on historical data
- Computer Aided forecast of clinical parameters (expected values, graphs, data correlation) More than 200 formulas



Main Goals

- WebTHAL is both:
 - A day by day tool for optimized patient followup:
 - different sections, accessed by role (physicians, nurses, administrative or external access,..)
 - Run time checks for data input
 - Instant graphs
 - Printouts for medical reports and request
 - A mine of data useful for studies, papers, best practices, with clever extraction tools

 Digitare i caratteri iniziali del cognome Chiudi cartella paziente
Pellico Silvio [Paziente 23] - Id: CTTRBRBR_FYFUZ
Sesso: F - Nato il 19/12/1971 - Gruppo sanguigno **mancante**
Codice fiscale: **patriots_12** - Diagnosi: **THALASSEMIA MAJOR**

Elenco accessi **Accesso ospedaliero del 21/05/2012 (Ambulatorio)**

Programma Trasfusionale

Ciclo trasfusionale
Ciclo corrente dal: al:
Ciclo precedente dal: **10/05/2012** al: **10/05/2012**
Intervallo trasfusionale (gg):

Unità trasfuse

Numero s...	Volume d...	Quantità tras...	Ematoc...	Tipo di preparazione

Quantità prescritta: Quantità trasfusa (g): **0**

Reazioni alla trasfusione
Tipo di reazione:
Pre-medicazione:
Terapia praticata:

Emoglobine (g/dl)
Data del controllo: Hb al controllo:
Hb pre trasfusionale:
Hb post trasfusionale: Hb post:
Hb post(Calc):
Fabbisogno medio: **170**
Fabbisogno: Calcolato (g%):
Decremento reale (g%):
Decremento percentuale:
Decremento teorico (g/dl):

Prossimo controllo
Data stimata: Hb pre teorica desiderata (g/dl):
Data scelta:
Esami:

Note di trasfusione



Graphs

WebTHAL 2.0

Cartelle cliniche

Agenda

Servizi / Infermieristica

Ricerche

Configurazione

Ricerche mirate

Ricerche avanzate

WT02

Tabelle

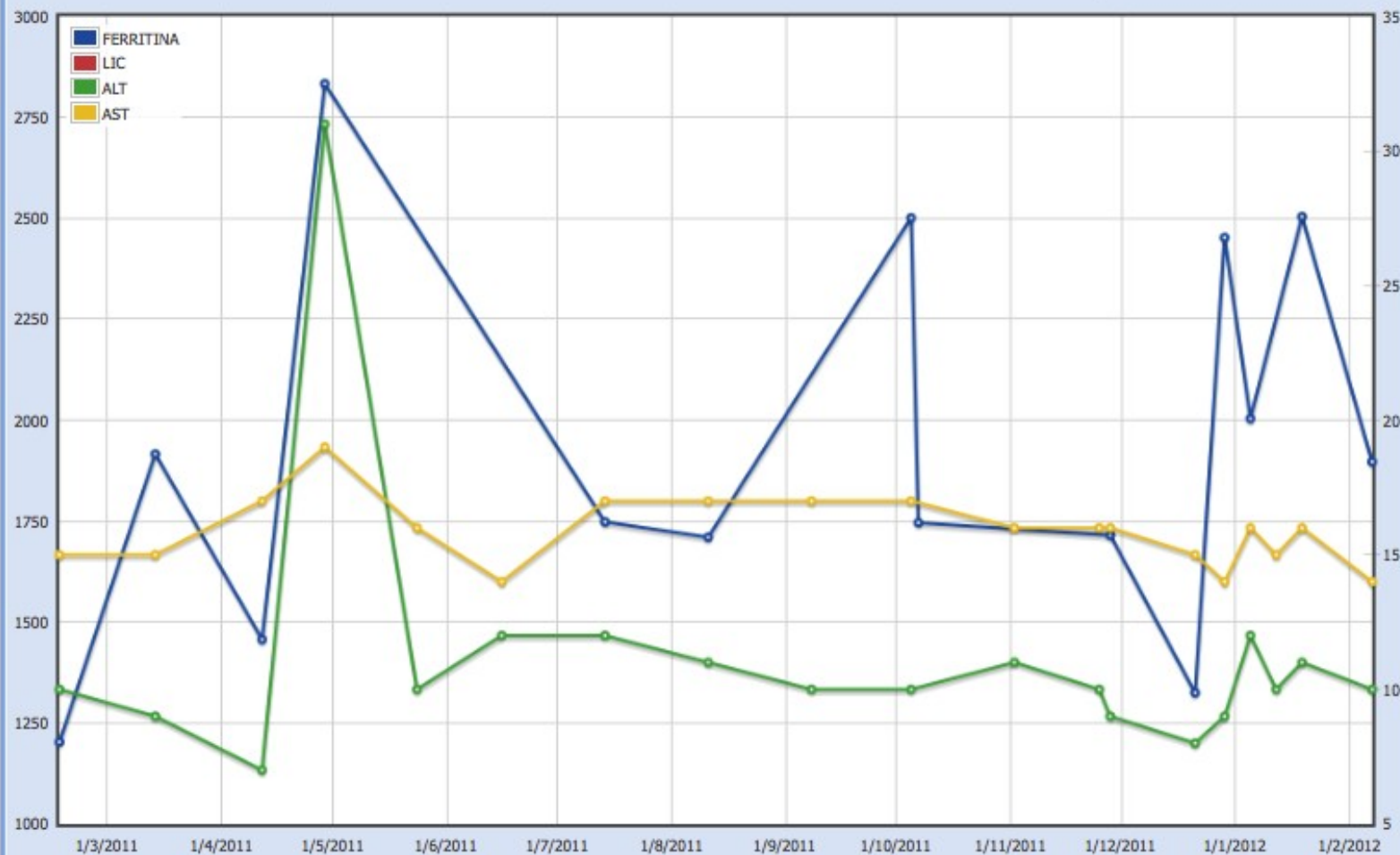
- Ricerca (riepilogo)
- Ricerca (dettaglio)
- Graph: HB pre/post (current patient)
- Graph: Ferritin/LIC/ALT/AST (current patient)

