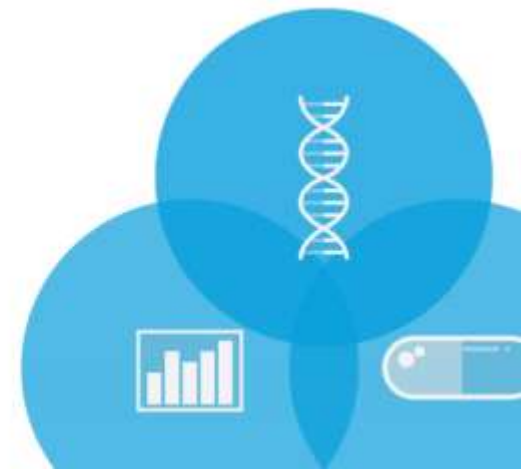


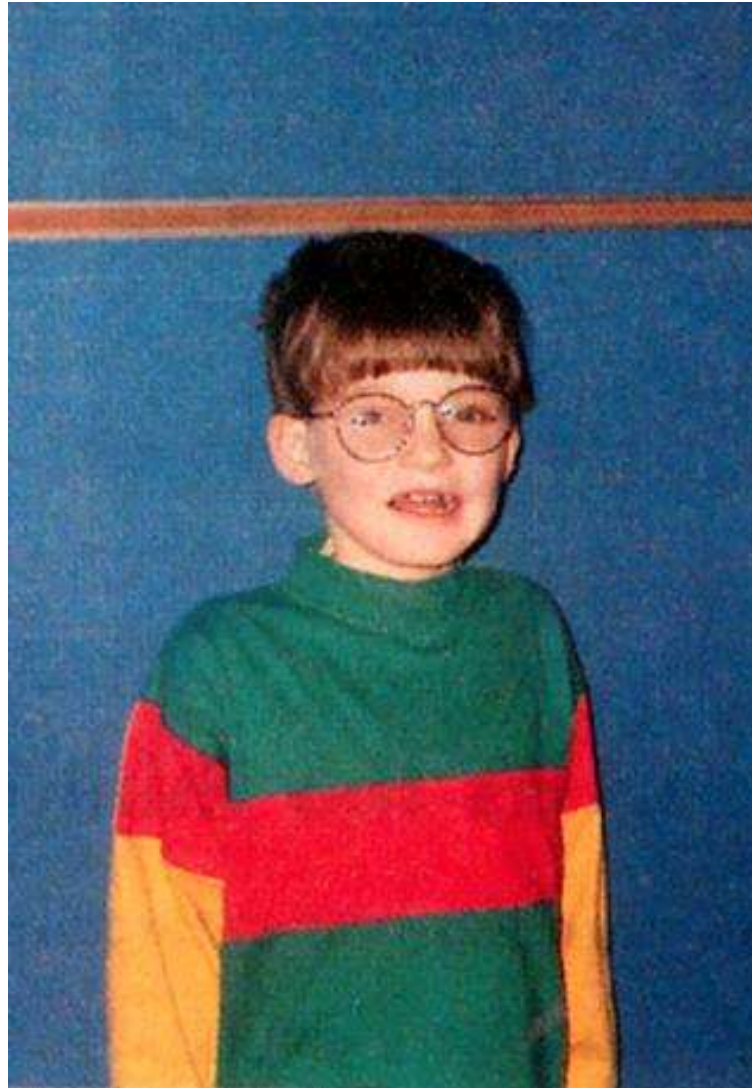
YouScript® Right drug, right dose, right now.

Arlington, Virginia

September 13th, 2014



Michael died from a seizure due to chronic overdose



Sallee et al.

