Threats & Opportunities in the Healthcare industry in this millennium

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Director, Asia Pacific

HEALTHCARE

THOMSON REUTERS

Topics

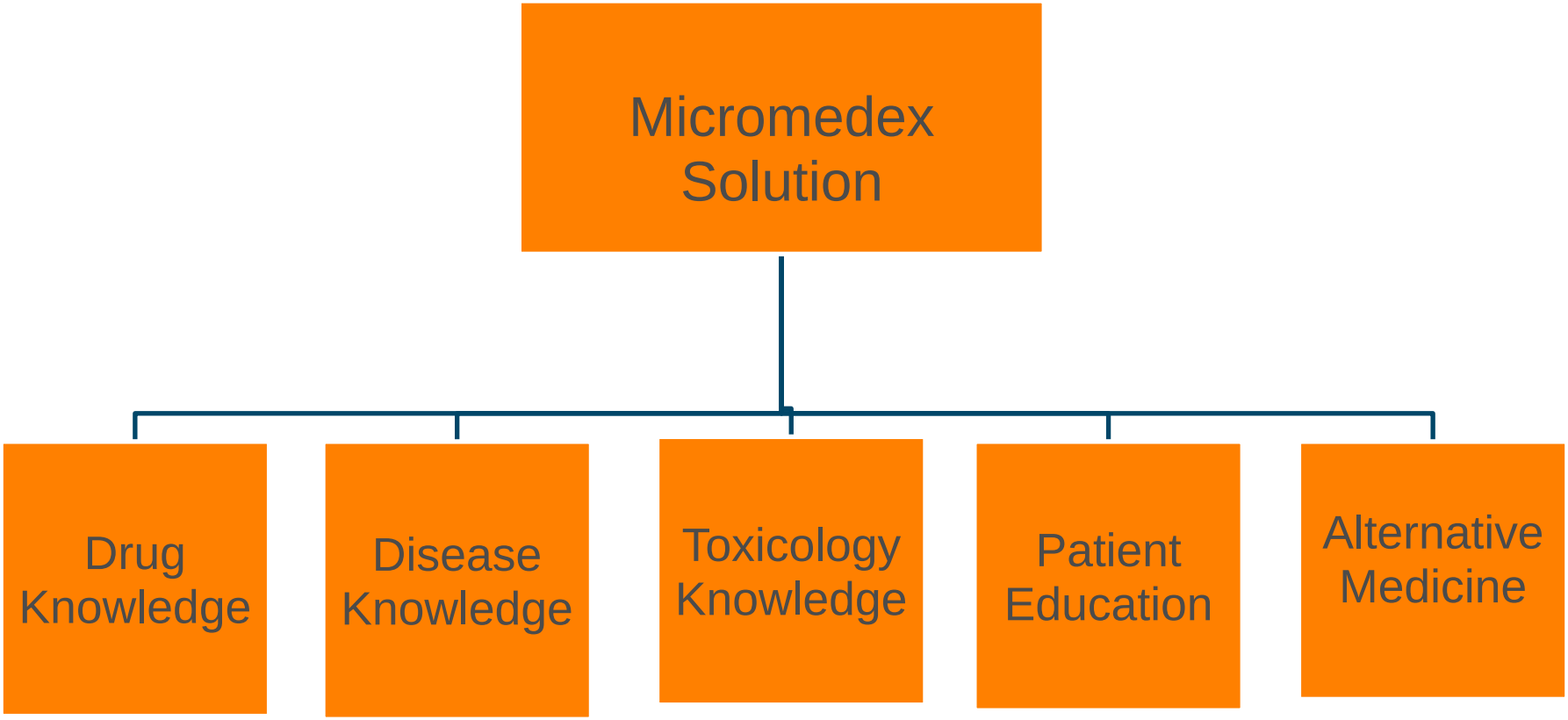
- Micromedex – brief Introduction
- Global Trends
- Taiwan Healthcare –
  - Strengths & Weaknesses
  - Threats
- Opportunities
  - Drug co.
  - Hospitals
  - How Micromedex can assist in realizing these opportunities

MICROMEDEX
Brief Introduction

Micromedex background

- Micromedex (Microfiche Medical Index) founded in 1974. Now a subsidiary of Truven Health Analytics
- Pioneer of EBM:
  - 1948 - 1st Randomized Controlled Trial (RCT)
  - 1993 - Cochrane collaboration
- Synthesis of the latest peer-review, full text , EBM content; *mission critical tool @ point of care*
- Updates:
  - RED BOOK Online – daily
  - Internet - weekly;
  - iPhone & Android Apps – Free
- Mission: *Knowledge...When you Need it Most* !

Micromedex Solution



The healthcare industry trusts Micromedex because….

- **Authority:**
  - Drugdex, Poisindex & Diseasedex accepted by US Congress as Official drug & medical compendia
- **Quality:**
  - Rigorous editorial process by 150 Internal editors & 500 advisors worldwide
- **Currency:**
  - *Weekly* update on Internet, Urgent cases *Daily*
- **Reliability:**
  - 36 years of Trusted EBM in-depth clinical content

Consistency

- Consistent Google-like search & data format

Global Healthcare Trends
Taiwan SWOT Analyses

Global Healthcare Trends

- Aging population & shrinking workforce. Exploding healthcare demand while Govt. struggle with healthcare costs.
- Explosion of Medical knowledge. Clinicians under pressure to keep up with latest medical knowhow.
- 62% of internet-users search for health information, influenced by commercial "*Advertising-Editorial" information.*
- 15-20% consumers take both prescription medicine & herbal medicine; consumers look for alternative treatment.
- Drug co. focus on lifestyle disease: ED, depression, obesity. Non-communicable disease (e.g. diabetes) displace infectious (e.g. malaria).

Global Healthcare Trends

- Biotech shift focus from cure to prevention using Genomics & Reverse Proteomics
- Effect of Govt. policy and emerging social trends
  - China's 1-child policy ; twin drugs" (FSH, Recombinant or clomifene citrate)
  - Singapore's tax incentives for 3 children
  - Gay couple use Indian surrogate mothers

Taiwan's healthcare: SWOT (strength, weakness, opportunity, threat)

STRENGTH
One of the best systems in Asia
Low cost universal systems
Highly skilled dedicated clinicians
Advanced high-tech equipment & info. resources
Very high standard of care
Relatively easy access to speedy care

WEAKNESS
Family clinics over-shadowed by hospitals
Overworked clinicians

THREATS
Declining birth rate & aging population
Unsustainable Healthcare cost increase
Increase in demand & declining tax base
Intense competition among hospitals

Taiwan's healthcare - Opportunities

Drug Co.	Drug Pricing
	Reverse Proteomics
Hospitals	Medical Tourism
	Alternative Medicine
	Reduction of ADE Adverse Drug Events)
	Drug Substitution
	Low birth rate

OPPORTUNITIES
Drug Co.

Drug Price
using Red Book Online

Patent expiry of branded drugs

- 57% of branded drugs will be off-patent by 2011 and 75% by 2013 - *RolandBerger Strategy Consultants.*
- $78 billion sales of branded drugs will be lost- *Datamonitor*.
- Another $32 billion sales of patent-expired brands will be lost from price cuts and reimbursement restrictions.
- Trend of low-price generic drugs replacing branded drugs upon patent expiry.

Challenges: Drugs coming off US patents in 2011-13

Manufacturer	Drug	Treatment for
Abbott Laboratories	Tricor	Cholestrol
Astra Zeneca	Nexium	Indigestion
Astra Zeneca	Seroquel	Depression
Bristol Myer Squibb	Plavix	Cardio (Blood Thinning)
Merck	Singulair	Asthma
Novartis	Diovan	Hypertension
Pfizer	Effexor XR	Depression
Pfizer	Lipitor	Cholestrol
Pfizer	Viagra	ED (Erectile Dysfunction)

Price replaces R&D as the most critical factor…..