Graph: Ferritin/LIC/ALT/AST (current patient)

14:35:24

FERRITINA LIC ALT AST

Linee



Patient BVOASNOICAFKDJ



Selective print

porti Android extra Google Translate Gmail

Database Search Configuration Administration

Cattaneo Carlo [Paziente 2] - Id: STTANCLIGEMUGVD
Gender: M - Born on 01/14/1999 - Blood Group 0+
Fiscal code: patriots_21 - Diagnosis: THALASSEMIA MAJOR

Blood Requests Heart Instrumental Exams Documents Intensive Chelations Urinary Iron Excretion Sera / DNA Annual Summary Family

Print Patient Clinical Records

Sections of the press folder Cattaneo Carlo

Master:	<input type="checkbox"/>	Family:	<input type="checkbox"/>	<input type="button" value="Seleziona/deseleziona tutto"/>	
Hits from the hospital:	<input type="text" value="11/22/2011"/>	to:	<input type="text" value="11/21/2012"/>		
Clinical:	<input checked="" type="checkbox"/>	Transfusion therapy / Red Cell Exchange:	<input checked="" type="checkbox"/>	Chelation therapy:	<input checked="" type="checkbox"/>
Haematological examinations:	<input type="text" value="Do not print"/>	Pharmacotherapy:	<input checked="" type="checkbox"/>	Instrumental tests and specialist visits:	<input type="checkbox"/>
Followup weekly Ferriprox @:	<input type="checkbox"/>	Cardiology consultation summary:	<input type="checkbox"/>	Urinary Iron Excretion:	<input type="checkbox"/>
Intensive chelation:	<input type="checkbox"/>	Annual Summary:	<input type="checkbox"/>	Diseases / Comorbidity:	<input type="checkbox"/>
For pre-clinical diary:	<input type="checkbox"/>	Cardiologic Check:	<input type="checkbox"/>	Echocardiography:	<input type="checkbox"/>
Holter E.K.G.:	<input type="checkbox"/>	Ergospirometria:	<input type="checkbox"/>	Magnetic resonance:	<input type="checkbox"/>
Nursing Diary:	<input type="checkbox"/>	Sheet discharge:	<input type="checkbox"/>		