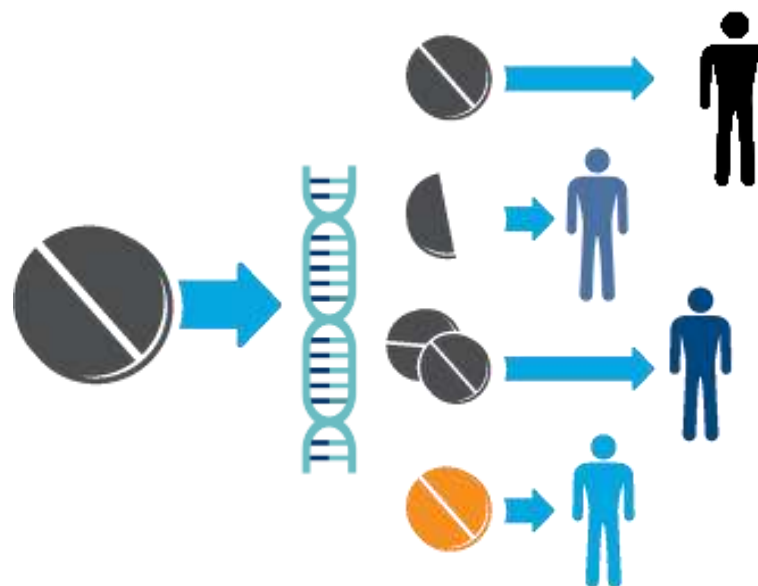
Without genetics

Advertised dose

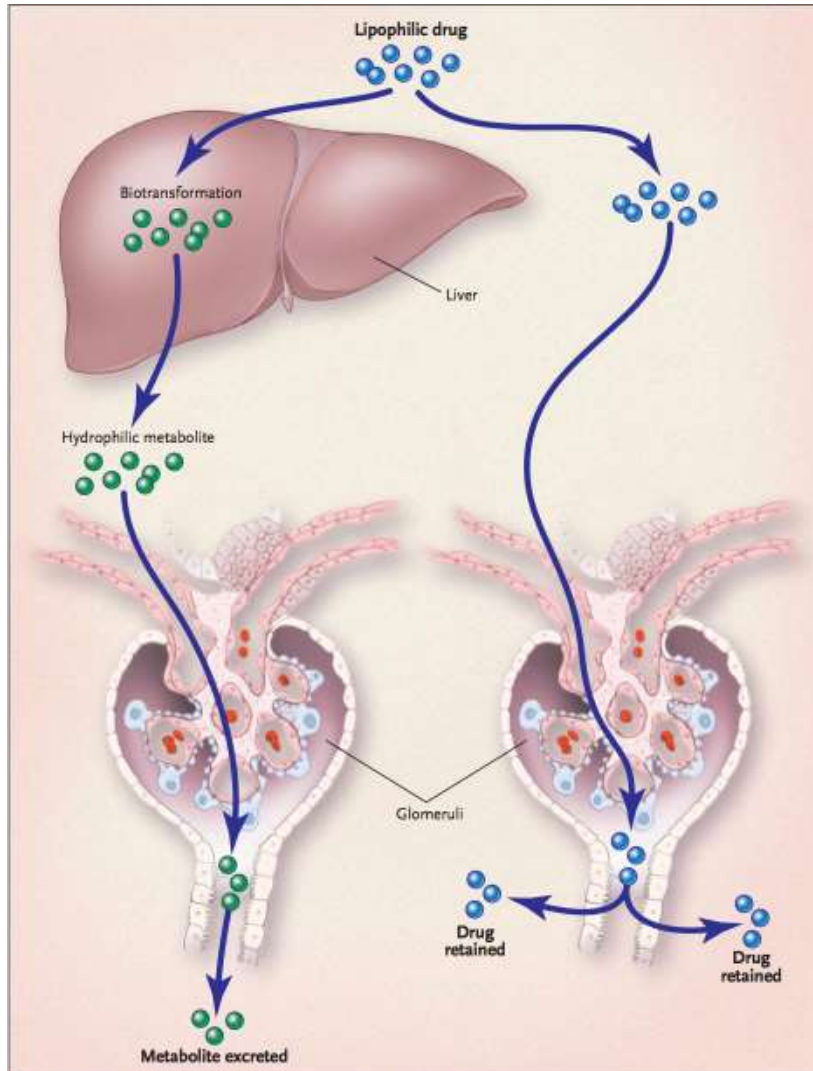


With genetics

Personalized dose



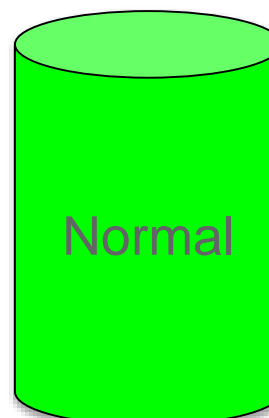
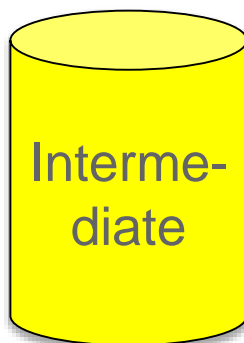
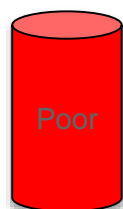
Cytochrome P450's Metabolize Drugs