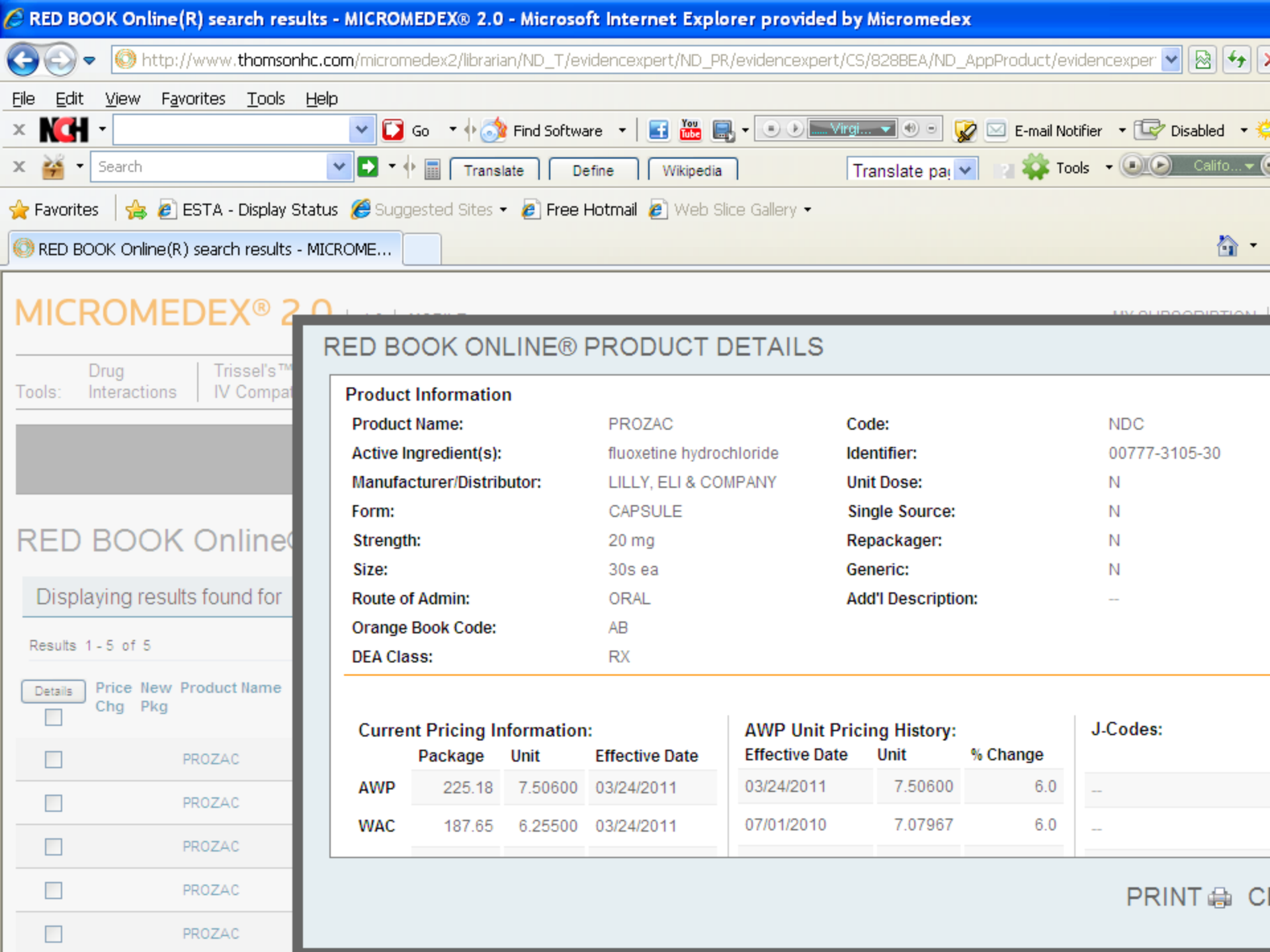
- Expensive ($1B) and lengthy (15 years) drug R&D process
- Shrinking R&D pipelines of new compounds
- Increasing regulatory complexity and commercial challenges (ROI)
- Only 1 in 5K to 10K drug compounds is commercialized successfully
- Drug co. now use Price to grow revenue and to enter market; price being the most important of the 4P of the marketing mix.
- All drug co. refer to Micromedex Red Book Online as the only source of drug price information.

RED BOOK Online

- US Drug Prices influence International pricing
- RED BOOK is the oldest source of drug pricing information in the U.S.
- RED BOOK™ Online provide electronic access to current pricing and product information on prescription drugs, OTC drugs, vitamin supplements and nutrition items.
- It is updated Continuously (daily Denver time 2 p.m.)
- First Data Bank ceased publishing the Blue Book AWP data field for all drugs since September 26, 2011.

RED BOOK Online

- Includes
  - Over 200,000 drugs (80,000 currently marketed) including Every drug approved by FDA
  - 105 data fields – E.g.
  - Brand name & Generic name, NDC #,
  - Dosage & forms, Strength,
  - Administration route, Package size etc.
- Contains different types of pricing
  - AWP (Average Wholesale Price)
  - WAC (Wholesale Acquisition Cost)
  - MSRP (Manufacturer's Suggested Retail Price),
  - DP (Direct Price)
  - FUL (Federal Upper Limit).