Section with run time checks

Webthal - Google Chrome

examples.most.it/wtdemo2/?locale=en

Servizi MOST Vari Meteo Clienti Trasporti Android extra Google Translate Gmail

WebTHAL 2.0 Clinical records Calendar Services / Nursery Database Search Configuration Administration

Type the patient surname Close patient record

Cattaneo Carlo [Paziente 2] - Id: STANCLIGEMUGVD
Gender: M - Born on 01/14/1999 - Blood Group 0+
Fiscal code: patriots_21 - Diagnosis: THALASSEMIA MAJOR

Patient Profile Diseases / Comorbidity Hospital Accesses Blood Requests **Heart** Instrumental exams Documents Intensive Chelations Urinary Iron Excretion Sera / DNA Annual Summary Family

Cardiologic Check **Echocardiography** Ergospirometrie Dynamic ECG Cardiac RMI

Echocardiography

New Delete

04/21/2012

Date examination	04/21/2012	Weight (kg):	<input type="text" value="39.5"/>	Height (cm):	<input type="text"/>
Body surface (m ²):	<input type="text"/>	Diameter of aorta:	<input type="text"/>	Box aorta (mm):	<input type="text"/>
Atrium diameter (mm):	<input type="text" value="37"/>	Right atrium. / Aorta:	<input type="text"/>	SIV thickness (mm):	<input type="text"/>
SIV hike (mm):	<input type="text"/>	Wall thickness (mm):	<input type="text"/>	Wall Tour (mm):	<input type="text"/>
LV diastolic diameter (mm):	<input type="text" value="50"/>	LV systolic diameter (mm):	<input type="text" value="30"/>	Index atrial:	<input type="text"/>
FS %:	<input type="text"/>	EF %:	<input type="text" value="64"/>	DTD index:	<input type="text"/>
Sys Admin / diastolic: EF-slope:	<input type="text"/>	RV diameter (mm):	<input type="text" value="21"/>	A2D:	<input type="text"/>
and:	<input type="text"/>	PAPs:	<input type="text"/>	IVS:	<input type="text"/>
VDIAD Range:	<input type="text"/>	A:	<input type="text"/>	and/A:	<input type="text"/>
		Waves:	<input type="text"/>		<input type="text"/>

Comments: esame normale

2D

Area telesistolica ventricolo dx in sezione 4 camere apicale:	<input type="text"/>	Area telesistolica ventricolo dx in sezione 2 camere apicale:	<input type="text"/>
Lunghezza area telesistolica:	<input type="text"/>	Volume area telesistolica:	<input type="text"/>
Frazione eiezione % ispettiva:	<input type="text"/>		
Volume telediastolico ventricolo sx:	<input type="text"/>	Volume telesistolico ventricolo sx:	<input type="text"/>
Ejection fraction %:	<input type="text"/>		
Area telediastolica ventricolo dx:	<input type="text"/>	Area telesistolica ventricolo dx:	<input type="text"/>
Frazione modificazione area ventricolo dx:	<input type="text"/>		

Reset values Save changes

guest 119' 0"

Caution: verify the patient consent v.2.3.21

Elastix-2.3.0-i38...iso grpliby.tar.gz

Show all downloads



History

- 30 years of history
- 1 main sponsor (Ciba Geigy, now Novartis)
- Medical steering committee led by top university centers
- 45 → 60 centers involved in Italy
- 5 → 10 centers worldwide



Plusses

- Optimized for day by day usage
- Privacy handling
- Ad hoc interface for data extraction
- Attended import of laboratory test results
- Interaction with external EMR systems and laboratories



Privacy

- Client side encryption of personal information: no clear data on the network or on the server
- Optional hardware authentication and decoding certificates
- Implementation of the italian legislation, with an assisted enrollment of new authorized personnel, document of appointment preparation and archiving
- Clinical data in clear form, but no correlation is available with personal info w/o authorization



Ad Hoc Data Extraction

- For epidemiological studies, thesis, papers and so on, we need big data sources, and fine grain selection of the intended patients and desired results
- Cooperative studies need homogeneous data from the centers: same units, ordered columns and so on
- The output can be used as is, using integrated graphics generation, or exported in spreadsheet format



Patient selection

Ricerca (riepilogo) Help Configurazione Ricerca Risultati

Quali pazienti vuoi visualizzare?

