Newer Atypical Antipsychotics: Novel Ideas or "Me Toos?"

Sanaz Farhadian, Pharm.D., BCPP
Clinical Psychiatric Pharmacist
Veterans Affairs Healthcare System, San Diego, CA

Objectives

- Discuss new antipsychotics approved within the last five years
- Review new formulations of previously approved antipsychotics
- Recognize the clinical utility of new antipsychotic agents for the treatment of schizophrenia

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Pre-Test: Question 1

Blockade of which receptor makes lurasidone a novel antipsychotic, due to the belief that it improves cognition?

A. 5-HT_7
B. 5-HT_{2A}
C. 5-HT_{1A}
D. D_2

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Pre-Test: Question 2

Which of the following antipsychotics is NOT available as a long-acting injectable?

A. Olanzapine
B. Aripiprazole
C. Paliperidone
D. Quetiapine

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PRE-TEST: QUESTION 3

Which of the following is a black box warning for Zyprexa Relprevv (olanzapine), requiring that a patient be observed for at least 3 hours after administration?

A. Acute dystonia
B. Post-injection delirium/sedation syndrome
C. Hyperglycemia
D. Increased mortality in elderly patients with dementia-related psychosis

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BACKGROUND

- Antipsychotics introduced in 1950s to treat psychosis
- Atypical antipsychotics gained popularity in 1990s
  - More efficacious than typical agents
  - Decreased risk of movement disorders
- New atypical entities and formulations continue to be approved
- Account for large portion of pharmaceutical market share

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AVAILABLE ATYPICALS

GENERIC	BRAND
Clozapine*	Clozaril
Risperidone*	Risperdal
Olanzapine*	Zyprexa
Quetiapine*	Seroquel
Ziprasidone*	Geodon
Aripiprazole	Abilify
Paliperidone	Invega
Iloperidone	Fanapt
Asenapine	Saphris
Lurasidone	Latuda

* Available generically

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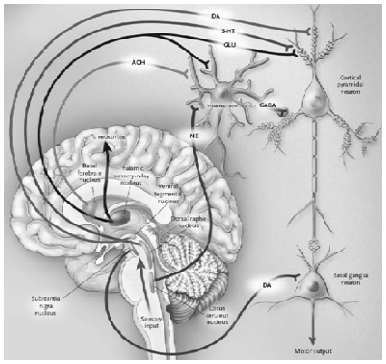
SCHIZOPHRENIA PATHOPHYSIOLOGY



Abnormal Neurotransmission

DA

5-HT

Glu

GABA

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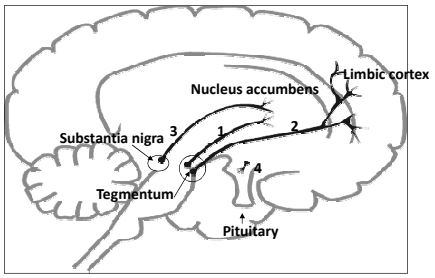
Dopamine Brain Pathways



1 – Mesolimbic
2 – Mesocortical
3 – Nigrostriatal
4 – Tuberoinfundibular

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Schizophrenia Core Symptoms

Positive	Negative	Cognitive
Hallucinations	Alogia	Difficulty with:
Delusions	Anergia	Attention
Disorganization	Avolition	Learning
Paranoia	Anhedonia	Memory
Combative/hostile	Restricted affect	Executive function
Unusual behavior	Social withdrawal	
	Psychomotor retardation	

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Atypical Antipsychotics

- Postsynaptic **D_2 receptor blockade** with limbic specificity
  - Mesolimbic pathway – decreased positive symptoms
  - Tuberoinfundibular pathway – decreased risk of hyperprolactinemia
- Presynaptic **5-HT_{2A} autoreceptor blockade** increases dopamine release that overcomes the postsynaptic blockade of the D_2 receptors in:
  - Mesocortical pathway – decreased negative symptoms
  - Nigrostriatal pathway – decreased risk of EPS
- Cause blockade of α_1, H_1, and mACh receptors
- Risk of metabolic side effects

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Common Adverse Side Effects

- Involuntary movements
  - Extrapyramidal symptoms
  - Tardive dyskinesia
- Hyperprolactinemia
- Sedation
- Orthostasis
- Anticholinergic side effects
- Metabolic abnormalities
  - Weight gain
  - Hyperglycemia and diabetes
  - Dyslipidemia

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Rare Adverse Side Effects

- Tachycardia
- QTc prolongation
- Seizures
- Cerebrovascular events
- Leukopenia, neutropenia, agranulocytosis
- Neuroleptic malignant syndrome
- Photosensitivity
- Thermoregulation
- Hepatic dysfunction

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Black Box Warnings

- Increased mortality in elderly patients with dementia-related psychosis due to cardiovascular or infectious causes
  - All atypical antipsychotics
- Suicidality in children and young adults due to depression indications
  - Aripiprazole
  - Quetiapine
- Myocarditis, seizures, agranulocytosis, orthostasis (± syncope)
  - Clozapine

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Where Do New Agents Fit In?