Major enzymes

- CYP2D6
- CYP2C9
- CYP2C19
- CYP3A4
- CYP3A5

Drug metabolism phenotypes



<15% normal for all three enzymes

Normal Metabolizer



Intermediate Metabolizer



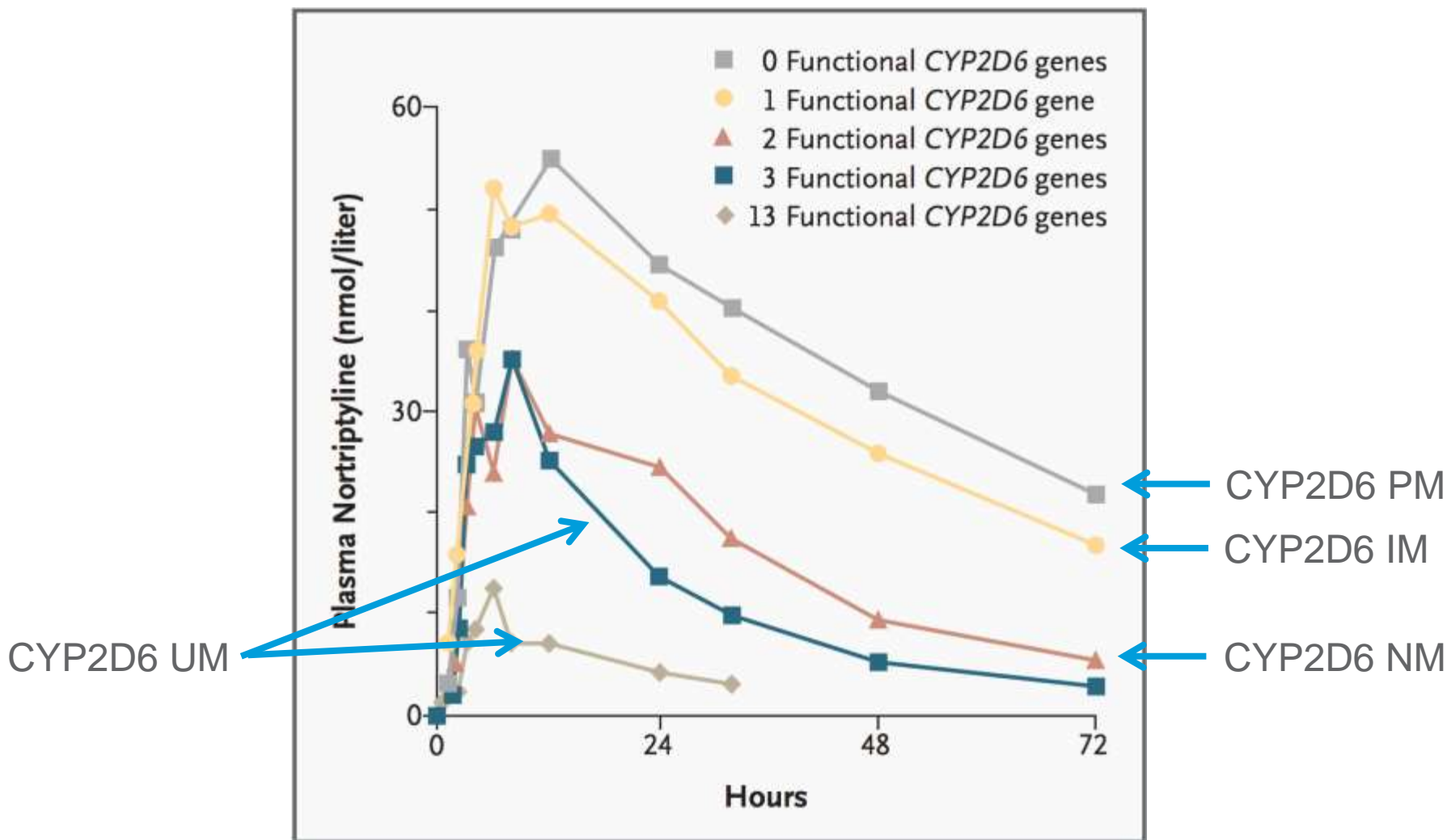
Poor Metabolizer



Ultra Rapid Metabolizer



CYP2D6 phenotype effects on nortriptyline pharmacokinetics



Weinshilboum R. N Engl J Med 2003;348:529-537.

Analogy



Implementation

YouScript® Personalized Prescribing System



Science that benefits humanity.



YouScript[®] testing process

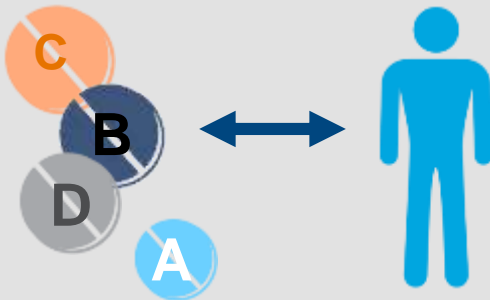
- Screen patient
- Deliver informed consent

Step 1



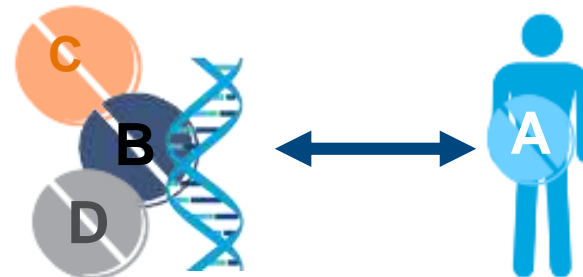
The YouScript[®] difference

Drug Interaction Software



Drug A vs. Drug B
Drug B vs. Drug C
Drug C vs. Drug A

youScript



Multi-drug-gene interactions

YouScript® software is the most advanced medication management software available

Interaction Report print e-mail Save

Patient Factors: 2C19 Normal metabolizer, 2D6 Poor metabolizer, 2C9 Intermediate metabolizer

Impact	Affected Drug ¹		Pharmaco Kinetic ¹	Pharmaco Dynamic ¹	Causative Agents ¹
	clopidogrel		↑ 25-75%	Major	2C9 Intermediate metabolizer, Prilosec
	clopidogrel metabolite		↓ 30-50%	Major	2C9 Intermediate metabolizer, Prilosec
	Prilosec			Major	clopidogrel metabolite, clopidogrel
	metabolite hydromorphone		↓ 80-100%		2D6 Poor metabolizer
	hydrocodone		↑ 25-75%		2D6 Poor metabolizer
	Klor-Con				
	estradiol				