Un paziente
 Tutti i pazienti
 Una selezione di pazienti

Campo di ricerca	Operatore di confronto	Valore cercato
Identifier	=	
Date of Birth	=	
Gender	=	
Last 12 months transfusional events	>=	
Exam	>=	
ICD9 Diagnosis	=	

Diagnosi

Pazienti che hanno una delle diagnosi selezionate:

ANEMIA DI BLACKFAN-DIAMOND DEFICIT VITAMINA B12 DREPANOCITOSI
 EMOCROMATOSI HBS/HBC CON CRISI MICRODREPANOCITOSI
 OVALOCITOSI TALASSEMIA THALASSEMIA INTERMEDIA
 THALASSEMIA MAJOR

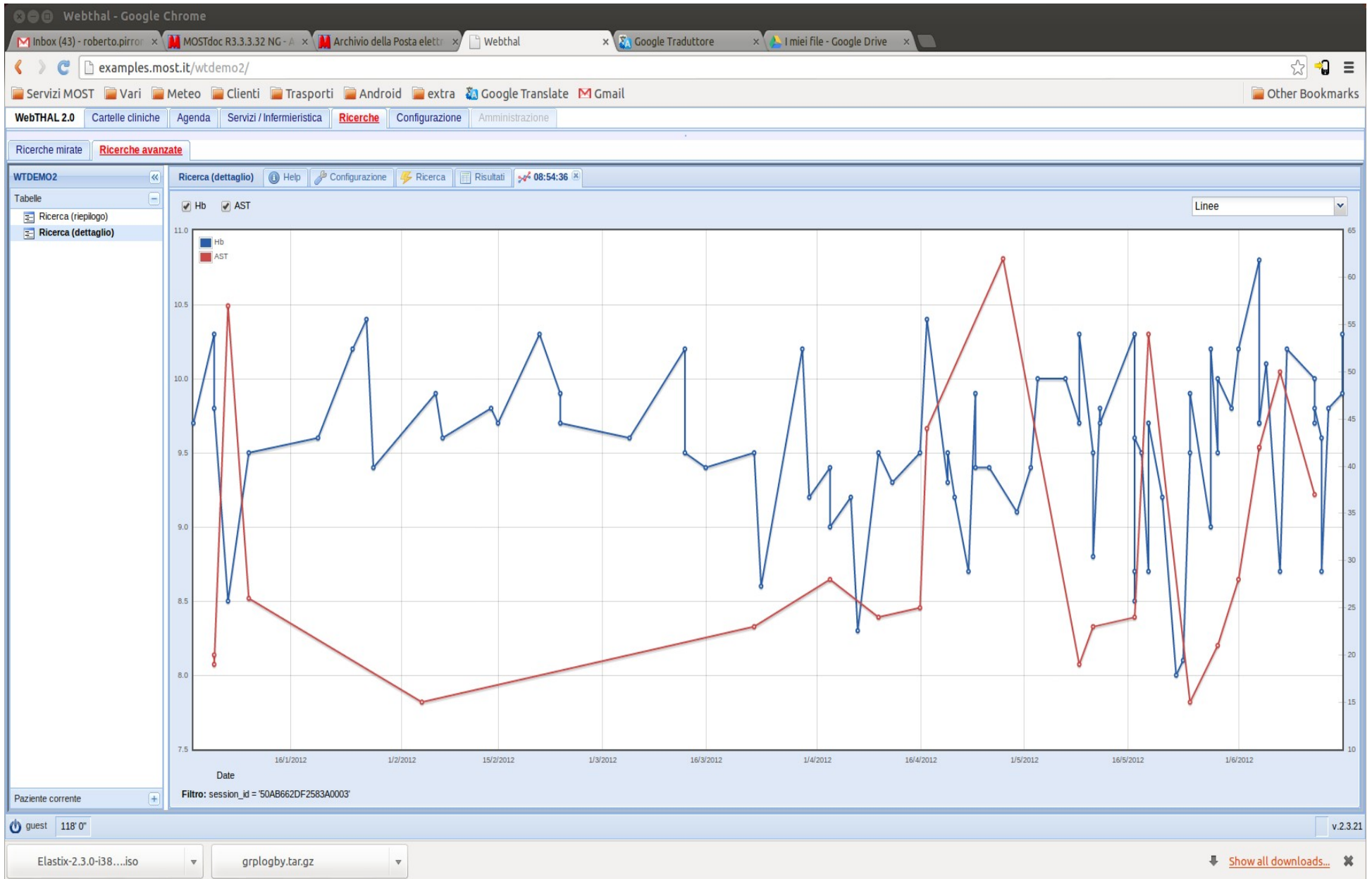
Complicanze

Pazienti che hanno almeno una delle complicanze selezionate:

425.9 - CARDIOMIOPATIA SECONDARIA, NON SPECIFICATA XXX.SPLENECTOMY - Splenectomia
 XXX.CHOLECYSTECTOMY - Colectomia 732.8 - ALTRE FORME SPECIFICATE DI OSTEOCONDROPATIA
 253.4 - ALTRE IPOFUNZIONI DELL'IPOFISI ANTERIORE 493.90 - ASMA, TIPO NON SPECIFICATO



Integrated graphics generation





Lab exams import

- Each patient has 30/40 results for each check
- Manual input is time consuming and error prone
- Laboratories have different IT systems
- So, there is an ad hoc front end for each laboratory for data crunching (from databases, files, web pages, ...) to a common file format
- Standard xml file is parsed and presented via a web interface, already associated to the patient