RED BOOK Online(R) search results - MICROMEDEX® 2.0 - Microsoft Internet Explorer provided by Micromedex
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Go
Find Software
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Search
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Wikipedia
Tools
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ESTA - Display Status
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Free Hotmail
Web Slice Gallery
RED BOOK Online(R) search results - MICROME...
MICROMEDEX® 2.0
Tools: Drug Interactions
RED BOOK Online
Displaying results found for
Results 1 - 5 of 5
Details
Price Chg
New Pkg
Product Name
PROZAC
PROZAC
PROZAC
PROZAC
PROZAC
RED BOOK ONLINE® PRODUCT DETAILS
Product Information
Product Name: PROZAC
Active Ingredient(s): fluoxetine hydrochloride
Manufacturer/Distributor: LILLY, ELI & COMPANY
Form: CAPSULE
Strength: 20 mg
Size: 30s ea
Route of Admin: ORAL
Orange Book Code: AB
DEA Class: RX
Code: NDC
Identifier: 00777-3105-30
Unit Dose: N
Single Source: N
Repackager: N
Generic: N
Add'l Description: --
Current Pricing Information:
Package
Unit
Effective Date
AWP 225.18 7.50600 03/24/2011
WAC 187.65 6.25500 03/24/2011
AWP Unit Pricing History:
Effective Date
Unit
% Change
03/24/2011 7.50600 6.0
07/01/2010 7.07967 6.0
J-Codes:
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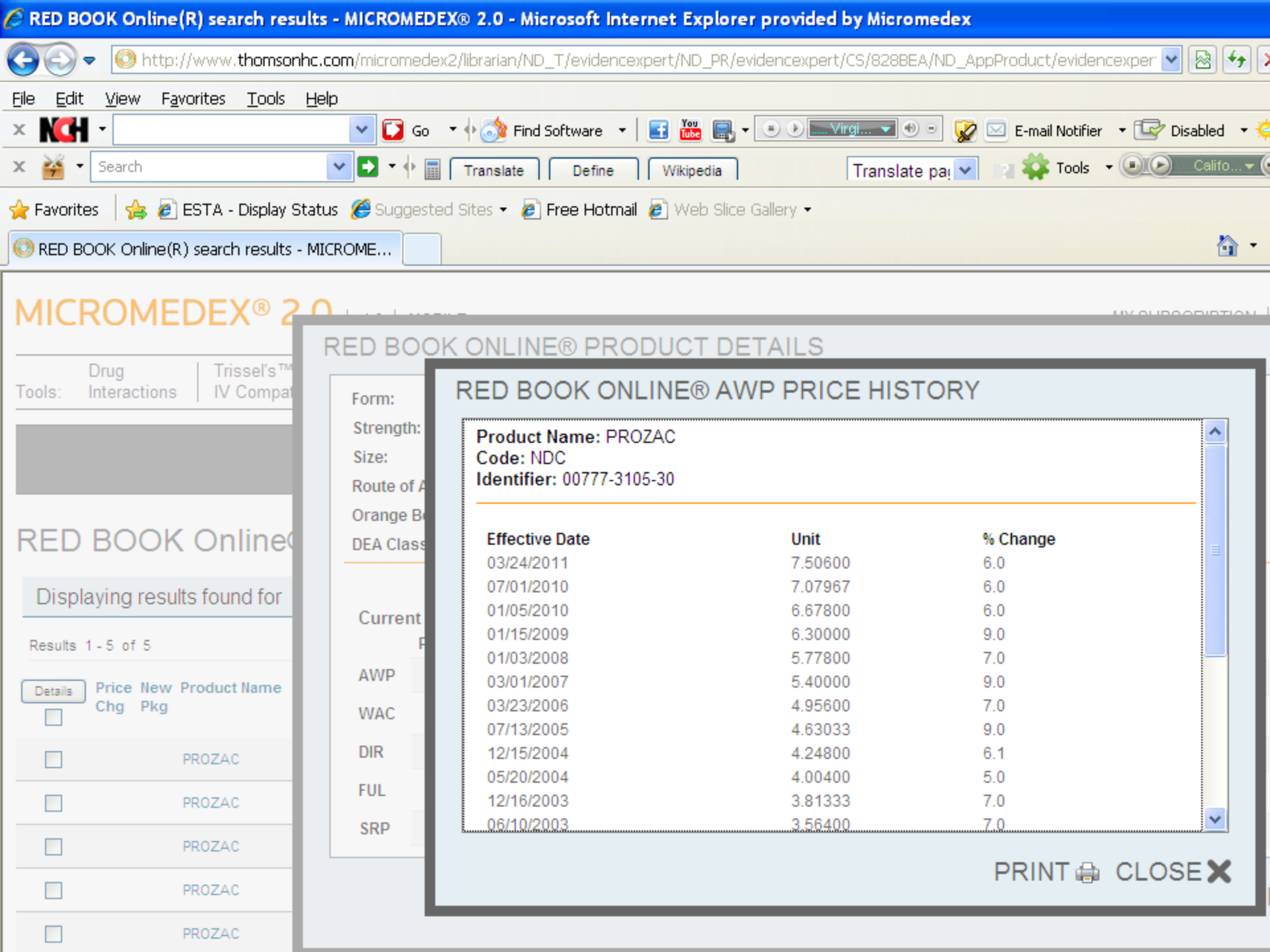
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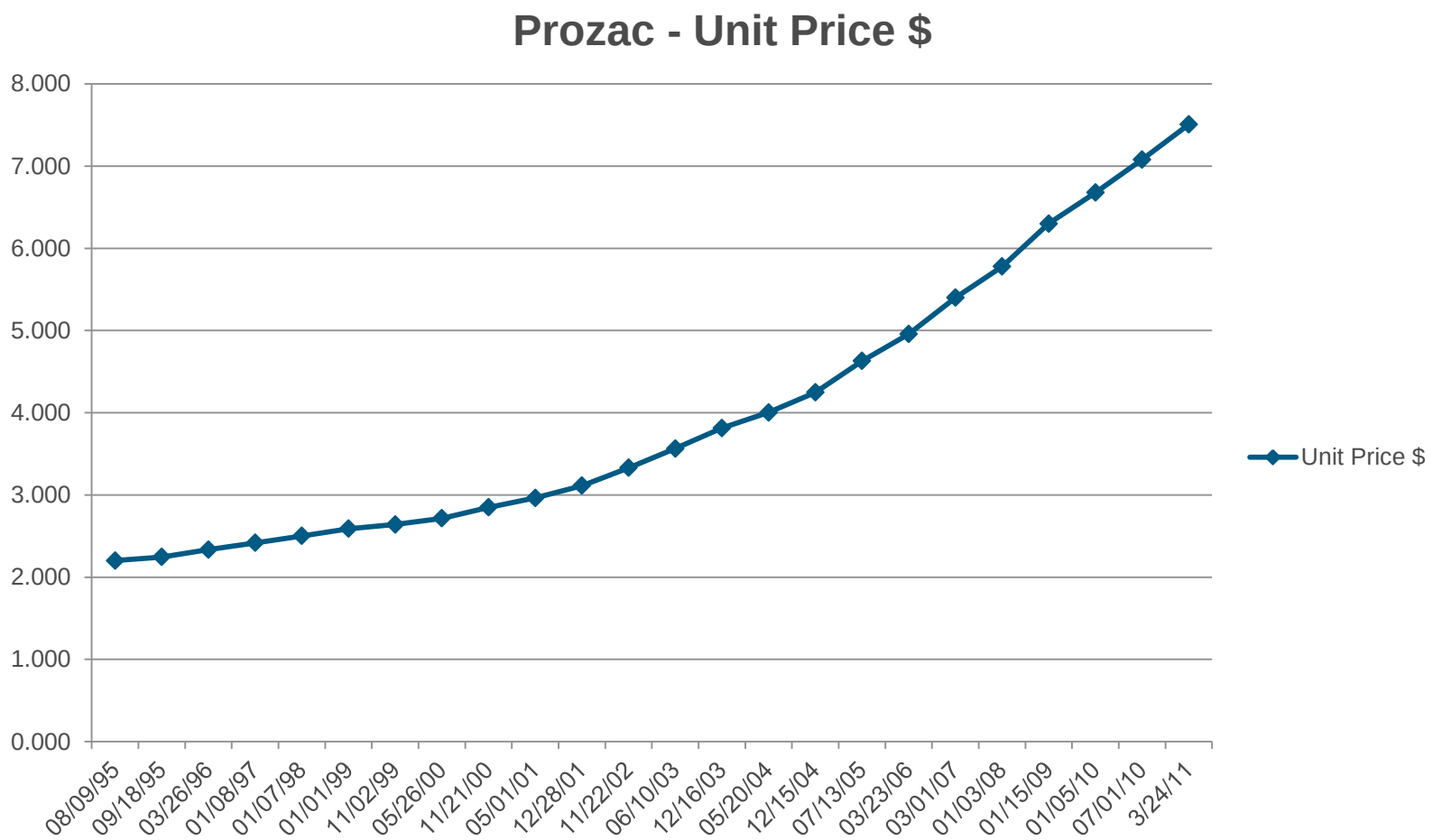
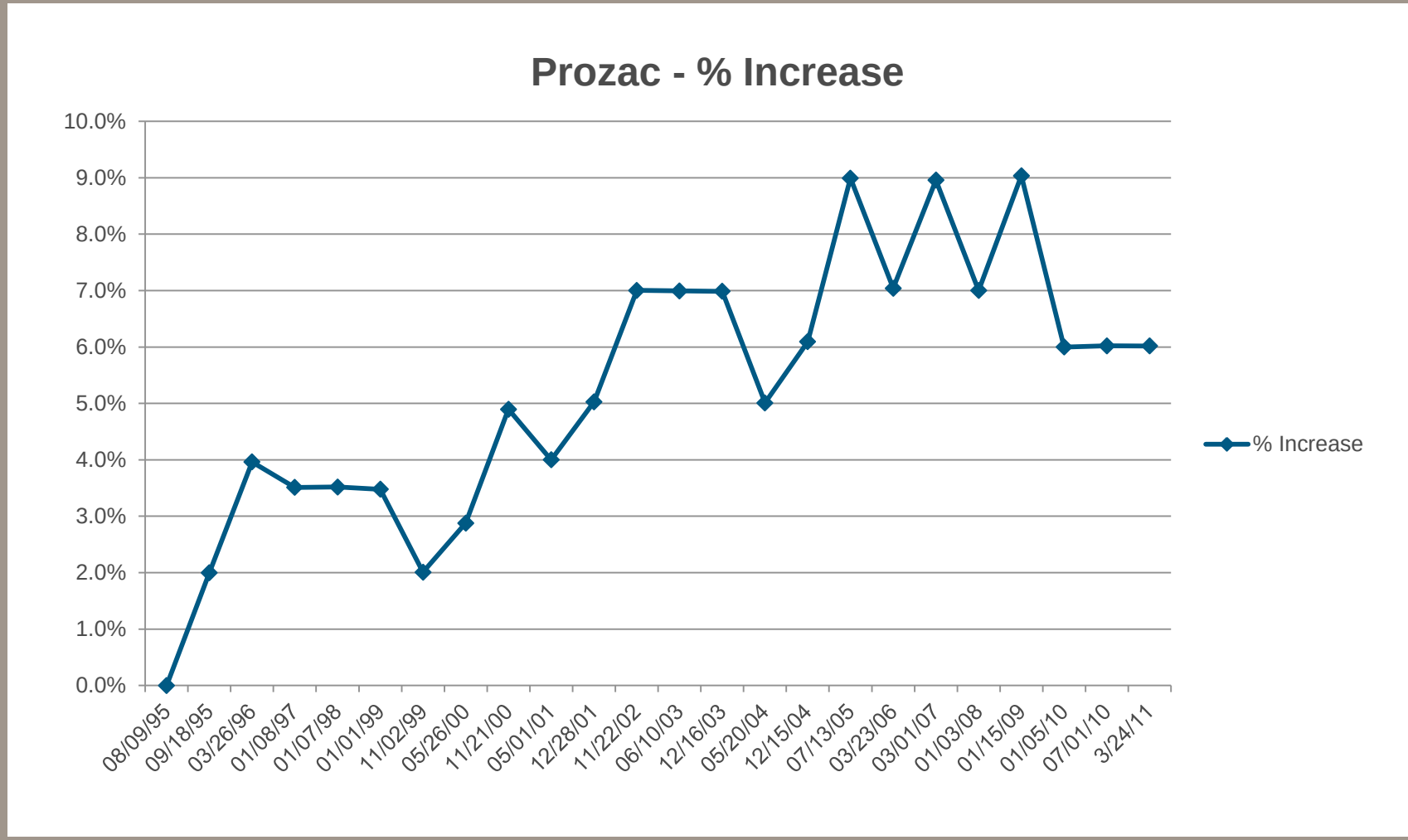
File Edit View Favorites Tools Help
Go
Find Software
E-mail Notifier
Disabled
Search
Translate
Define
Wikipedia
Tools
Favorites
ESTA - Display Status
Suggested Sites
Free Hotmail
Web Slice Gallery
RED BOOK Online(R) search results - MICROME...
MICROMEDEX® 2.0
Tools:
Drug Interactions
RED BOOK Online
Displaying results found for
Results 1 - 5 of 5
Details
Price Chg
New Pkg
Product Name
PROZAC
PROZAC
PROZAC
PROZAC
PROZAC
RED BOOK ONLINE® PRODUCT DETAILS
Form:
Strength:
Size:
Route of A
Orange B
DEA Class
Current
AWP
WAC
DIR
FUL
SRP
RED BOOK ONLINE® AWP PRICE HISTORY
Product Name: PROZAC
Code: NDC
Identifier: 00777-3105-30
Effective Date
Unit
% Change
03/24/2011 7.50600 6.0
07/01/2010 7.07967 6.0
01/05/2010 6.67800 6.0
01/15/2009 6.30000 9.0
01/03/2008 5.77800 7.0
03/01/2007 5.40000 9.0
03/23/2006 4.95600 7.0
07/13/2005 4.63033 9.0
12/15/2004 4.24800 6.1
05/20/2004 4.00400 5.0
12/16/2003 3.81333 7.0
06/10/2003 3.56400 7.0
PRINT
CLOSE