Reducing Interaction Risk Reduces the Cost of Care

*12 month data pull, publication pending

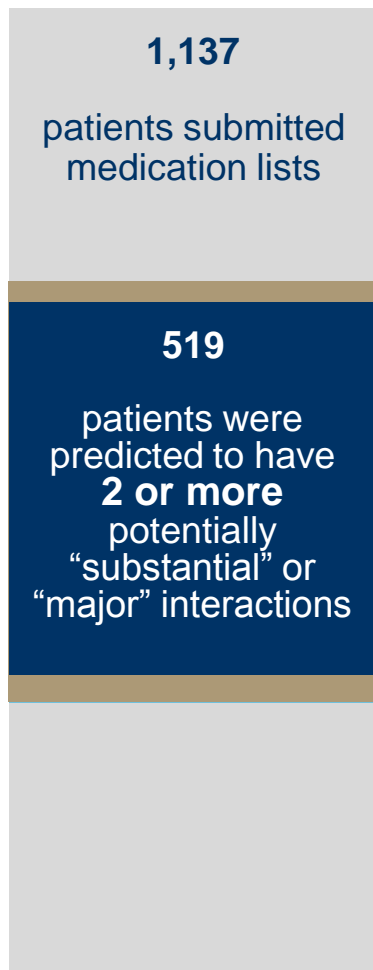
Study background:

- 2 arms dividing a 700,000 patient, 2000 physician plan
- 1000 patient genetic testing subarm

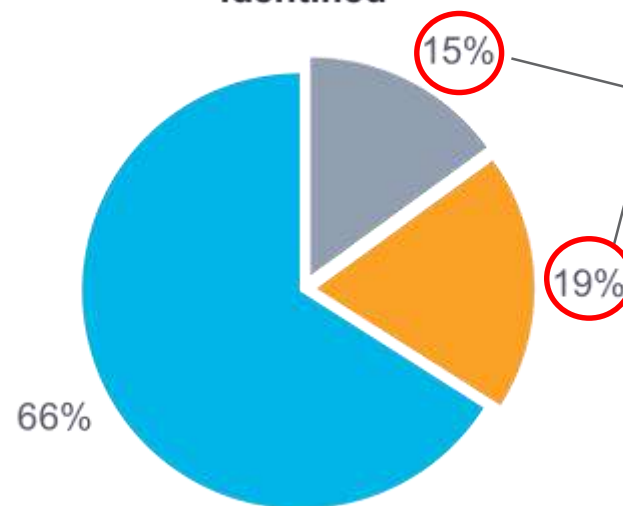
	vs. Control arm
Hospitalizations	-5.6%
Total number of drugs used**	-1.5%
Imaging Procedures (MRI, CT, U/S, X-ray)	-2.1%

- Genetic testing switched 1 in 8 from unwarned to warned
- Patients in warned cost \$1924 more per year to treat.
- Patients switched from warned to unwarned showed a \$1518 reduction in costs

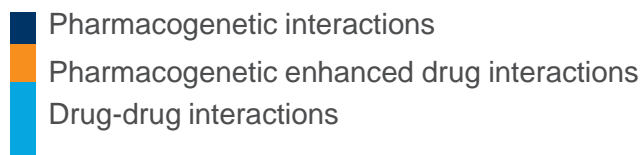
How common are drug-gene interactions?¹



Major or substantial interactions identified



Commercially available drug interaction software identified 34% more **significant** potential problems than would have been found by a DDI program



Case Vignettes

YouScript® Personalized Prescribing System



Science that benefits humanity.



Confusion – Alzheimer's like symptoms

- Chlor-Trimeton®
(chlorpheniramine)
- Major CYP2D6 substrate
- CYP2D6 Poor Metabolizer
- 200% increase in blood levels