Approval Date	Antipsychotic	Brand
May 2009	Iloperidone	Fanapt
July 2009	Paliperidone IM Injection	Invega Sustenna
August 2009	Asenapine SL	Saphris
December 2009	Olanzapine IM Injection	Zyprexa Relprevv
October 2010	Lurasidone	Latuda
February 2013	Aripiprazole IM Injection	Abilify Maintena
February 2013	Clozapine Oral Suspension	Versacloz

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Fanapt
(Iloperidone)

- Oral tablet
  - 1mg, 2mg, 4mg, 6mg, 8mg, 10mg, 12mg
- Indication: acute treatment of schizophrenia
- Antagonist at α_{2C} receptors
- Twice daily dosing
  - 95% protein bound
  - Well absorbed, peak plasma concentrations 2-4 hours post-dose
  - Metabolized by CYP2D6 and CYP3A4 into P88 and P95
  - Elimination half-life: 18-33 hours for parent drug; 23-37 hours for metabolites

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Fanapt package insert.

FANAPT: DOSING
(ILOPERIDONE)

- Slow titration required due to orthostasis risk
- Initial dose: 1mg PO BID, titrating by 1-2mg BID daily
- Target dose: 6-12mg PO BID
- Maximum dose: 24mg/day in divided doses
- Dosage adjustments – reduce by 50%
  - CYP2D6 poor metabolizers
  - Strong CYP2D6 or CYP3A4 inhibitor
  - Hepatic impairment: NOT recommended

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Fanapt package insert.

FANAPT: ADVERSE EFFECTS
(ILOPERIDONE)

- Hyperprolactinemia
- Orthostasis
- Medium metabolic risk
- QTc prolongation (~11.4 msec)
- Priapism

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Fanapt package insert.

FANAPT: EFFICACY
(ILOPERIDONE)

All studies were randomized, double-blind, placebo-, active controlled

STUDY DURATION	ILOPERIDONE REGIMEN	ACTIVE COMPARATOR	PRIMARY OUTCOME (BASELINE TO ENDPOINT)
4 weeks	24mg/day	Ziprasidone 160mg/day	↓ PANSS-T in ilo vs plac ($p<0.019$) and zipr vs plac ($p<0.05$)
6 weeks	4, 8 , or 12 mg/day	Haloperidol 15mg/day	↓ PANSS-T in ilo 12mg/day vs plac ($p=0.047$) and halo vs plac ($p<0.001$)
6 weeks	4-8mg/day 10-16mg/day	Risperidone 4-8mg/day	↓ BPRS-d in all ilo groups and risp Sign. improv. in both ilo groups vs plac
6 weeks	12-16mg/day 20-24mg/day	Risperidone 6-8mg/day	↓ BPRS-d in all ilo groups and risp Sign. improv in ilo 20-24mg vs plac ($p=0.01$)

Ilo = iloperidone, zipr = ziprasidone, halo = haloperidol, risp = risperidone, plac = placebo, sign. improv = significant improvement
PANSS-T = Positive and Negative Symptom Scale, Total
BPRS = Brief Psychotic Rating Scale
BPRS-d = PANNS-derived BPRS

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Fanapt package insert.
Caccia et al. Drug Des Devel Ther 2010;4:33.

FANAPT: CLINICAL UTILITY
(ILOPERIDONE)

PROS	CONS
Low EPS risk	Slow titration
	BID dosing
	QTc prolongation

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INVEGA SUSTENNA
(PALIPERIDONE PALMITATE)

- Long-acting formulation of paliperidone
  - 39mg/0.25ml, 78mg/0.5ml, 117mg/0.75ml, 156mg/1.0ml, 234mg/1.5ml
- Indication: acute and maintenance treatment of schizophrenia
- Once monthly injection
  - 74% protein bound
  - Paliperidone palmitate hydrolyzed to paliperidone
  - Metabolized by CYP2D6 and CYP3A4 to 9-hydroxyrisperidone
  - Peak plasma concentrations at 13 days
  - Elimination half-life: 25 days (39mg), 48 days (234mg)

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Invega Sustenna package insert.