PROZAC: AWP Price History ($)



PROZAC: AWP % Increase in Price



Reverse Proteomics

Drugdex (off-label uses)

Case Study –
Japan Reverse Proteomics Research Institute

Japan Reverse Proteomics Research Institute

- Japanese Govt. worried about Western drug co. taking over Japanese drug co. e.g. Roche buying Chugai Pharma.
- Esp. Very concerned with Japanese drug co. weak R&D capability.
- Set up 50:50 joint venture between Japanese Govt. and 15 drug companies to catch up with US and EU Multinationals - **Japan Reverse Proteomics Research Institute.**
- R&D into existing drugs using Reverse Proteomics to
  - Find new uses
  - Enhance efficacy, and
  - Reduce adverse effects

Reverse Proteomics

- Proteomics - study of proteins given out by the genome of a cell. Reverse proteomics is the re-engineering of these proteins, a logical extension of Genome R&D.
- Helps researchers understand the biological process in normal cell functions and disease development.
- The key components and processes of the cells can be used to improve existing drugs by
  - Discovering new uses
  - Enhancing efficacy
  - Reducing adverse effects

R&D of OTC and Generics Co.

- One of the Critical Tools in Reverse Proteomics is Micromedex Drugdex database
- Drugdex is the world's largest repository of "off label uses", an essential tool for reverse proteomics.
- Drugdex is widely used by Generics and OTC manufacturers on R&D into Orphan Drugs.
- The Japan Reverse Proteomics Research Institute leads to
  - Mergers of Japanese domestic drug co.
  - Acquisition of other overseas drug co.

Mergers & Acquisitions of Japanese drug co.

- **Mergers of Japanese drug co.**
  - Daiichi Pharma + Sankyo = **Daiichi Sankyo**
  - Yamanouchi Pharma + Fujisawa Pharm = **Astellas Pharma**
  - Dainippon + Sumitomo = **Dainippon Sumitomo**
- **Acquisition of other overseas drug co.**
  - Takeda → **Millennium** Pharma USA, **Syrrx** USA, **Nycomed** Switzerland
  - Daiichi Sankyo → **Ranbaxy** India, **Plexxikon Inc**. USA
  - Shionogi → **Sciele Pharma** USA
- **Acquisition by other Overseas drug co.**
  - **Roche Switzerland -→ Chugai Pharma**
  - **Teva Israel → Taiyo**
  - **Johnson & Johnson USA → Kyowa Hakko = Janssen Kyowa**

OPPORTUNITIES
Hospitals

Medical Tourism

CareNotes (& Google Chrome)

Global medical tourism industry

- Patients travel overseas for treatment because of cost, quality & waiting period. A $60B high growth service industry.
- 3 market sectors in Asia
  - US, EU seek affordable treatment
  - Middle East patients prefer a culture-religion friendly Asia
  - Asian middle class seek quality care within Asia
- E.g. of Procedures and Surgeries
  - Major- Heart bypass, Liver transplants, Joint replacement, cancer surgery
  - Minor- Health screening, dental, lasik, cosmetic, IVF, TCM treatment
- Key Player countries & Patients
  - Thailand 2 million
  - India 750,000
  - Singapore 600,000
  - Malaysia 550,000
  - Korea 100,000

Cost Comparisons for foreign patients

Costs of Procedure (USD)	USA	Taiwan	Singapore	India
Heart bypass surgery	75,000	25,000	16,000	8,000
%	100%	33%	21%	11%

Cost Comparison (USD)	USA	Thailand
Hip Replacement	53,000	12,000
Coronary Angioplasty	70,000	13,000
Coronary Bypass	150,000	12,000
Gastric Bypass	58,000	13,000

Taiwan – SWOT in medical tourism

Strength	Weakness
Highly skilled clinicians	Lack marketing & promotion
Advanced high-tech equipment	Small number of JCI hospitals
Easy access to speedy care	Spoken English need improving
Chinese Speaking (mainland China)	Inexperienced in handling foreign patients
Japanese language	Need greater Govt. support
Opportunity	**Threat**
Huge China market with direct flight	Distraction from setting up hospital in China
US & Japan market to be tapped	ROC-PRC politics (Patient's perspective)
	Competition from Korea

13 JCI-Accredited hospitals in Taiwan

Hospital	City	When
Chang Bin Show Chwan Memorial Hospital	Changhua Lugang	Dec-09
Changhua Christian Hospital	Changhua	Sep-08
China Medical University Hospital	Taichung	Oct-10
Dr. Wells WeiYu Dental & Implant Center	Taipei	Nov-11
E-Da Hospital	Kaohsiung	Nov-08
Koo Foundation Sun Yat-Sen Cancer Center	Taipei	Dec-07
Min-Sheng General Hospital	TaoYuan	Jul-07
National Taiwan University Hospital	Taipei	Apr-10
Shuang Ho Hospital – Taipei Medical University	New Taipei City	Aug-09
Wang Fang Medical Center- Taipei Medical University	Taipei	Jul-06
Taipei Medical University Hospital	Taipei	Dec-09
Tungs' Taichung MetroHarbor Hospital Wuchi Campus	Taichung	Nov-08
Universal Eye Center	Taipei	Oct-10

Medical tourism & JCI-JCAHO accreditation

- JCI accredits overseas hospitals using standards linked to JCAHO to reflect overseas condition. Hospitals involved in medical tourism usually have JCI accreditation.
- JCAHO accredits 16,000 US hospitals to improve the safety and quality of care with 7 main goals
- Micromedex Drugdex, Poisindex and DrugReax help to meet all JCI-JCAHO's 7 main goals especially Goals 2 and 3
- Micromedex Care Notes System database helps to achieve compliance to six JCI-CAHO standards on patient education.