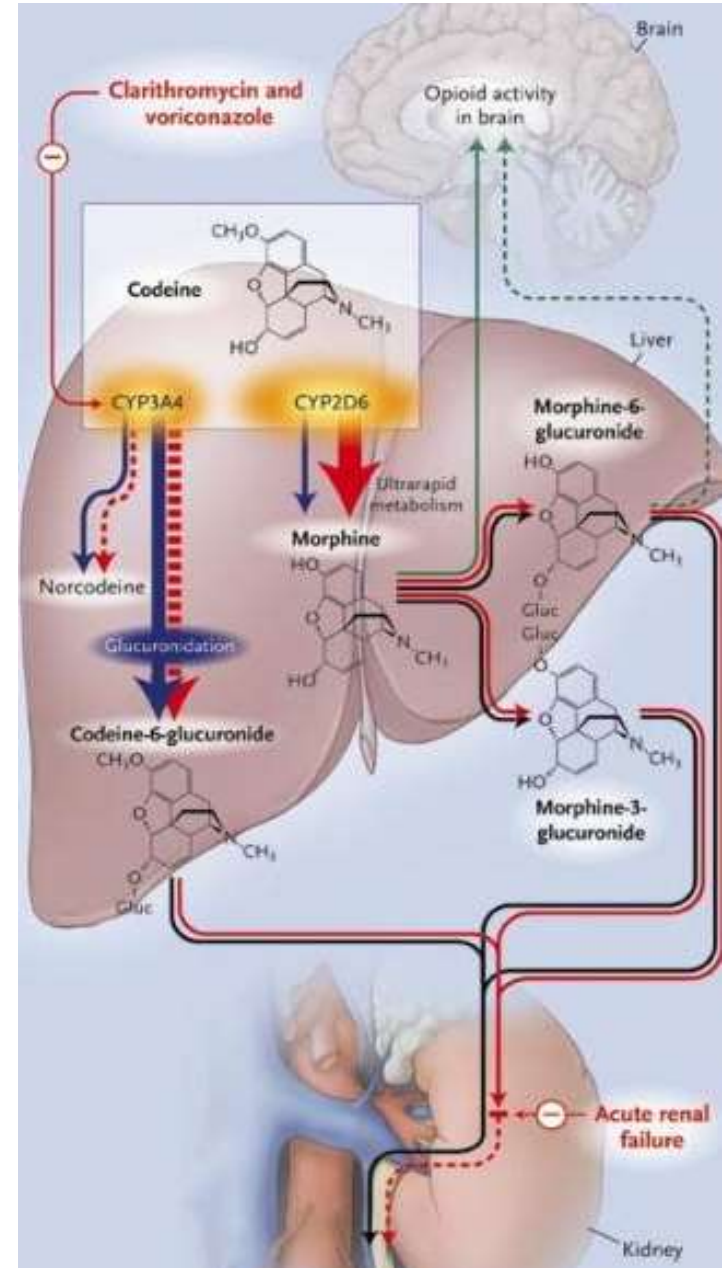


YouScript® software screenshot

Overall Impact ⓘ	Affected Drug ⓘ	Drug Exposure (PK) ⓘ	Clinical Effect (PD) ⓘ	Causative Agents ⓘ
	chlorpheniramine	 >200% ↑	Major	65 years or older, CYP2D6 Poor Metabolizer







Codeine toxicity

- 62 yo pt – PMH chronic lymphocytic leukemia
- 3 day hx of fatigue, dyspnea, fever & cough
- Admitted for pneumonia
- Day 4: found unresponsive → sent to ICU



Gasche Y et al. N Engl J Med 2004;351:2827-2831.

YouScript® software screenshot

Overall Impact ⓘ	Affected Drug ⓘ	Drug Exposure (PK) ⓘ	Clinical Effect (PD) ⓘ	Causative Agents ⓘ
	codeine	Prodrug ⓘ	Major	CYP2D6 Ultra Rapid Metabolizer
	metabolite morphine	(M) >200% ↑	Major	clarithromycin, voriconazole, CYP2D6 Ultra Rapid Metabolizer
	voriconazole	 >200% ↑	Some	clarithromycin
	clarithromycin	 76-200% ↑	Some	voriconazole
	14-hydroxycarithromycin	(M)		
	ceftriaxone			

What if we could make a difference?



What if we could make a difference?