INVEGA SUSTENNA: DOSING
(PALIPERIDONE PALMITATE)

- Must establish efficacy/tolerability on risperidone or oral paliperidone first
- First two doses must be given in deltoid
  - Day 1: 234mg IM; Day 8: 156mg IM
- Then, 117mg IM (deltoid or gluteal) q4 weeks
  - Maintenance dose may range from 39-234mg
- Dosage adjustments
  - CrCl 50-79mL/min: day 1 - 156mg, day 8 - 117mg, q4 weeks - 78mg
  - CrCl ≤ 49mL/min: NOT recommended
  - Strong CYP3A4 inducer: decrease paliperidone dose

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Invega Sustenna package insert.

SWITCHING TO INVEGA SUSTENNA
(PALIPERIDONE PALMITATE)

- Oral antipsychotic to paliperidone palmitate
  - Stop oral antipsychotic, initiate as discussed on previous slide
  - If switching from oral paliperidone, use following conversion for maintenance dose

PO QDAY	IM Q4 WEEKS
3mg	39-78mg
6mg	117mg
9mg	156mg
12mg	234mg

- Long-acting injection to paliperidone palmitate
  - If at steady state, initiate with maintenance dose q4 weeks when next injection is due

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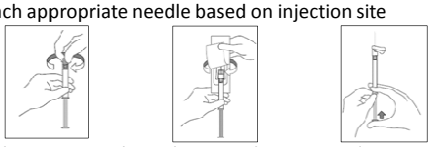
Invega Sustenna package insert.

INVEGA SUSTENNA: ADMINISTRATION
(PALIPERIDONE PALMITATE)

- Visually inspect prefilled syringe for particles/discoloration
  - White to off-white suspension
- Shake syringe vigorously for at least 10 seconds
- Attach appropriate needle based on injection site



- Hold syringe upright to de-aerate by moving plunger rod forward
- Inject entire contents IM slowly into selected muscle

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Invega Sustenna package insert.

INVEGA SUSTENNA: ADVERSE EFFECTS
(PALIPERIDONE PALMITATE)

- Injection site reaction
- Dose-related EPS
- Hyperprolactinemia
- Sedation
- Orthostasis
- Medium metabolic risk
- Priapism

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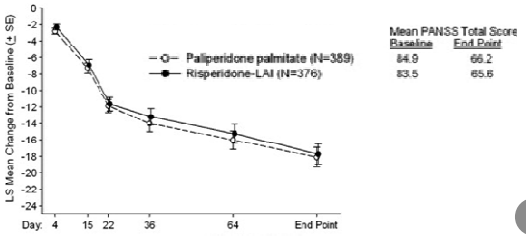
Invega Sustenna package insert.

INVEGA SUSTENNA: EFFICACY
(PALIPERIDONE PALMITATE)

- 13-week randomized, double-blind/-dummy, non-inferiority trial
  - Long-acting paliperidone 78-234mg
  - Long-acting risperidone 25-50mg with oral risperidone x3 weeks



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Invega Sustenna package insert.
Pandina et al. Prog Neuropsychopharmacol Biol Psychiatry 2011;35:218.

INVEGA SUSTENNA: CLINICAL UTILITY
(PALIPERIDONE PALMITATE)

PROS	CONS
Helps with adherence	Dose-related EPS
Administered monthly	Two dose initiation
No oral overlap required	

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SAPHRIS
(ASENAPINE)

- Sublingual tablet
  - 5mg, 10mg
- Indications
  - Acute and maintenance treatment of schizophrenia
  - Acute treatment of bipolar I manic or mixed episodes
- Antagonist at 5-HT_{2c}, 5-HT_6, 5-HT_7, and α_2 receptors
- Twice daily dosing
  - 95% protein bound
  - Bioavailability: 35% sublingually, 2% orally
  - Peak plasma concentrations 0.5-1.5 hours post-dose
  - Metabolized by CYP1A2 and UGT1A4
  - Elimination half-life: 24 hours

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Saphris package insert.

