From Sea to Shining Sea: The Wave of Prescriptive Authority Crosses the Country

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APA Division 55 President 2019

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- ***President*** *– American Psychological Association (APA) Division 55 (American Society for the Advancement of Pharmacotherapy) 2019*
- ***Chair*** *– The Council of Post Doctoral Training Programs in Psychopharmacology*
- ***Liaison*** *for Division 55 to APA Committee on Deep Poverty*

- ***Program Director & Associate Professor*** *– Alliant International University MSCP Program 2018*

- ***Adjunct Professor*** *– Chicago School of Professional Psychology MSCP Program*
  - *Advanced Pathophysiology*
  - *Biochemistry*
  - *Pharmacology*
  - *Advanced Physical Assessment*

- ***Consultant*** *– UH Hilo MSCP Program (2016-2019)*
- ***Chair*** *RxP Subcommittee - Hawai`i Psychological Association*

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Our MSCP Mission

American Society for the Advancement of Pharmacotherapy

The American Society for the Advancement of Pharmacotherapy (ASAP), Div. 55 of the American Psychological Association, was created to enhance psychological treatments combined with psychopharmacological medications.

•The division promotes the public interest by working for the establishment of high quality statutory and regulatory standards for psychological care.

•Div. 55 encourages the collaborative practice of psychological and pharmacological treatments with other health professions.

•The division seeks funding for training in psychopharmacology and pharmacotherapy from private and public sources such as federal Graduate Medical Education programs.

•Div. 55 facilitates increased access to improved mental health services in federal and state demonstration projects using psychologists trained in psychopharmacology.

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While each state develops its own educational requirements, the training for a licensed psychologist to prescribe is rigorous in all the proposed legislation.

- **In Louisiana**, psychologists must complete a post-doctoral master's degree in clinical psychopharmacology.
- **New Mexico** requires a minimum of 450 hours of didactic instruction along with a 400-hour supervised practicum as part of its eligibility criteria.
- **In Illinois**, psychologists seeking prescriptive authority must complete advanced, specialized training in psychopharmacology as well as full-time practicum of 14 months of supervised clinical rotations in various settings such as hospitals, community mental health clinics and correctional facilities.
- Psychologists must pass a **certified exam** in psychopharmacology.
- **After completing their formal training,** psychologists must coordinate care with a patient's primary care physician.
- Psychologists are also trained to **know when to refer patients** for the evaluation of other health problems.
- *When all the training – doctoral and post-doctoral – is completed, prescribing psychologists have more training in diagnosing, treating and prescribing for mental health disorders than primary care physicians.*

https://www.apaservices.org/practice/advocacy/authority/prescribing-psychologists

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ASPPB
Association of State and Provincial Psychology Boards

ASPPB is pleased to announce that as of March 19th, 2018, we have completed the Beta Test for the Psychopharmacology Exam for Psychologists (PEP). We are currently reviewing the data and preparing the exam for release. The current projection is that registration will open on Tuesday, June 5th, 2018. Please check back for updates.

In keeping with testing industry standards, the examination has been thoroughly reviewed and revised to ensure that the content reflects a valid representation of the knowledge required for the current practice of psychology with prescription privileges.

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FINAL PEP EXAM BLUEPRINT

Domain	Final No.	Knowledge Statements	% of Exam
1: Integrating clinical psychopharmacology with the practice of psychology			**7.3%**
1: Integrating clinical psychopharmacology with the practice of psychology	k0101	Knowledge of biopsychosocial variables as determinants of medication utilization and effects (e.g., age, gender, family history, patient belief systems/culture, economics/poverty, social support, current environmental circumstances)	
1: Integrating clinical psychopharmacology with the practice of psychology	k0102	Knowledge of limitations and benefits, patient perceptions (including help-seeking attitudes), and treatment expectations regarding psychopharmacological and psychological interventions as sole, additive, or interactive treatments for given disorders and functional impairments	
1: Integrating clinical psychopharmacology with the practice of psychology	k0103	Knowledge of practitioner-patient partnership for case and medication management, including the impact on patient education, medication adherence, effectiveness of treatment, adverse effects and response to side effects, and implications for the relationship when psychosocial and pharmacological interventions are utilized (e.g., ethnicity/culture, sexual orientation, gender identity, socioeconomic factors, religion, refugee status)	
1: Integrating clinical psychopharmacology with the practice of psychology	k0104	Knowledge of the development and implementation of a coherent and organized integrated treatment plan of psychosocial, cultural (including participation of traditional healers when appropriate) and pharmacological interventions with attention to comorbidities, as well as evidence-based developments in psychotherapy and pharmacotherapy	
2: Neuroscience			**6.7%**
2: Neuroscience	k0201	Knowledge of cellular and molecular nervous system biology and regulatory processes (e.g., neurotransmitter and neuromodulator systems, up and down regulation, tolerance/cross-tolerance) needed to understand the pharmacological effect of medications	
2: Neuroscience	k0202	Knowledge of the structure and function of the central and peripheral nervous systems	
2: Neuroscience	k0203	Knowledge of neurodevelopment and neuroplasticity	
2: Neuroscience	k0204	Knowledge of the major neuronal pathways and their functions, and associated messenger systems	
3: Nervous system pathology			**11.3%**
3: Nervous system pathology	k0301	Knowledge of etiological factors and diagnosis of dementia, delirium, and other cognitive and neurological disorders	
3: Nervous system pathology	k0302	Knowledge of etiological factors and diagnosis of chronic pain, including headache (e.g., migrainous vs. non-migrainous headache), neuropathic pain, fibromyalgia; and the role of the CNS in pain experience and management	
3: Nervous system pathology	k0303	Knowledge of etiological factors and diagnosis of sleep disorders	
3: Nervous system pathology	k0304	Knowledge of common idiopathic movement disorders, their etiological factors, signs, symptoms, and diagnosis (e.g., Parkinson's, Huntington's, Tourette's syndrome)	
3: Nervous system pathology	k0305	Knowledge of common iatrogenic or drug induced movement disorders, their etiological factors, signs, symptoms, and diagnosis (e.g., extrapyramidal symptoms, dystonias, dyskinesias, akathesia, Dystonic Tremors (DTs))	