Drugdex, Poisindex & DrugReax meet JCI's safety goals

Micromedex Drugdex, Poisindex and DrugReax help to meet ALL the goals especially Goals 2 and 3

JCI-JCAHO 2004 National Patient Safety Goals (NPSG) standards

Goals	Standards
1	Patient Identification
2	Communications (standardized acronyms)
3	High Alert Medications
4	Wrong Site Surgery
5	Infusion Pumps
6	Alarm Systems
7	Healthcare-Acquired Infection

CareNotes meet JCI's patient education standard

Micromedex CareNotes System database helps to achieve compliance to the above JCI-JCAHO PE standards
PE= Patient Education

Standard	Description
LD.3.120	Plan for and support …..PE activities
MM.5.10	Medications are safely and accurately administered
PC.6.30	The patient receives PE ……. specific to his ABILITIES
PC.6.10	The patient receives PE ……specific to his NEEDS
PC.15.20	A Patient's transfer or discharge …..is based on the patient's assessed needs and the hospital's capabilities
RI.3.10	Patients are given information about their responsibilities while receiving care……

CareNotes patient leaflets

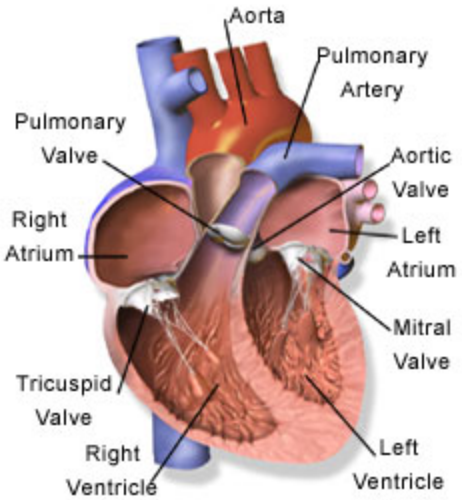
- CareNotes is a patient education (drug & disease) leaflets written at a 12-year old reading level.
- The most common 200 drug & disease leaflets are translated into 14 European and Asian languages
- All 4,000 leaflets can also be automatically machine translated into 52 languages (from Afrikaan to Yiddish) using Google Chrome.
- These leaflets may be customized for hospitals' needs: hospital names & logos, patient name, and the content customized for individual patient.

14 European & Asian languages

French	Arabic
German	Chinese (Simplified) China
Italian	Chinese (Traditional) Taiwan
Portuguese (Brazilian)	Japanese
Spanish (Mexican)	Korean
Polish	Vietnamese
Russian	Turkish

Tim ghép

là một phẫu thuật được thực hiện để thay thế trái tim của bạn không có một trái tim các nhà tài trợ. Nhà tài trợ là một người đã chọn để cung cấp cho các cơ quan của họ để nhữ
bạn trông giống như một quả lê lộn ngược và được tìm thấy trong ngực của bạn giữa phổi của bạn. Trái tim của bạn được kết nối với các mạch máu lớn như động mạch chủ và t
ốn buồng (không gian) bao gồm cả hai phía trên tâm nhĩ và tâm thất thấp hơn. Các bức tường buồng mô cơ đánh bại (thắt chặt và thư giãn) liên tục. Với mỗi nhịp đập, máu, oxy và
ác mô khác và các cơ quan trong cơ thể của bạn.



Anatomy of the Heart

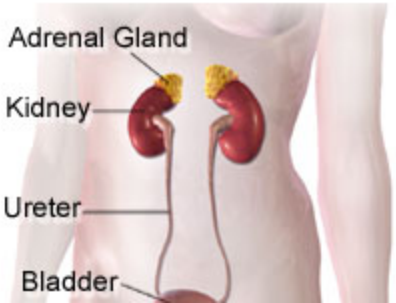
Lihat: Inggris

GINJAL KRONIS KEGAGALAN - Informasi Umum

Gagal Ginjal Kronis

INFORMASI UMUM:

Apakah gagal ginjal kronis? gagal ginjal kronis juga disebut gagal ginjal kronis (CRF). Hal ini terjadi ketika ginjal perlahan bekerja kurang dan kurang sampai mereka tida menghilangkan bahan kimia dan limbah dari darah. Limbah ini berubah menjadi air seni oleh ginjal. Pada gagal ginjal kronis, ginjal tidak dapat lagi melakukan hal ini. Gag menyebabkan stadium akhir penyakit ginjal (ESRD).



CAM (Complementary & Alternative Medicine)

St John's wort 金絲桃- replacing prozac & zoloft (depression)

Drugs	adult dose mg/day	Cost/dose US$	Annual cost US$		Annual Savings US$
Prozac (branded)	20	4.52	1,650.61		
Prozac (generic)	20	3.81	1,391.06		
Zoloft	50	3.32	1,212.61		
Average (Prozac+zoloft)			1,418.09		
St. John's wort 金絲桃	300	0.34	124.83		1,293.26

Annual Savings/ patient US$	Estimate # users in USA	Annual Savings for USA US$
1,293.26	4.9 Million	6.38 Billion

Clinical Scenario 1 - AltMedDex

- Your 68 year-old male patient suffering from severe hypertension and Erectile Dysfunction (ED) was treated with 100 gram Viagra. While effective, he was concerned with its potential severe side effects (e.g. blindness) and seek an alternative medicine Yohimbine on your OTC shelf

- **Recommendation**

Trial	Patients	Dose	Method	Results	
#	(n)	mg/d		Yohimbe	Placebo
1	40	16.2	Double blind crossover	33%	15%
2	215	unknown	Review	38%	
3	82	up to 42	Double blind partial	14% full, 20% partial	3/82
4	48	18	Double blind partial crossover	46%	19%
5	100	18	Randomized partial crossover	43.50%	26.60%

Prevention of ADE (adverse drug events)

DrugReax

IV Index

DrugReax & IV Index prevent ADE (adverse drug event)

- *Improved Safety & Treatment Outcome*
- *Reduction of Adverse Drug Events (ADE)*
- *Improved Productivity & Cost Reduction*

DrugReax for drug interaction checking

- 50 concurrent drug-specific interactions checks for 8,000 drugs
  - Drug-drug
  - Drug-alcohol
  - Drug-food
  - Drug-previous allergy
  - Drug-tobacco
  - Drug-Alternative Medicine
  - Drug-pregnancy
  - Drug-lacta**tion**

Clinical Scenario - DrugReax

- A 34-year old breast-feeding female patient reports having a previous allergy history to Pontocaine 0.5% ophthalmic solution. Can Benzocaine be administered ? The patient's drug history includes Prednisone 5 mg oral.
- **Recommendation**
- Drug/Lactation
  - Pontocaine - Major
  - Benzocaine - Major
  - Prednisone – Major
  - Infant risk cannot be ruled out:
- Drug/Pregnancy
  - Pontocaine - Moderate
  - Benzocaine - Moderate
  - Prednisone - Moderate
- Drug-Lab
  - Prednisone - Minor

IV Index for IV compatibility checking

- 600 unique solutions, 51,000 compatibility results and 3,000 references to identify unsafe drug-drug and drug-solution combination from Trissel's 2
- Gives quick IV compatibility results with features such as:-
  - Word wheel searching
  - Single and multiple drug searches
  - Collapsed overview results
  - Y-Site, Admixture, Syringe, Solution, and Total Parenteral Nutrition information included in one product, separately displayed
- Notes Field that identifies factors that may contribute to conflicting compatibility results; one-step drug lookup by trade name and generic

Clinical Scenario – IV Index

- What is the IV Compatibility of :
  - Heparin Sodium
  - Dopamine HCI (INTROPIN)
  - Cefazolin sodium (ANCEF, KEFZOL)

IV 相容性結果

修改相容性

Key: 

All Drugs (3)

全部選中 | 全部不選

- Cefazolin sodium
- Dopamine hydrochloride
- Heparin sodium

取消 更新

Tip: To see additional information on IV Solutions and TPN/TNA compatibility, select a single drug from the list and choose Update.