Interaction Report



print



e-mail



Save

Patient Factors

Patient Not Tested

Known

Potential

Gene Only ☐All Drugs ☒

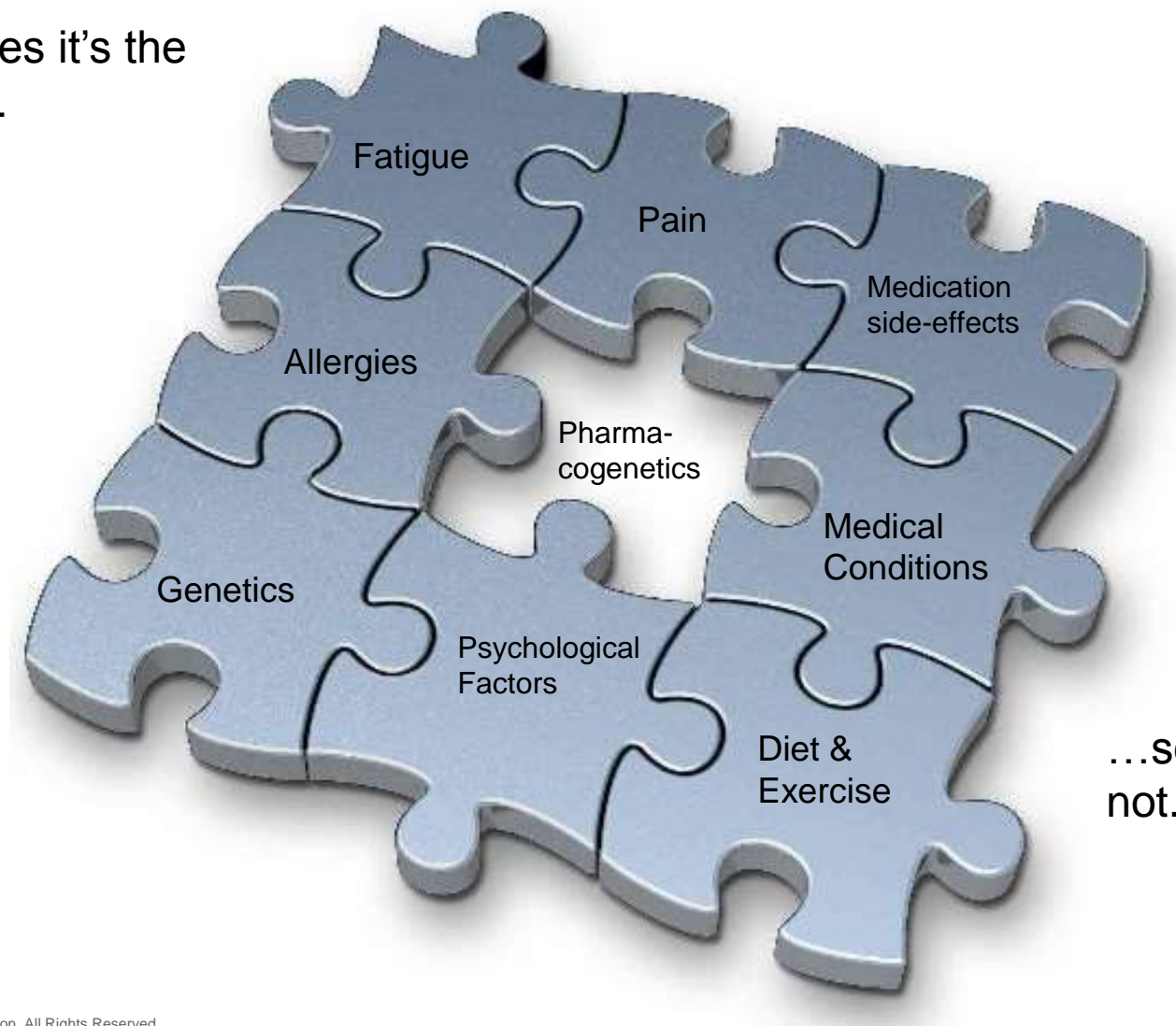
Overall Impact ⓘ	Affected Drug ⓘ	Drug Exposure (PK) ⓘ	Clinical Effect (PD) ⓘ	Causative Agents ⓘ
	Cipro		Some	
	Zelboraf	26-75% 	Some	Cipro

YouScript has not been reviewed or approved by the United States Food and Drug Administration and cannot be used to diagnose or treat any disease or other health condition.

[+ Algo Report](#)
[+ Icon Legend](#)

Personalized Prescribing is a Piece of the Puzzle

Sometimes it's the
answer...



...sometimes it's
not.

Recommended reading