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3: Nervous system pathology	k0306	Knowledge of etiological factors and categories of seizure disorders	
3: Nervous system pathology	k0307	Knowledge of traumatic brain injury and post-concussive syndrome and its impact on prescriptive decisions	
3: Nervous system pathology	k0308	Knowledge of nervous system pathology (e.g., multiple sclerosis, infectious diseases, exposure to environmental neurotoxins, neoplasms, intellectual/developmental disabilities)	
3: Nervous system pathology	k0309	Knowledge of basic indications for neurodiagnostic imaging and testing (e.g., EEG, CT, MRI, neuropsychological assessment)	
4: Physiology and pathophysiology			**16.0%**
4: Physiology and pathophysiology	k0401	Knowledge of indications for referral to other health care providers for assessment or treatment when organ system pathology is indicated	
4: Physiology and pathophysiology	k0402	Knowledge at a functional level of cardiovascular system physiology and pathophysiology across the life span (e.g., rhythm and rate disorders such as prolonged QT interval), and their relationships to psychopharmacology and psychopathology (e.g., blood pressure changes secondary to psychotropic medication; mitral valve prolapse related to panic disorder)	
4: Physiology and pathophysiology	k0403	Knowledge at a functional level of pulmonary system physiology and pathophysiology across the life span, and their relationships to psychopharmacology and psychopathology (e.g., beta blockers and asthma, respiratory suppression with CNS depressants)	
4: Physiology and pathophysiology	k0404	Knowledge of etiological factors and diagnosis of central nervous system vascular disorders (e.g., cerebral vascular accidents, transient ischemic attacks)	
4: Physiology and pathophysiology	k0405	Knowledge at a functional level of renal/genitourinary system physiology and pathophysiology across the life span, and their relationships to psychopharmacology and psychopathology (e.g., effect of psychotropic substances on urinary/sexual functioning; role in excretion of wastes and medications; valproic acid and polycystic ovary syndrome (PCOS); lithium and renal functioning)	
4: Physiology and pathophysiology	k0406	Knowledge at a functional level of hepatic system physiology and pathophysiology across the life span, and their relationships to psychopharmacology and psychopathology (e.g., first-pass metabolism, the interaction between psychotropic medication and liver enzymes, such as the cytochrome P450 system; infectious liver disease, such as hepatitis; alcoholism)	
4: Physiology and pathophysiology	k0407	Knowledge at a functional level of endocrine system physiology and pathophysiology across the life span, and their relationships to psychopharmacology and psychopathology (e.g., elevated prolactin and antipsychotic medications; hormonal disequilibrium; thyroid disorders; premenstrual dysphoria)	
4: Physiology and pathophysiology	k0408	Knowledge at a functional level of hematological system physiology and pathophysiology across the life span, and their relationships to psychopharmacology and psychopathology (e.g., agranulocytosis and clozapine; anemia and depression)	
4: Physiology and pathophysiology	k0409	Knowledge at a functional level of muscular/skeletal physiology and pathophysiology across the life span, and their relationships to psychopharmacology and psychopathology (e.g., hypercalcemia and depression; idiopathic dystonias; osteoarthritis (OA) and depression; statins and rhabdomyolysis)	

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4: Physiology and pathophysiology	k0410	Knowledge at a functional level of dermatologic system across the life span, and its relationship to psychopharmacology and psychopathology (e.g., lamotrigine and SJS/TENS; sensitivity reactions to some antipsychotic medications)	
4: Physiology and pathophysiology	k0411	Knowledge at a functional level of immunologic/rheumatology system physiology and pathophysiology across the life span, and their relationships to psychopharmacology and psychopathology (e.g., drug allergies, systemic lupus erythematosus and depression; fibromyalgia and depression; PANDAS)	
4: Physiology and pathophysiology	k0412	Knowledge at a functional level of the endocrine system's interface with neurotransmitter systems and their relationship to psychopharmacology and psychopathology (e.g., steroids and mood disorders; various medications and sleep disorders; antidepressants and sexual disorders)	
4: Physiology and pathophysiology	k0413	Knowledge of psychoneuroimmunology and impact on systems (e.g., interactions among stress, psychopharmacology and immune function; impact of psychopharmacology on psychological interventions on immune system function; interactions among hormonal disorders, psychopharmacology and sexual functioning; interactions among gastrointestinal system biome, neurophysiology and psychopharmacology)	
5: Biopsychosocial and pharmacological assessment and monitoring			**6.0%**
5: Biopsychosocial and pharmacological assessment and monitoring	k0501	Knowledge of individual and family history taking procedures and psychological assessments that provide information relevant to prescribing (e.g., review of systems, dietary habits, mental status, behavioral observations, developmental history, social history, academic history, family medical and psychiatric history (including knowledge of diversity-related variations in the incidence/prevalence of disorders), history of sexually transmitted disease and history of general level of functioning)	
5: Biopsychosocial and pharmacological assessment and monitoring	k0502	Knowledge of basic physical and neurological examination procedures (e.g., history and physical examination (HPE); review of systems (ROS)) and variations in these procedures for special populations (e.g., ethnicity for estimated glomerular filtration rate (EGFR))	
5: Biopsychosocial and pharmacological assessment and monitoring	k0503	Knowledge of appropriate laboratory tests and assessment procedures before prescribing particular medications (e.g., the implication of disease states, gender, ethnicity, sample timing, and potential effects of medications on those values) and ongoing during treatment (e.g., TDM for lithium blood levels, white blood cell monitoring with clozapine use)	
5: Biopsychosocial and pharmacological assessment and monitoring	k0504	Knowledge of behavioral assessment methods (e.g., rating scales, direct observation of behaviors, parent/teacher/self-report) at baseline and ongoing monitoring for therapeutic effectiveness, quality of life, and adverse effects of psychopharmacological agents (e.g., akathesia with antipsychotics and SSRIs; rating scales for ADHD; MMSE for cognitive function; CGI scale for global response to treatment)	
6: Differential diagnosis			**10.0%**
6: Differential diagnosis	k0601	Knowledge of medical disorders and their most prominent symptoms that may also present with psychological symptoms (e.g., ADHD versus PKU versus autism, anxiety versus Graves' disorder, dementia versus depression in the elderly; depression as a primary disorder vs. a prodromal sign of underlying cancer; personality changes in the elderly vs. dementia)	