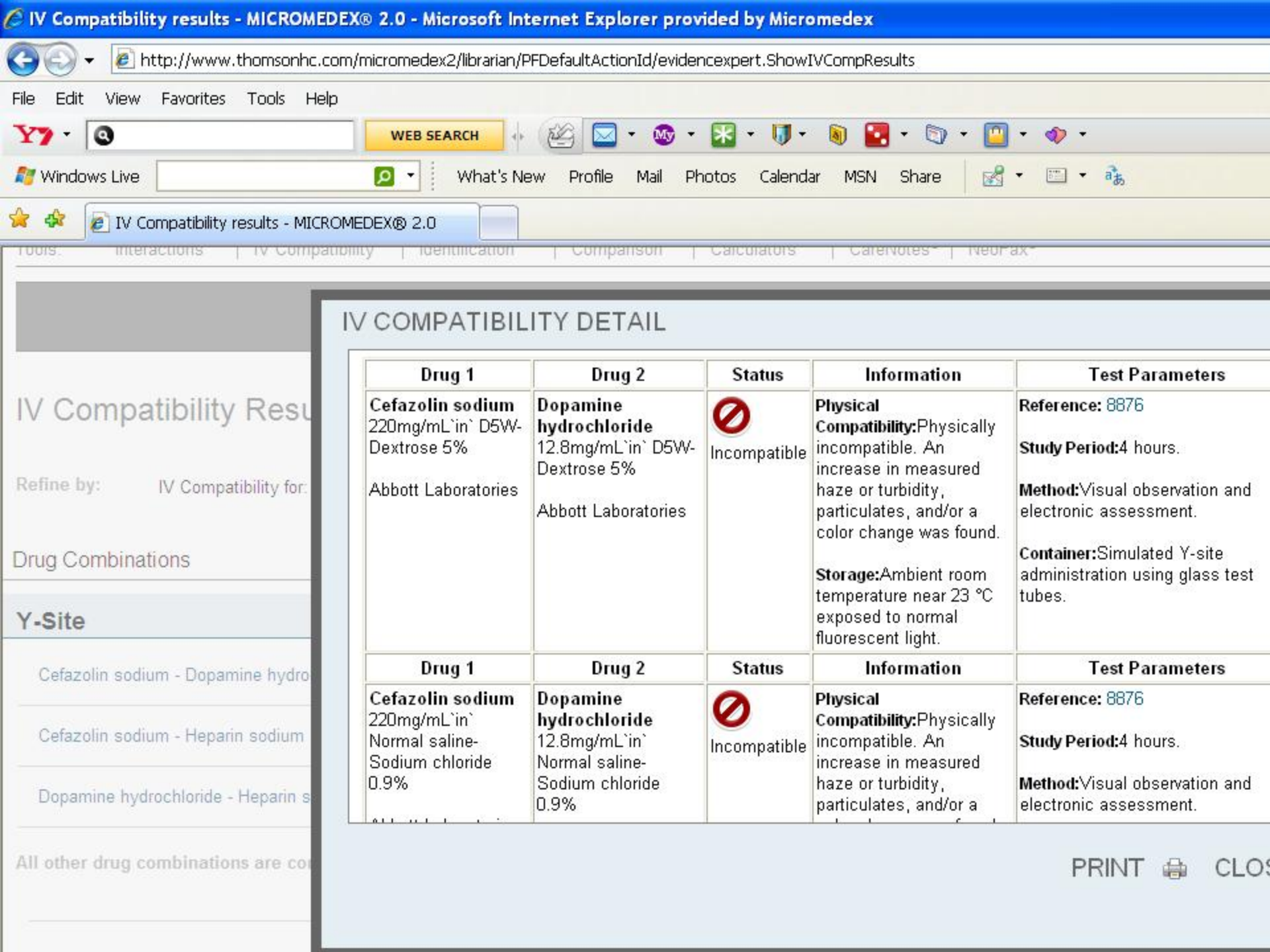
Y-Site | Admixture | Syringe

相容性： All

Y 型管

Cefazolin sodium - Dopamine hydrochloride	不相容
Cefazolin sodium - Heparin sodium	相容
Dopamine hydrochloride - Heparin sodium	相容

由 Trissel's™ 2 Clinical Pharmaceutics Database (Parenteral Compatibility). 支援。


IV Compatibility results - MICROMEDEX® 2.0 - Microsoft Internet Explorer provided by Micromedex
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WEB SEARCH
Windows Live
What's New Profile Mail Photos Calendar MSN Share
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Drug Combinations
Y-Site
Cefazolin sodium - Dopamine hydro
Cefazolin sodium - Heparin sodium
Dopamine hydrochloride - Heparin s
All other drug combinations are co
IV COMPATIBILITY DETAIL
Drug 1
Drug 2
Status
Information
Test Parameters
Cefazolin sodium 220mg/mL`in` D5W-Dextrose 5%
Abbott Laboratories
Dopamine hydrochloride 12.8mg/mL`in` D5W-Dextrose 5%
Abbott Laboratories
Incompatible
Physical Compatibility:Physically incompatible. An increase in measured haze or turbidity, particulates, and/or a color change was found.
Storage:Ambient room temperature near 23 °C exposed to normal fluorescent light.
Reference: 8876
Study Period:4 hours.
Method:Visual observation and electronic assessment.
Container:Simulated Y-site administration using glass test tubes.
Drug 1
Drug 2
Status
Information
Test Parameters
Cefazolin sodium 220mg/mL`in` Normal saline-Sodium chloride 0.9%
Dopamine hydrochloride 12.8mg/mL`in` Normal saline-Sodium chloride 0.9%
Incompatible
Physical Compatibility:Physically incompatible. An increase in measured haze or turbidity, particulates, and/or a
Reference: 8876
Study Period:4 hours.
Method:Visual observation and electronic assessment.
PRINT
CLOS

Drug Substitution

Compare Drugs

Drugdex database

- Covers -
  - Dosage
  - Pharmacokinetics
  - Cautions
  - Interactions
  - Clinical applications
  - Comparative efficacy & Therapeutic use.
- Search by trade & generic names
- 2500 drugs with 150,000 trade names
- US Congress Endorsed as Official Drug Compendium

50 Drug Comparison Summary !

- Concurrent Comparison of 50 drugs summaries can be made at one on key items e.g.:
  - Dosing Indication
  - FDA-Labelled Indications
  - Non FDA-Labelled Indications
  - Precautions
  - Drug Interactions
  - Adverse Effects
  - Toxicology and Clinical Effects
  - Pharmacokinetics, etc.
- Use Copy & Paste function to create a huge table of Comparison on Excel spreadsheet.