Exam result import

WebTHAL 2.0 Cartelle cliniche Agenda **Servizi / Infermieristica** Ricerche Configurazione

Sezione servizi

Ricevimento sacche trasfusionali **Importazione esami di laboratorio** Importazione esami SQUID

aggiorna elenco esami

Validazione degli esami di laboratorio

Elenco esami paziente

08/02/2012 (h 10:20) - 9 esami
CA... ANTONIO (nato il 21/05/1971)
08/02/2012 (h 10:20) - 1 esami
CA... ANTONIO (nato il 21/05/1971)
08/02/2012 (h 10:19) - 22 esami
CA... ANTONIO (nato il 21/05/1971)
08/02/2012 (h 10:20) - 2 esami
CA... DARIO (nato il 04/04/1976)
08/02/2012 (h 07:19) - 25 esami
CA... DARIO (nato il 04/04/1976)
08/02/2012 (h 07:19) - 3 esami
CA... DARIO (nato il 04/04/1976)
08/02/2012 (h 07:19) - 22 esami
CA... DARIO (nato il 04/04/1976)
08/02/2012 (h 07:19) - 4 esami
CA... RCO (nato il 14/01/1975)
08/02/2012 (h 11:39) - 22 esami
CA... RCO (nato il 14/01/1975)
08/02/2012 (h 11:39) - 4 esami
CE... PATRIZIA (nato il 13/11/1971)
08/02/2012 (h 10:20) - 8 esami
CE... PATRIZIA (nato il 13/11/1971)
08/02/2012 (h 10:19) - 22 esami
CU... RIA CHIARA (nato il 05/05/1977)

Esami del 08/02/2012 (h 11:39) di C. [] CO nato il 14/01/1975
Accesso ospedaliero di tipo DAY_HOSPITAL