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6: Differential diagnosis	k0602	Knowledge of psychological signs and symptoms (e.g., mental status changes, memory dysfunction, depression, psychosis) secondary to substances of abuse, prescribed and over-the-counter medications, most commonly used herbal remedies that have psychological effects, and dietary supplements	
6: Differential diagnosis	k0603	Knowledge of the psychopharmacological treatment implications related to mental health disorders with multiple symptoms (e.g., one disorder with multiple symptoms vs. comorbid disorders with related symptoms: major depressive disorder with psychotic features vs. major depressive disorder and schizophrenia; anxious depression vs. anxiety disorder and dysthymia; bipolar vs. psychotic depression; behavioral health disorders and substance use disorders)	
6: Differential diagnosis	k0604	Knowledge of iatrogenic effects of medication versus primary symptoms of disease course (e.g., akathisia versus anxiety; anticholinergic effects versus dementia; medication induced tremor versus idiopathic movement disorders)	
7: Pharmacology			**12.7%**
7: Pharmacology	k0701	Knowledge of drug classifications for psychotropic and adjunctive medications (e.g., stimulants, sedatives, antidepressants, anticholinergics), major drug categories used to treat common medical disorders (e.g., antibiotics), OTC medications, herbals, and substances of abuse	
7: Pharmacology	k0702	Knowledge of pharmacokinetic parameters (e.g., absorption, distribution, metabolism, and elimination) and how each phase affects drug action (e.g., delayed-release preparations, routes of administration, area under the curve, lipophilicity and drug transit across membrane barriers, CYP enzymes, drug/drug and drug/food interactions, routes of clearance)	
7: Pharmacology	k0703	Knowledge of pharmacodynamic changes caused by medications (receptor up/down regulation; transcription)	
7: Pharmacology	k0704	Knowledge of the importance of biological half-life in determining steady state drug concentrations, dosing schedules, accumulation, and toxicity	
7: Pharmacology	k0705	Knowledge of drug properties and characteristics (e.g., therapeutic index, therapeutic blood levels/prescription doses, potency, bioavailability, efficacy, cognitive and behavioral manifestations of toxicity, dose response relationships)	
7: Pharmacology	k0706	Knowledge of types of drugs/receptor interactions (e.g., direct and indirect agonists, antagonists, partial agonists, and inverse agonists, competitive vs. non-competitive antagonism and agonism)	
7: Pharmacology	k0707	Knowledge of the relationship between neurotransmitters and their receptor targets and the behavioral effects of stimulation vs. inhibition (e.g., 5HT1A and anxiety, beta blockers and performance anxiety, D2 and psychosis; histamine and sedation; ACh and memory)	
7: Pharmacology	k0708	Knowledge of the mechanism of action of common therapeutic agents (e.g., receptor stimulation/inhibition; receptor up and down regulation; tolerance, dependence, and withdrawal)	
7: Pharmacology	k0709	Knowledge of the theoretical relationship between neurotransmitter systems and psychopathological conditions (e.g., serotonin and norepinephrine in depression, dopamine in psychosis and substance abuse; dopamine in Parkinson's disease; acetylcholine in Alzheimer's disease)	

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7: Pharmacology	k0710	Knowledge of the factors (e.g., biological, ethnic, pharmacodynamic, genetic, pharmacokinetic) related to intra- and inter-individual responses to medications (e.g., variation of blood levels to the same dose across individuals, change in responsiveness within same individual across administrations of same drug [e.g., pregnancy, obesity, age])	
7: Pharmacology	k0711	Knowledge of drug-induced disease, dysfunction, and adverse reactions (e.g., hepatotoxicity, agranulocytosis, dystonias)	
8: Clinical psychopharmacology			**16.0%**
8: Clinical psychopharmacology	k0801	Knowledge of indications and contraindications for various psychotropic medications, including use of multiple medications both on and off label	
8: Clinical psychopharmacology	k0802	Knowledge of decision making strategies for psychotropic medication selection (e.g., risk-benefit analysis, practice guidelines, genetics, ethnicity, cost, pregnancy, disease status, limitations of current diagnostic systems [e.g., DSM, ICD])	
8: Clinical psychopharmacology	k0803	Knowledge of dosing, time course of therapeutic action and adverse effects of medication based on patient factors (e.g., weight, gender, ethnicity, culture, age, trauma, pregnancy, concurrent disease)	
8: Clinical psychopharmacology	k0804	Knowledge of dosing strategies (e.g., augmentation, titration, cross taper, discontinuation)	
8: Clinical psychopharmacology	k0805	Knowledge of common signs and symptoms of drug toxicity and the management of adverse reactions to drugs (e.g., referral for appropriate medical care, use of appropriate medications)	
8: Clinical psychopharmacology	k0806	Knowledge of the management of at risk patients (e.g., relapse prevention, adherence, suicide prevention, patients seeking medication inappropriate or inconsistent with treatment plan)	
8: Clinical psychopharmacology	k0807	Knowledge of potential adverse psychological and physiological signs of drugs used for common medical conditions (e.g., steroids, beta blockers, antibiotics, antivirals), OTCs, and herbals/dietary supplements	
8: Clinical psychopharmacology	k0808	Knowledge of psychological and physiological signs of common recreational substances and the management of intoxication or addiction, including strategies for assisted withdrawal, maintenance, and relapse prevention	
8: Clinical psychopharmacology	k0809	Knowledge of how to recognize and manage tolerance, cross-tolerance, dependence and abstinence syndromes, sensitization/cross-sensitization with respect to specific medications	
8: Clinical psychopharmacology	k0810	Knowledge of the patient factors (e.g., culture, literacy, stage of change) that need to be considered when informing patients about drug utilization, risks, benefits, potential complications, and alternatives to pharmacotherapy	
9: Research			**7.3%**
9: Research	k0901	Knowledge of research designs and analytic techniques used in psychopharmacological research (e.g., open label, single vs double blind, random assignment, placebo control, drug washout, dose response relationships, intent-to-treat analyses, within-subject and group designs, concurrent administration of other drugs, FDA drug development process)	
9: Research	k0902	Knowledge of how to critically review clinical research data including non-evidence based therapies and emerging research methodologies, and use the information for making treatment decisions (e.g., NNT, NNH, OR, RR, effect size)	

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9: Research	k0903	Knowledge of influential, non-industry sponsored multi-site research studies relating to psychopharmacology (e.g., CATIE, STAR-D, CUtLASS, MTA)	
9: Research	k0904	Knowledge of evidence-based research regarding complementary and alternative medicines (e.g., Omega-3, folate, DHEA, St. John's Wort, melatonin)	
10: Professional, legal, ethical, and interprofessional issues			**6.7%**
10: Professional, legal, ethical, and interprofessional issues	k1001	Knowledge of relevant legal and ethical codes and standards that pertain to pharmacological practice; and laws and statutes for prescribing psychotropic medications (e.g., DEA regulations, telehealth)	
10: Professional, legal, ethical, and interprofessional issues	k1002	Knowledge of practice guidelines and standards of care for prescribing psychotropic medications (including relationship with referring psychologist)	
10: Professional, legal, ethical, and interprofessional issues	k1003	Knowledge of patients' rights related to medication treatments and therapy (e.g., informed consent, right to refuse treatment, right to treatment within the least restrictive environment, inappropriate psychotropic restraints, duty to warn, privileged communication, alternative decision maker, living will, durable power of attorney, advance directives)	
10: Professional, legal, ethical, and interprofessional issues	k1004	Knowledge of ethical issues regarding relationships with pharmaceutical companies (e.g., acceptance of gifts and samples, revealing sources of funding and affiliations, interactions with pharmaceutical reps)	

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Prescriptive Authority for Advance Trained Psychologists - History