Drugdex: Precautions

LIPITOR	ZOCOR
Atorvastatin Calcium (see details in DRUGDEX®)	Simvastatin (see details in DRUGDEX®)
Precautions (see details in DRUGDEX®)	Precautions (see details in DRUGDEX®) Back to top
	amyotrophic lateral sclerosis (ALS); rate of ALS functional decline may increase with statin therapy
Back to top	age, 65 years or greater; risk factor for myopathy
	concomitant use of more than 10 mg of simvastatin with gemfibrozil, cyclosporine, and danazol should be avoided
amyotrophic lateral sclerosis (ALS), preexisting; rate of ALS functional decline may increase with statin therapy	concomitant use of more than 20 mg of simvastatin with amiodarone and verapamil should be avoided
concomitant therapy with azole antifungals, cyclosporine, clarithromycin, erythromycin, fibric acid derivatives, lopinavir/ritonavir, niacin, ritonavir/saquinavir	concomitant use of more than 40 mg of simvastatin with diltiazem should be avoided
conditions predisposing to renal failure due to rhabdomyolysis (eg, sepsis, hypotension, dehydration, trauma, major surgery, uncontrolled seizures, and severe metabolic, endocrine and electrolyte disorders); increased risk	creatine kinase (greater than 10 times the ULN) elevations may occur; dose-related increased risk of myopathy, including rhabdomyolysis with or without acute renal failure, rarely with fatalities
creatine kinase (CK) greater than 10 times the upper limit of normal (ULN) may occur; dose-related increased risk of myopathy, including rhabdomyolysis with or without acute renal failure, rarely with fatalities	grapefruit juice; avoid large quantities (greater than 1 quart/day)
heavy alcohol use; increased risk of liver dysfunction	heavy alcohol use; increased risk of liver dysfunction
liver disease, history; increased risk of liver dysfunction	higher doses (particularly 80 mg); increased risk of myopathy compared with lower doses
myopathy and rhabdomyolysis with acute renal failure, including fatalities, have been reported	hypothyroidism, uncontrolled; risk factor for myopathy
recent stroke or transient ischemic attack (TIA); post-hoc analysis showed greater incidence of hemorrhagic stroke with atorvastatin compared with placebo in patients who had a stroke or TIA within preceding 6 months	increased serum transaminase levels (greater than 3 times the ULN) have been reported; monitoring recommended; discontinuation may be required if increased levels persist

Drugdex:Adverse Effects

LIPITOR	ZOCOR
Atorvastatin Calcium (see details in DRUGDEX®)	Simvastatin (see details in DRUGDEX®)
Adverse Effects (see details in DRUGDEX®)	Adverse Effects (see details in DRUGDEX®)
Common	**Common**
Gastrointestinal: Diarrhea (up to 14.1%)	**Gastrointestinal: Abdominal pain (7.3% In pre-marketing and open extension studies with a median follow up period of 18 months, abdominal pain was reported in 7.3% of enrolled patients (n=2423) .), Constipation (6.6% In pre-marketing and open extension studies with a median follow up period of 18 months, constipation was reported in 6.6% of enrolled patients (n=2423) .), Nausea (5.4% In pre-marketing and open extension studies with a median follow up period of 18 months, nausea was reported in 5.4% of enrolled patients (n=2423) .)**
Musculoskeletal: Arthralgia (up to 11.7%)	**Neurologic: Headache (7.4% In pre-marketing and open extension studies with a median follow up period of 18 months, headache was reported in 7.4% of all patients enrolled (n=2423) .)**
Renal: Urinary tract infectious disease (up to 8%)	**Respiratory: Upper respiratory infection (9%)**
Respiratory: Nasopharyngitis (8.3%)	
Other: Pain, In extremity (up to 9.3%)	
Serious	**Serious**
Hepatic: Increased liver enzymes (0.2% to 2.3%), Liver failure	**Hepatic: Cholestatic hepatitis, Increased liver enzymes (1%)**
Musculoskeletal: Disorder of muscle, Myalgia (up to 8.4%), Rhabdomyolysis (rare), Rupture of tendon	**Musculoskeletal: Compartment syndrome of lower leg, Disorder of muscle (20 to 40 mg/day, 0.02% to 0.08%; 80 mg/day, 0.53% to 0.9%), Rhabdomyolysis, Rupture of tendon**
Neurologic: Hemorrhagic cerebral infarction (2.3%)	

Drugdex: Toxicology & Clinical Effects

LIPITOR	ZOCOR
Atorvastatin Calcium (see details in DRUGDEX®)	Simvastatin (see details in DRUGDEX®)
Toxicology	**Toxicology**
Clinical Effects	**Clinical Effects**
LOVASTATIN AND RELATED DRUGS	**LOVASTATIN AND RELATED DRUGS**
OVERDOSE: Ingestions of up to 6 grams of lovastatin have been tolerated; severe toxicity is not anticipated as a single agent overdose. ADVERSE EFFECTS: Diarrhea is the most common reported adverse effect. Hyperkalemia, peripheral neuropathy, myopathy, myalgias, acute renal failure, rhabdomyolysis, elevated liver enzymes, hepatitis, behavioral changes, CNS depression also reported. One patient developed compartment syndrome resulting in a four-compartment fasciotomy from statin-induced myositis.	**OVERDOSE: Ingestions of up to 6 grams of lovastatin have been tolerated; severe toxicity is not anticipated as a single agent overdose. ADVERSE EFFECTS: Diarrhea is the most common reported adverse effect. Hyperkalemia, peripheral neuropathy, myopathy, myalgias, acute renal failure, rhabdomyolysis, elevated liver enzymes, hepatitis, behavioral changes, CNS depression also reported. One patient developed compartment syndrome resulting in a four-compartment fasciotomy from statin-induced myositis.**
Treatment	**Treatment**
LOVASTATIN AND RELATED DRUGS	**LOVASTATIN AND RELATED DRUGS**
Decontamination: Ipecac, activated charcoal	**Decontamination: Ipecac, activated charcoal**
Rhabdomyolysis: IV hydration to maintain urine output of 2 mL/kg/hr or more.	**Rhabdomyolysis: IV hydration to maintain urine output of 2 mL/kg/hr or more.**
Monitoring of patient: Fluid balance, serum potassium, renal function, CPK, & liver enzymes in severe overdose.	**Monitoring of patient: Fluid balance, serum potassium, renal function, CPK, & liver enzymes in severe overdose.**
Range of Toxicity	**Range of Toxicity**
Adult: overdoses of up to 5 to 6 grams lovastatin have been well tolerated; no specific symptoms occurred with no sequelae reported.	**Adult: overdoses of up to 5 to 6 grams lovastatin have been well tolerated; no specific symptoms occurred with no sequelae reported.**

Low Birth Rate

Neofax

Neofax – caring for pre-mature babies

Concerns in neonatal medicine

- More than 1 million premature babies are admitted to neonatal intensive care units (NICUs) each year.
- Many neonates are very “sick” in addition to being premature
- Drug doses must be carefully adjusted for weight and age (post-natal and gestational) and the baby’s specific condition
- Neonatal orders for Drugs and IV Solutions are extremely complex and error prone.
- IV Solution orders for neonates can include 20-30 ingredients and must be prepared using minute (tiny) volumes of medication, while maintaining specific ratios (balance) of certain ingredients.

Do problems actually occur?

- 70% of all pediatric medication errors involve incorrect calculations.
- Medication errors are a significant contributor to neonatal morbidity in the NICU setting
- More than 90% of prescribed drugs used for Neonates are “off-label”, i.e., dosing is based on experience, not FDA approved package labeling.
- TPN (Total Parenteral Nutrition) orders are complex and time consuming (up to 20min/order), creating opportunities for errors

What happens in the typical NICU now?

Neonatologist evaluates the baby's condition …

NEONATAL INTENSIVE CARE
PARENTERAL NUTRITION ORDER FORM

ALL ORDERS MUST BE RECEIVED IN THE PHARMACY BY 1400. MUST COMPLETE ALL SECTIONS

1. Patient weight _____ kg
2. Line placement ☐ Central ☐ Peripheral
3. Dextrose _____% (Range 3-20%)
4. Amino acids _____ grams/kg/day (Range 0.5 - 3.5 gm/kg/day)
5. Lipids 20% _____ grams/kg/day x wt(kg) = _____ grams/day x 5 = _____ ml/day ÷ 24 = _____ ml/hr. (Range 0.5-4 gm/kg/day)
6. Total Daily Fluids _____ ml/kg/day x wt(kg) = _____ (A) ml/day ÷ 24 = _____ ml/hr.