Esegui la import

Elimina la import

Nome Esame	Valore	Unità di misura	Limiti di normalità	Seleziona/deseleziona tutti gli esami	Codice esame
Emoglobina	10.4	g/dL	13-17	Scegliere... ▾	STD-HB
Basofili #	0.07	x1000/uL	0-2	<input checked="" type="checkbox"/>	1100BAS#
Basofili %	0.7	%	0-1.5	<input checked="" type="checkbox"/>	1100BAS%
Eosinofili #	0.62	x1000/uL	0-8	<input checked="" type="checkbox"/>	1100EOS#
Eosinofili %	6.7	%	0-7	<input checked="" type="checkbox"/>	1100EOS%
Ematocrito	30.4		40-52	<input checked="" type="checkbox"/>	1100HCT
Linfociti #	5.44	x1000/uL	.9-5.2	<input checked="" type="checkbox"/>	1100LYM#
Linfociti %	59.5	%	19-48	<input checked="" type="checkbox"/>	1100LYM%
MCH	29	pg	27-31	<input checked="" type="checkbox"/>	1100MCH
MCHC	34.3	g/dL	33-37	<input checked="" type="checkbox"/>	1100MCHC
MCV	84.7	fL	80-100	<input checked="" type="checkbox"/>	1100MCV
Monociti #	1.09	x1000/uL	.16-1	<input checked="" type="checkbox"/>	1100MON#
Monociti %	11.9	%	3.4-9	<input checked="" type="checkbox"/>	1100MON%
MPV	9.2	fL	7.2-11.1	<input checked="" type="checkbox"/>	1100MPV
PCT	0.31	%	.12-.36	<input checked="" type="checkbox"/>	1100PCT



Documents

- Patient history is made of values (exam results) but also of documents (official medical reports, MRI, radiography,...)
- High definition images loaded from the Web are best viewed with incremental download of small tiles, at the right zoom level

Ricerche mirate

Ricerche avanzate

WTDEMO2



Documenti (paziente corrente)



Help



Configurazione



Ricerca



Risultati

Tabelle



Paziente corrente



Documenti

Immagini

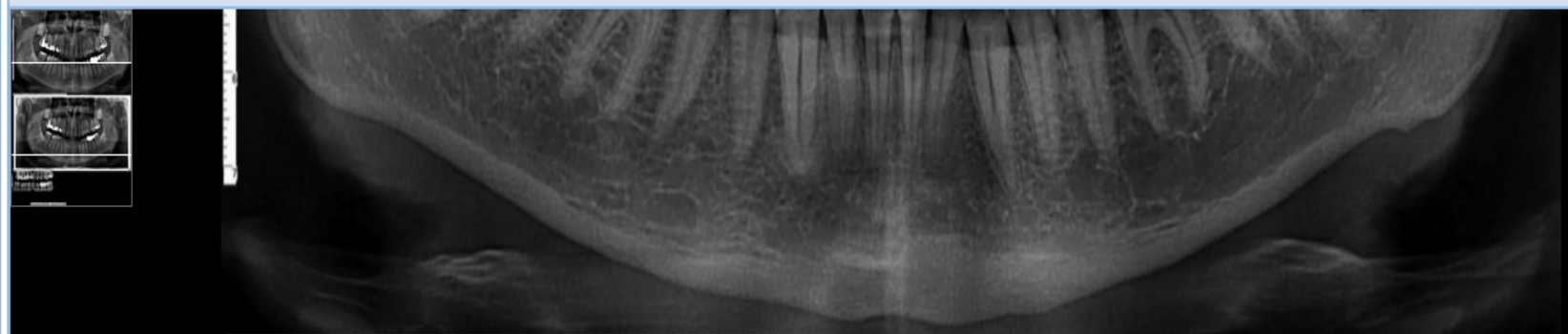
Grafico: HB pre/post

Grafico: Ferritin/LIC/ALT/AST

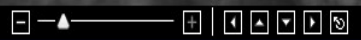
Esporta

<input type="checkbox"/>		Data di riferimento	Tipo documento	Documento	Note
<input type="checkbox"/>		23/05/1995	Ecografia		zoom su immagine 6
<input checked="" type="checkbox"/>		23/05/1995	Ecografia		
<input type="checkbox"/>		12/11/2009	RX		Panoramica dentale
<input type="checkbox"/>		01/11/2012	Lettera		

- Paziente corrente
- Documenti
- Immagini
- Grafico: HB pre/post
- Grafico: Ferritin/LICIAL/IAST



Programma RadMedica 5.2 - Le misurazioni ottenibili con le scale riportate nelle radiografie sono da considerarsi indicative





Future

- Leveraging the plusses of the product to reach a wider audience:
 - WebTHAL as a general tool, for other types of disease, building ad hoc sections
 - Coping with local privacy legislation in each country
 - Deep integration with external Dbs (hospital records) and services (blood and drug requests)