- The first bill seeking to authorize prescription privileges to psychologists was introduced in Hawaii in 1985 under Hawaii State Resolution 159
- In 1988, the U.S. Department of Defense approved a pilot project to train psychologists in issuing psychotropic medications "under certain circumstances".
- Guam became the first U.S. territory to approve RxP legislation in 1999.
- New Mexico became the first state to approve RxP legislation in 2002
- Louisiana followed in 2004.
- In 2014, Illinois became the third state to approve RxP legislation.
- In 2016, Iowa became the fourth state to grant prescriptive authority
- Idaho followed in 2017.
- The rules and regulations for Illinois' RxP law were approved in 2018
- Iowa and Idaho rules were approved in 2019

https://en.wikipedia.org/wiki/Prescriptive_authority_for_psychologists_movement

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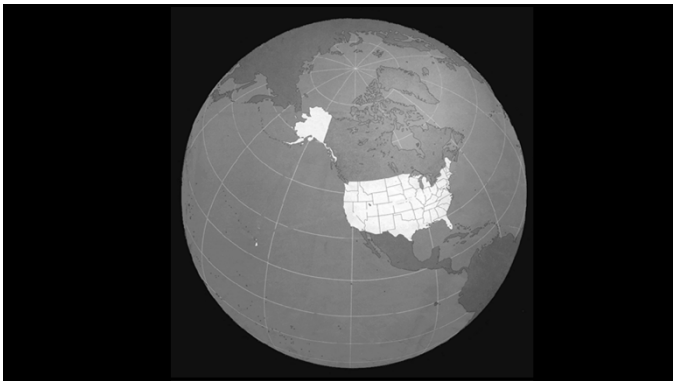

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States That Have Passed RxP Legislation

New Mexico
Louisiana
Illinois
Iowa
Idaho

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States With Active RxP Legislative Bills or Efforts Underway

Ohio
Florida
Texas
California
Hawai`i

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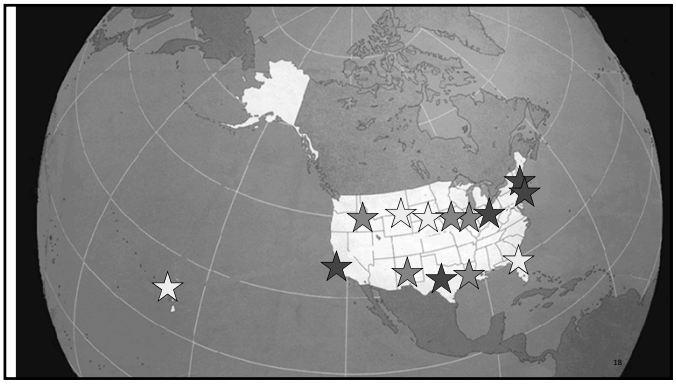

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What Happened in Hawai`i?

The Hawaiian Roller Coaster of RxP Legislation

HB1072 – 2016

- Introduced by House Speaker Joe Souki
- Made it through triple referral in House
- Passed out of Senate back to House
- Moved to last item on House floor
- Never called for final floor vote

https://i.ytimg.com/vi/KYYIgxbsAas/hqdefault.jpg

SB819 – 2019

- Introduced by House Leadership
- Passed out of Senate
- House gave it QUADRUPLE referral
- Passed first of 4 committees (Health)
- Never called by other committees (House Speaker Scott Saiki)[9]

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LESSONS LEARNED

HB1072 - 2016

- Spend a lot of time at the Capitol
- Spend a lot of time at Fund Raisers
- Relationships Matter
- Personal Stories
  - Kathy & Robby
  - Ruth
  - Tina & Tiana
- Most important person is the House Speaker
- Partnerships
  - Physicians & Nurses
  - Mental Health Organizations
  - Licensing Board
  - DOH

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- Most important person is the House Speaker
- Lost some partnerships
- Physicians don't want to come forward
- Licensing Board & DOH still strong

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Training Requirements for New HI Bill:

- Completion of a doctoral program in psychology
- Completion of a masters program in clinical psychopharmacology, practicum and PEP.
- 80 Hours of Supervised "Physical Assessment" Practicum in Primary Care Setting
- 400 Hours of Supervised "Medication" Practicum
- 100 Hours of Supervised "Community Service" Practicum treating Homeless, Low Income and Other Special Needs Populations

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COSTS – STATES SURVEYED

- Hawai`i
- Florida
- Illinois
- Iowa
- Idaho
- Ohio
- Texas

- COST RANGE $6,000 TO $650,000

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TRAINING TRAINING TRAINING

- CSPP – Alliant International University
  - Oldest program with APA Designation
  - Most graduates of all MSCP programs
  - Most graduates to take the PEP exam
  - Most graduates to pass the PEP exam
  - Improvements in Technology
  - Practicum training

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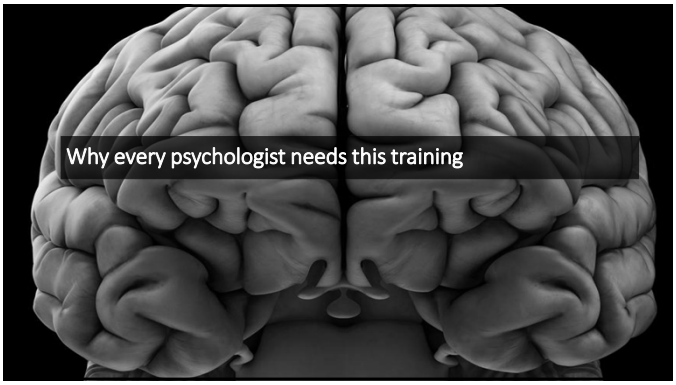

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- **Because you know your patients best**
- **Because you need to understand how medication plays a role in treatment**
- **Because you need relationships with each of your patient's providers**
- **Because you want to fight for your right to treat your patient**

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- **Improve your practice**
- **Answer patient questions**
- **Collaborate with primary care physician**
- **Support prescription authority movement**
- **Federal government authorizes psychologists to prescribe in an increasing number of settings**

Alliant International University
California School of Professional Psychology

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11 Courses in your 8-week term Psychopharmacology curriculum

Year 1: Jan, March, August, October
- Clinical Biochemistry
- Neuroscientific Basis of Psychopharmacology I: Neurophysiology, Neuroimaging & Neuroanatomy
- Neuroscientific Basis of Psychopharmacology II: Neurochemistry, Neuropathology
- Clinical Medicine I: Pathophysiology I

Year 2: Jan, March, August, October
- Clinical Medicine II Pathophysiology and Physical Assessment
- Clinical Pharmacology
- Advanced RxP
- Pharmacotherapy

Year 3: Jan, March
- Special Populations I
- Special Populations II
- Capstone: Practicum

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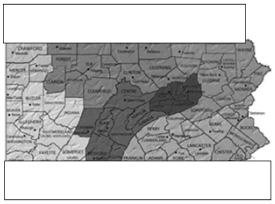
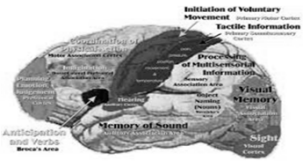
How can MSCP training benefit Pennsylvania's patients?