Volume for pharmacy to mix dextrose/amino acids (Ⓐ) - (lipids + other drips (i.e. pressor agents, UAC fluids)) = _____ ml/day

ADDITIVES		GUIDELINES	
Sodium	_____ mEq/kg/day	Sodium	0-4 mEq/kg/day
Potassium	_____ mEq/kg/day	Potassium	0-4 mEq/kg/day
Calcium* (elemental)	_____ mEq/kg/day	Calcium* (elemental)	1-3 mEq/kg/day
Magnesium	_____ mEq/kg/day	Magnesium	0-0.6 mEq/kg/day
Phosphorus*	_____ mmol /kg/day	Phosphorus*	0.5-2mmol /kg/day
Pediatric MVI	_____ ml/day	Pediatric MVI	less than 1 kg 1.5 ml/day; greater than or equal to 1-3 kg 3.3 ml/day; greater than or equal to 3 kg 5 ml/day
Cysteine	_____ mg/kg/day	Cysteine	less than 2 kg 60 mg/kg/day; greater than or equal to 2 kg 120 mg/kg/day
Levocarnitine	_____ mg/kg/day	Levocarnitine	less than 2 kg; greater than or equal to 2 kg
Zinc (supplemental)	_____ mcg/kg/day	Zinc (supplemental)	less than 2 kg
Heparin	_____ unit/ml	Heparin	less than 2 kg and … 0.5 units/ml then in… to 1 unit/ml
Other	_____		

	☐ PedTrace-5 (standard)	☐ Hepatic cholestasis	☐ Renal d…
Zinc	200 mcg/kg/day	200 mcg/kg/day	200 mcg/kg…
Chromium	0.2 mcg/kg/day	0.2 mcg/kg/day	
Selenium	3 mcg/kg/day	3 mcg/kg/day	
Manganese	5 mcg/kg/day		5 mcg/kg/d…
Copper	20 mcg/kg/day		20 mcg/kg/…

Chloride/Acetate
☐ Balanced 1:1
☐ Chloride 2: Acetate 1
☐ Chloride 1: Acetate 2
☐ Minimize Chloride
☐ Minimize Acetate

*If the solution is insoluable due to excess calcium/phosphate, pharmacy will decrease both cal… phosphate until soluable. If you want only calcium or only phosphate changed, check the appr…
☐ Decrease phosphate ☐ Decrease calcium
If sodium plus potassium equals 1 mEq/kg/day, pharmacy can only put in a maximum of 0.65 … of phosphate. If the order is for zero sodium and potassium, zero phosphate can be added.

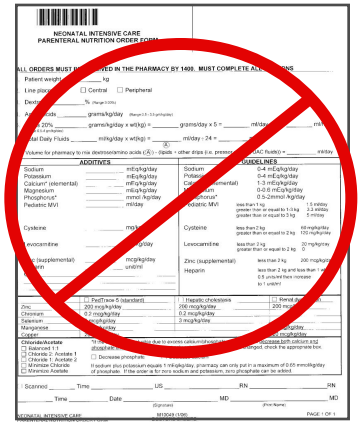
☐ Scanned _____ Time _____ US _____ RN _____

_____ Time _____ Date _____ MD _____ MD
(Signature) (Print Name)

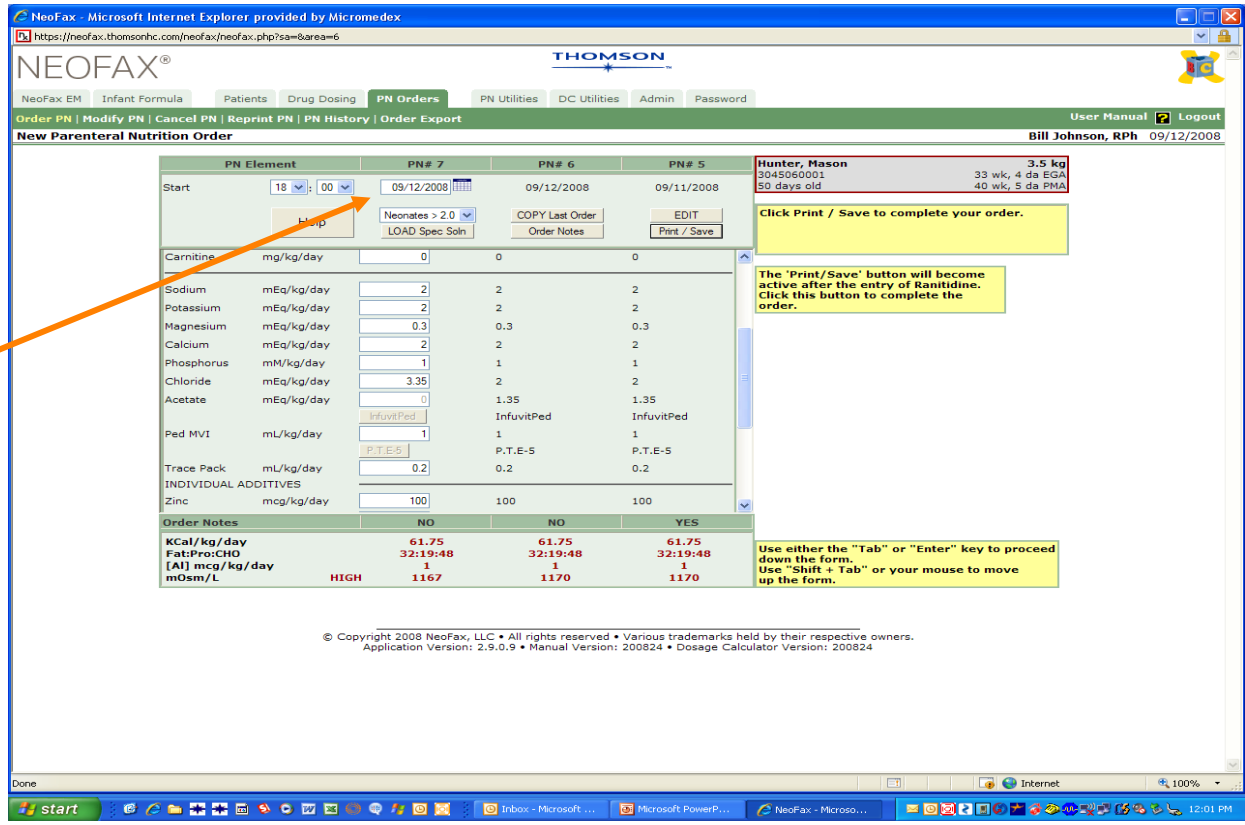
NEONATAL INTENSIVE CARE PARENTERAL NUTRITION ORDER FORM M10049 (1/06) DOCTORS ORDERS PAGE 1 OF 1

… then prescribes medications and nutritional support

How NeoFax Online help in NICU…….



Neonatologist prescribes medications and nutritional support at the Computer!



NeoFax® Online

- Drug Database (Referential Drug Information)
  - Covers more than 140 drugs commonly used to treat Neonates – most are “off-label” because of dosing and admin
  - The trusted source of knowledge for over 20 years
- Infant Formula Database
  - Provides detailed nutritional information for 45+ infant formulas
  - Can compare up to 3 nutritional formulations side-by-side
- Access
  - Internet
  - iPhone, Android

Mobile platform

Iphone, Android

MDX Summary Info. on Handheld Devices:

- Easily accessible
  - Internet access
  - On iPhone® and iPod® Touch, I-Pad
  - On Blackberry®
  - Android
- Suports Internet Explorer & Firefox
- Minimal training required
  - Intuitive and user friendly — even for new users with no prior knowledge of Micromedex
- Increase usability
  - … Increase speed to results
  - … Increase clinical effectiveness
  - … Improve clinician outcomes

Thank You

- Questions Please?