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The Joint State Government Commission's Physician Shortage Report (2015) states that Pennsylvania has the fourth highest percentage of medical school students, but ranks 37 in retaining medical students who complete their training in Pennsylvania.

https://www.haponline.org/Newsroom/News/ID/4706/New-Program-Seeks-to-Address-Rural-Physician-Shortage-in-Northeast-PA

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Is Pa. likely to have a shortage of doctors? Study aims to predict what states will be hit hardest

8 (tie). **Pennsylvania**
National rank: 50
Physicians per 100,000 people: 311.8
Percentage of doctors nearing retirement age: 32.2%
Residents/fellows in accredited programs per 100,000 people: 63.7

8 (tie). **New York**
National rank: 50
Physicians per 100,000 people: 365.1

https://www.pennlive.com/news/2019/05/is-pa-likely-to-have-a-shortage-of-doctors-study-aims-to-predict-what-states-will-be-hit-hardest.html

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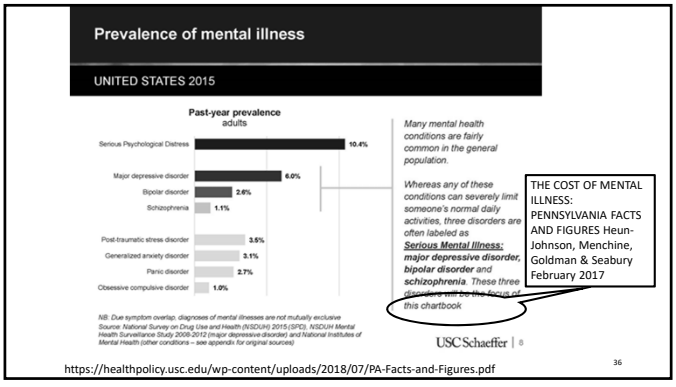

THE COST OF MENTAL ILLNESS: PENNSYLVANIA FACTS AND FIGURES Heun-Johnson, Menchine, Goldman & Seabury February 2017

https://healthpolicy.usc.edu/wp-content/uploads/2018/07/PA-Facts-and-Figures.pdf

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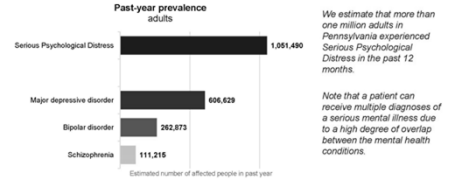
Estimated number of people living with mental illness

PENNSYLVANIA 2015



We estimate that more than one million adults in Pennsylvania experienced Serious Psychological Distress in the past 12 months.

Note that a patient can receive multiple diagnoses of a serious mental illness due to a high degree of overlap between the mental health conditions.

Source: National Institutes of Mental Health, National Survey on Drug Use and Health (NSDUH) 2015, and NSDUH-MHSS 2008-2012.
Estimate of # of people affected using total state population of 10,110,483 adults (18 years and over), Census Bureau data (2015)

USC Schaeffer | 9

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https://healthpolicy.usc.edu/wp-content/uploads/2018/07/PA-Facts-and-Figures.pdf

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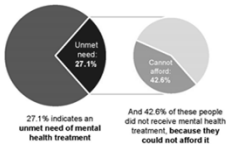
There is significant unmet need for mental health care in the U.S.

UNITED STATES 2015

Among adults who experienced **Serious Psychological Distress** during the past year:



27.1% indicates an **unmet need of mental health treatment**

And 42.6% of these people did not receive mental health treatment, **because they could not afford it**

More than a quarter of adults who experienced Serious Psychological Distress in the previous year in the U.S. reported an unmet need for mental health care. Almost half of the people with a perceived unmet need reported that they did not receive treatment because they could not afford it.

Source: National Survey on Drug Use and Health (NSDUH) 2015

USC Schaeffer | 12

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https://healthpolicy.usc.edu/wp-content/uploads/2018/07/PA-Facts-and-Figures.pdf

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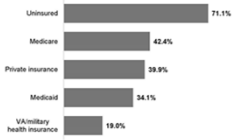
Unmet need of mental health treatment due to costs

UNITED STATES 2015

Percentage of adults with past-year Serious Psychological Distress and unmet need of treatment, **who could not afford mental health care**



The extent to which cost was a factor in driving unmet need for mental health care varied by insurance status. People without health insurance were most affected by the inability to afford mental health treatment (71.1%), while those with VA/military health insurance coverage were least affected (19.0%).

Source: National Survey on Drug Use and Health (NSDUH) 2015

USC Schaeffer | 13

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https://healthpolicy.usc.edu/wp-content/uploads/2018/07/PA-Facts-and-Figures.pdf

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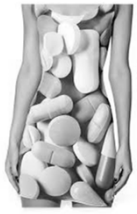
How Does MSCP Training Affect Patient Care?

- **A unique body of knowledge is gained with MSCP training**
  - Biochemistry
  - Anatomy
  - Physiology
  - Pharmacology
  - Needs of Special Populations



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Examples of Areas of Learning

The following questions give you an idea of the types of content areas

41

41

All preganglionic fibers of the autonomic nervous system use the neurotransmitter:

A. acetylcholine
B. dopamine
C. GABA
D. norepinephrine

42

42

All preganglionic fibers of the autonomic nervous system use the neurotransmitter:

A. acetylcholine
B. dopamine
C. GABA
D. norepinephrine

43

43

Monoamine oxidase inhibitors produce their effects by:

A. inhibiting the degradation of norepinephrine
B. the reuptake of norepinephrine
C. the reuptake of acetylcholine
D. decreasing the amount of norepinephrine available at the synapse

44

44

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45

45

A 45-year-old female on an inpatient unit who has been recently treated with haloperidol develops hyperthermia, rapid heart rate, pallor, and muscular rigidity. These symptoms MOST likely indicate the onset of:

A. spinal meningitis
B. neuroleptic malignant syndrome
C. agranulocytosis
D. a condition unrelated to the medication

46

46

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A. spinal meningitis
B. neuroleptic malignant syndrome
C. agranulocytosis
D. a condition unrelated to the medication

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Basic and Applied Science

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Basics of Pharmacology

1. DRUG ADMINISTRATION
2. PHARMACOKINETICS
   - Effects of the body on drugs:
   - Absorption
   - Distribution
   - Elimination
   - Metabolism
3. PHARMACODYNAMICS
   - Effects of drugs on the body:
   - Receptor-mediated responses

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Drug Absorption

Drug absorption

- Factors influencing drug absorption (Drug factors) or Physiochemical factors:
- Lipid solubility of drug
- Nature of the drug
- pH of the media (Stomach & Intestine)
- pK_a of the drug
- Molecular size of drug
- Disintegration & dissolution of drug

https://www.slideshare.net/jahidbmc/drug-absorption-27588186

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Tabel 3.1: pH values of various human body fluids and tissues.

Blood	7.35-7.45	Cerebrospinal fluid (CSF)	7.35-7.45
Gastric juice	1.0-2.0	Saliva	6.7-7.4
Bile	7.4-8.5	Tears	7.4
Human milk	6.9-7.0	Lysosomes	4.0-5.0
Mitochondria	6.6	Osteoblasts	9.0-10.0
Kupffer cells	6.4-6.5	Prostate	3.0-5.0
Urine	5.0-7.5	Stool	7.0-7.5

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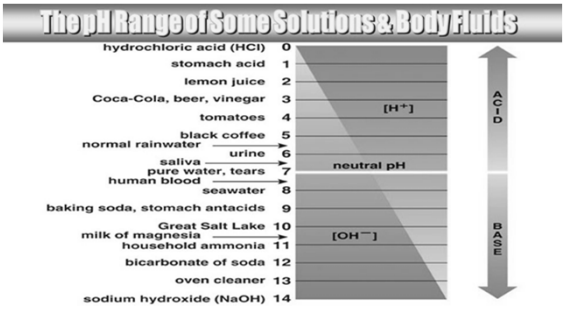

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Factors affecting absorption - ionization

Drug absorption

Non-Ionized Molecule (lipid soluble)

Ionized Molecule (water soluble)

CELL MEMBRANE

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Moral of the story...

Acidic drugs are best absorbed from acidic environments

Basic drugs are best absorbed from basic environments

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Urine pH and Elimination

A patient has overdosed on phenobartital. Phenobarbital is an acid. If we 'alkalinalize' the urine by giving bicarbonate what will happen to the phenobarbital molecules as they are filtered through the renal tubules?

They will ionize…

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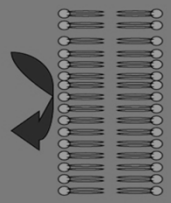
How will this affect phenobarbital reabsorption by the kidney?

Non-ionized Ionized

$HA \longrightarrow H^+ + A^-$

Decreased reabsorption

Increased elimination



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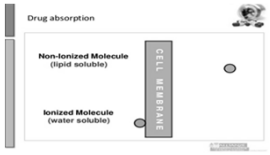
Factors affecting absorption - ionization



Non-ionized = Non-polar = Lipophilic

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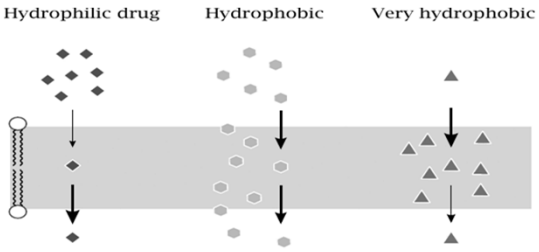
Factors affecting absorption - hydrophilicity



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Factors affecting absorption - ionization

- **Non-ionized = Non-polar = Lipophilic**
- **Lipophilic = Lipid Soluble = Crosses membranes**

- **Ionized = Polar = Hydrophilic**
- **Hydrophilic = Less Lipid Soluble**

The rate at which a drug is transported by controlling pH of the solution &/or the pKa of the ligand

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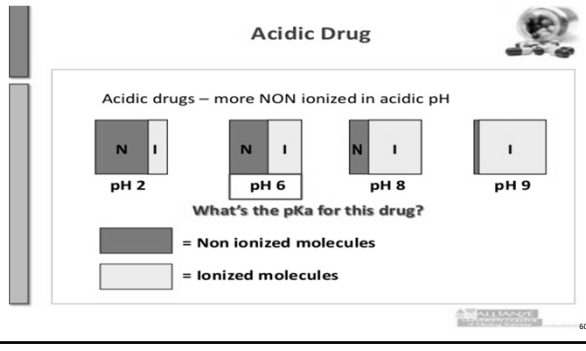

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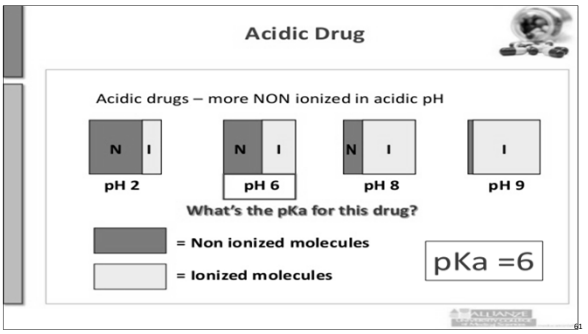

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Examples of Drugs with Different pKas

Weak acid (pKa)	Weak base (pKa)
•Levodopa (2.3)	•Lignocaine (7.9)
•Amoxycillin (2.4)	•Codeine (8.2)
•Aspirin (3.5)	•Cocaine (8.5)
•Cephalexin (3.6)	•Adrenaline (8.7)
•Frusemide (3.9)	•Atropine (9.7)
•Warfarin (5.0)	•Amphetamine (9.8)
	•Metoprolol (9.8)
	•Methyldopa (10.6)

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Lazy drug has a pKa of 9.2. Will it be fully unionized in an acid or a basic environment?

A. Acidic
B. Basic

63

63

Lazy drug has a pKa of 9.2. Will it be fully unionized in an acid or a basic environment?

A. Acidic
B. Basic

64

64

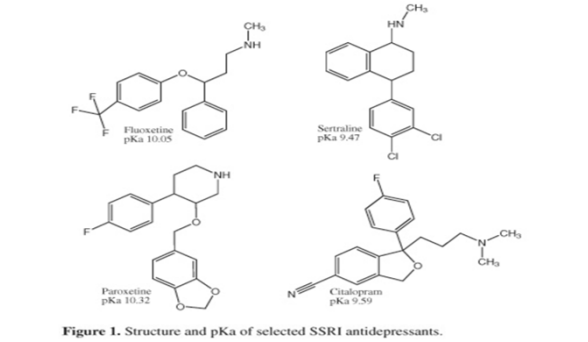

Figure 1. Structure and pKa of selected SSRI antidepressants.

http://www.scielo.br/img/revistas/jbchs/v23n1/a09fig01.jpg

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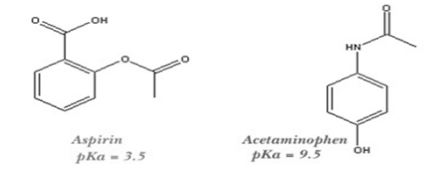

https://pharmacy.nova.edu/Pharmacodynamics/Modules/AcidsSaltsBases/Figures/Aspirin.jpg

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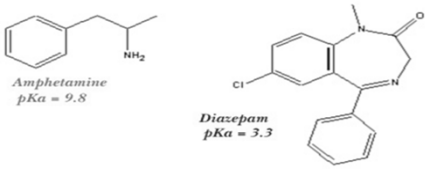

https://pharmacy.nova.edu/Pharmacodynamics/Modules/AcidsSaltsBases/Figures/Amphetamine.jpg

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Types Of Drug-Receptor Interactions

- **Covalent bonds:** irreversible; drug removal/receptor re-activation requires re-synthesis of the receptor or enzymatic removal of the drug.
- **Non-covalent bonds:** reversible; most drugs bind to receptors via non-covalent bonds

  Listed below from strongest to weakest:
  - **Ionic Bonds:** electrostatic interaction between positively and negatively charged ions
  - **Hydrogen bonds:** electrostatic bond between the net positive charge of hydrogen atoms in many functional groups and the net negative charge of many nuclei.
  - **Hydrophobic interactions:** between hydrophobic regions of the drug and the receptor
  - **Van der Waals forces:** weak electrostatic interactions involving dipole moments within functional groups

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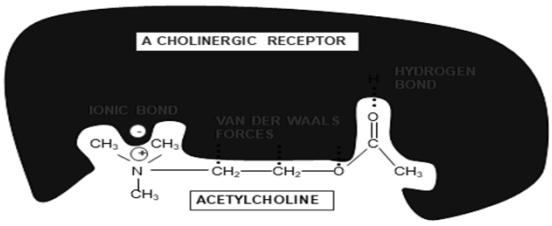
Example: **Binding of acetylcholine to a cholinergic receptor**



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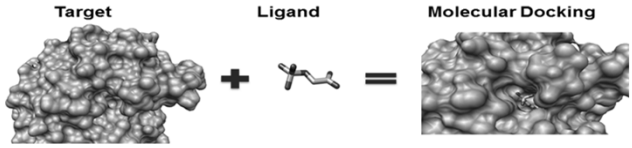

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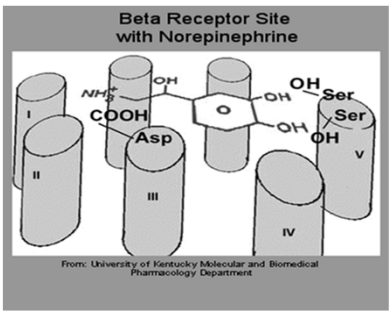

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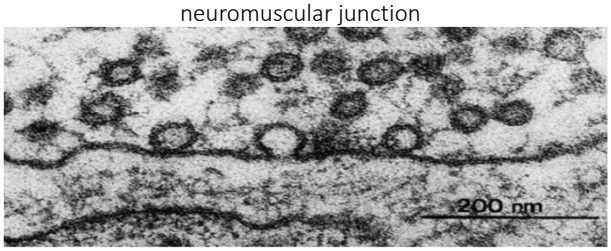
Vesicles merging with synaptic membrane – neuromuscular junction



http://starklab.slu.edu/neuro/vesicle.jpg

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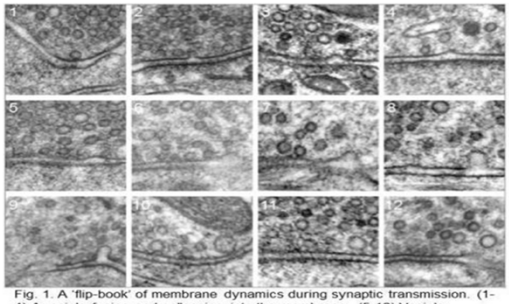

Fig. 1. A 'flip-book' of membrane dynamics during synaptic transmission. (1-4) A vesicle fusing and collapsing into the membrane. (5-12) Vesicle membrane invaginating back into the cell. All these events complete within 100 ms.

http://cellbio.jhmi.edu/sites/default/files/styles/large/public/Figure1rev.jpg?itok=irrysD-M

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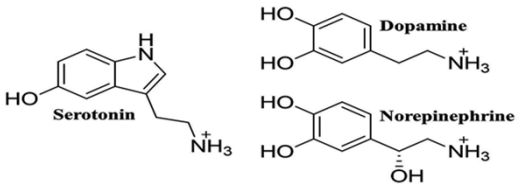

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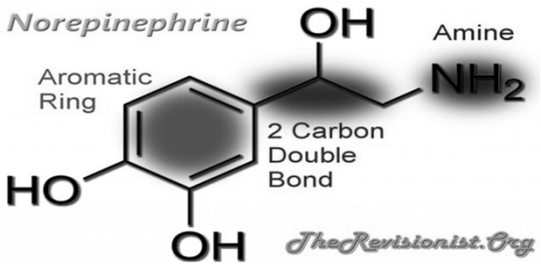

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Understanding medications prescribed to patients

SSRIs: Half-Lives

Fluoxetine	1-4 days
Norfluoxetine	*7-9 days*
Sertraline	26 hours
Paroxetine	21 hours
Fluvoxamine	16 hours
Citalopram	35 hours

Michelle Fitzgerald, B.Sc (Pharm) St. John's, Atlantic Psychotherapeutic Review Spring, 2001 (Vol 4 issue 2) http://www.theborne.ns.ca/Archives/2001Fall/2001_discontinuation.html This also may be in the PDR

76

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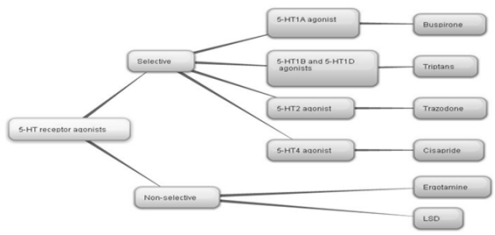
Understanding mechanisms of medications prescribed to patients



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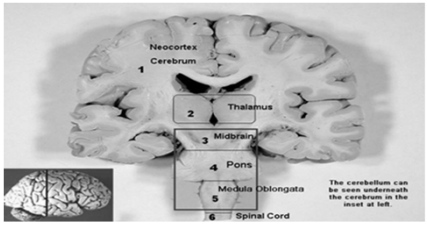
Understanding brain function underlying behavioral and pharmacotherapy



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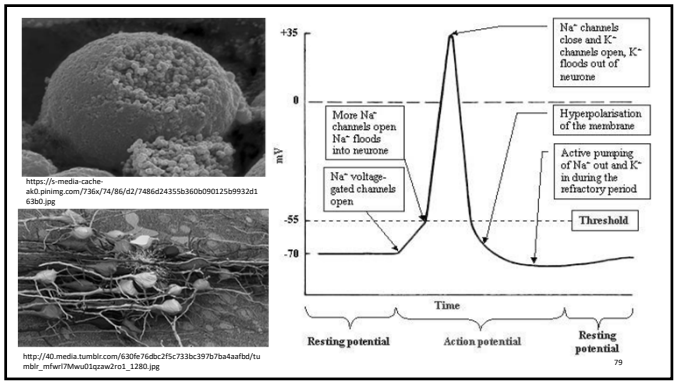
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http://40.media.tumblr.com/630fe76dbc2f5c733bc397b7ba4aafbd/tumblr_mfwrl7Mwu01qzaw2ro1_1280.jpg
+35
0
-55
-70
mV
Na+ channels close and K+ channels open, K+ floods out of neurone
Hyperpolarisation of the membrane
Active pumping of Na+ out and K+ in during the refractory period
Threshold
More Na+ channels open Na+ floods into neurone
Na+ voltage-gated channels open
Time
Resting potential
Action potential
Resting potential
79

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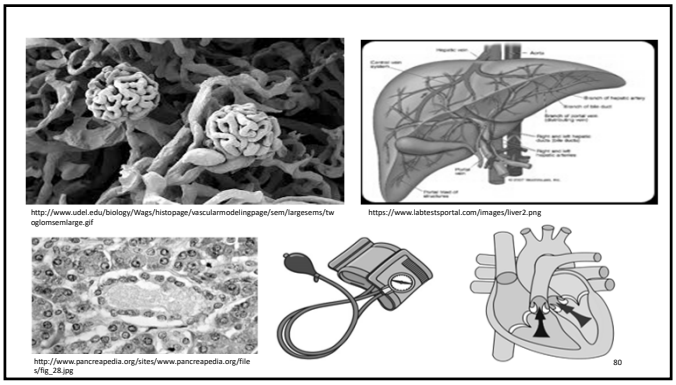
http://www.udel.edu/biology/Wags/histopage/vascularmodelingpage/sem/largesems/twoglomsemlarge.gif
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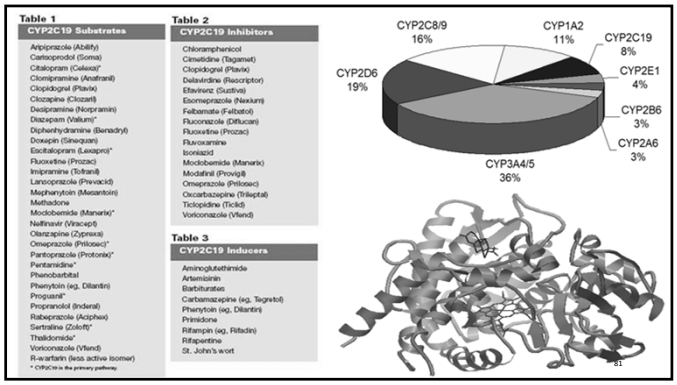
Table 1
CYP2C19 Substrates
Aripiprazole (Abilify)
Carisoprodol (Soma)
Citalopram (Celexa)*
Clomipramine (Anafranil)
Clopidogrel (Plavix)
Clozapine (Clozaril)
Desipramine (Norpramin)
Diazepam (Valium)*
Diphenhydramine (Benadryl)
Doxepin (Sinequan)
Escitalopram (Lexapro)*
Fluoxetine (Prozac)
Imipramine (Tofranil)
Lansoprazole (Prevacid)
Mephenytoin (Mesantoin)
Methadone
Moclobemide (Manerix)*
Nelfinavir (Viracept)
Olanzapine (Zyprexa)
Omeprazole (Prilosec)*
Pantoprazole (Protonix)*
Pentamidine*
Phenobarbital
Phenytoin (eg, Dilantin)
Propanil*
Propranolol (Inderal)
Rabeprazole (Aciphex)
Sertraline (Zoloft)*
Thalidomide*
Voriconazole (Vfend)
R-warfarin (less active isomer)
* CYP2C19 is the primary pathway
Table 2
CYP2C19 Inhibitors
Chloramphenicol
Cimetidine (Tagamet)
Clopidogrel (Plavix)
Delavirdine (Rescriptor)
Efavirenz (Sustiva)
Esomeprazole (Nexium)
Felbamate (Felbatol)
Fluconazole (Diflucan)
Fluoxetine (Prozac)
Fluvoxamine
Isoniazid
Moclobemide (Manerix)
Modafinil (Provigil)
Omeprazole (Prilosec)
Oxcarbazepine (Trileptal)
Ticlopidine (Ticlid)
Voriconazole (Vfend)
Table 3
CYP2C19 Inducers
Aminoglutethimide
Artemisinin
Barbiturates
Carbamazepine (eg, Tegretol)
Phenytoin (eg, Dilantin)
Primidone
Rifampin (eg, Rifadin)
Rifapentine
St. John's wort
CYP2C8/9 16%
CYP1A2 11%
CYP2C19 8%
CYP2E1 4%
CYP2B6 3%
CYP2A6 3%
CYP3A4/5 36%
CYP2D6 19%
81

81

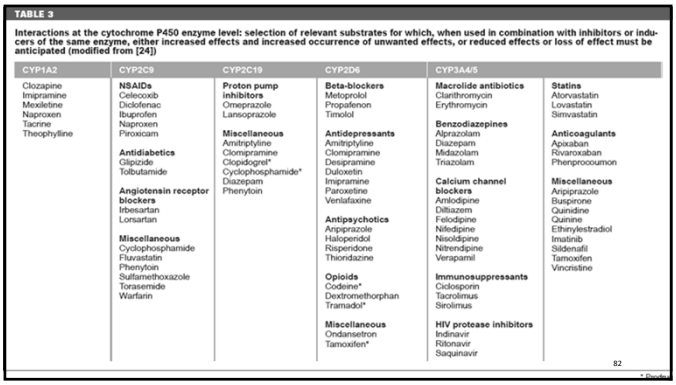
TABLE 3
Interactions at the cytochrome P450 enzyme level: selection of relevant substrates for which, when used in combination with inhibitors or inducers of the same enzyme, either increased effects and increased occurrence of unwanted effects, or reduced effects or loss of effect must be anticipated (modified from [24])
CYP1A2
Clozapine
Imipramine
Mexiletine
Naproxen
Tacrine
Theophylline
CYP2C9
NSAIDs
Celecoxib
Diclofenac
Ibuprofen
Naproxen
Piroxicam
Antidiabetics
Glipizide
Tolbutamide
Angiotensin receptor blockers
Irbesartan
Lorsartan
Miscellaneous
Cyclophosphamide
Fluvastatin
Phenytoin
Sulfamethoxazole
Torasemide
Warfarin
CYP2C19
Proton pump inhibitors
Omeprazole
Lansoprazole
Miscellaneous
Amitriptyline
Clomipramine
Clopidogrel*
Cyclophosphamide*
Diazepam
Phenytoin
CYP2D6
Beta-blockers
Metoprolol
Propafenon
Timolol
Antidepressants
Amitriptyline
Clomipramine
Desipramine
Duloxetin
Imipramine
Paroxetine
Venlafaxine
Antipsychotics
Aripiprazole
Haloperidol
Risperidone
Thioridazine
Opioids
Codeine*
Dextromethorphan
Tramadol*
Miscellaneous
Ondansetron
Tamoxifen*
CYP3A4/5
Macrolide antibiotics
Clarithromycin
Erythromycin
Benzodiazepines
Alprazolam
Diazepam
Midazolam
Triazolam
Calcium channel blockers
Amlodipine
Diltiazem
Felodipine
Nifedipine
Nisoldipine
Nitrendipine
Verapamil
Immunosuppressants
Ciclosporin
Tacrolimus
Sirolimus
HIV protease inhibitors
Indinavir
Ritonavir
Saquinavir
Statins
Atorvastatin
Lovastatin
Simvastatin
Anticoagulants
Apixaban
Rivaroxaban
Phenprocoumon
Miscellaneous
Aripiprazole
Buspirone
Quinidine
Quinine
Ethinylestradiol
Imatinib
Sildenafil
Tamoxifen
Vincristine
82

82

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