SAPHRIS: DOSING
(ASENAPINE)

- Regular flavor or black cherry
- Initial dose: 5mg SL BID
- Maintenance: increase to 10mg SL BID after 7 days
- Maximum dose: 20mg/day in divided doses
- Avoid eating or drinking for 10 minutes after administration
  - Reduces bioavailability
- Dosage adjustments
  - NOT recommended in severe hepatic impairment

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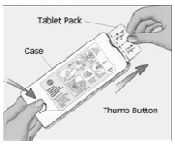
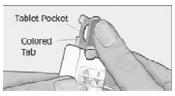
Saphris package insert.

SAPHRIS: ADMINISTRATION
(ASENAPINE)





- Remove immediately before administration with dry hands
- Peel back colored tab to remove tablet
- Place under tongue and allow to dissolve fully
- Do not eat or drink for 10 minutes post-administration
- Slide tablet pack into case until it clicks

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Saphris package insert.

SAPHRIS: ADVERSE EFFECTS
(ASENAPINE)

- Oral hypoesthesia
- Bitter taste
  - Black cherry flavor developed
- Akathisia
- Somnolence
- Low metabolic side risk

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Saphris package insert.

SAPHRIS: EFFICACY
(ASENAPINE)

All studies were randomized, double-blind, placebo-, active controlled

STUDY DURATION	ASENAPINE REGIMEN	ACTIVE COMPARATOR	PRIMARY AND SECONDARY OUTCOMES (BASELINE TO ENDPOINT)
6 weeks	5mg BID	Risperidone 3mg BID	↓ PANSS-T in asen vs plac (p<0.005) Asen superior for PANSS-P and PANSS-N Asen > plac for improvement on cognition
6 weeks	5mg BID 10mg BID	Haloperidol 4mg BID	↓ PANSS-T in asen 5mg and halo vs plac
6 weeks	5mg BID 10mg BID	Olanzapine 15mg daily	↓ PANSS-T in olan vs plac ↓ PANSS-P in asen 5mg and olan vs plac

Asen = iloperidone, risp = risperidone, halo = haloperidol, olan = olanzapine, plac = placebo
PANSS-T = Positive and Negative Symptom Scale, Total
PANSS-P = Positive and Negative Symptom Scale, Positive subscale
PANSS-N = Positive and Negative Symptom Scale, Negative subscale

32

Saphris package insert.
Bishara et al. Neuropsychiatr Dis Treat 2009;5:483.
Minassian et al. Expert Opin Pharmacother 2010;11:2107.
Citrome et al. Neuropsychiatr Dis Treat 2011;7:325.

SAPHRIS: CLINICAL UTILITY
(ASENAPINE)

PROS	CONS
Low metabolic risk	Akathisia
	BID dosing
	Patients without insight may swallow it instead of use it sublingually
	Eating and drinking affects bioavailability

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ZYPREXA RELPREVV
(OLANZAPINE PAMOATE)

- Long-acting formulation of olanzapine
  - 210mg, 300mg, 405mg
- Indication: schizophrenia
- Once to twice monthly injection
  - 93% protein bound
  - Metabolized by glucoronidation and CYP1A2
  - Peak plasma concentrations within 7 days
  - Elimination half-life: 30 days

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Zyprexa Relprevv package insert.

ZYPREXA RELPREVV: DOSING
(OLANZAPINE PAMOATE)

- Must establish efficacy/tolerability on oral olanzapine first

TARGET ORAL DOSE	IM (GLUTEAL) DOSE IN FIRST 8 WEEKS	IM (GLUTEAL) DOSE AFTER 8 WEEKS
10mg/day	210mg q2 weeks OR 405mg q4 weeks	150mg q2 weeks OR 300mg q4 weeks
15mg/day	300mg q2wks	210mg q2 weeks OR 405mg q4 weeks
20mg/day	300mg q2wks	300mg q2wks

- Dose adjustments
  - Geriatric or debilitated patients, and those with hypotension risk
    - Starting dose 150mg IM q4 weeks
  - Clearance may be impaired in severe hepatic dysfunction

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Zyprexa Relprevv package insert.

ZYPREXA RELPREVV: ADMINISTRATION
(OLANZAPINE PAMOATE)

- Loosen powder in the vial by light tapping
- Withdraw desired diluent volume and inject into powder vial
- Pad a hard surface and tap vial firmly until no powder is visible
- Shake vigorously until suspension is homogenous
  - Yellow and opaque
- Inject immediately after reconstitution
  - Otherwise, shake vigorously to re-suspend; stable for 24 hours
- Using 19 gauge or larger needle, inject into gluteal muscle
- Aspirate for several seconds to ensure not in blood supply
- Administer injection at steady, continuous pressure

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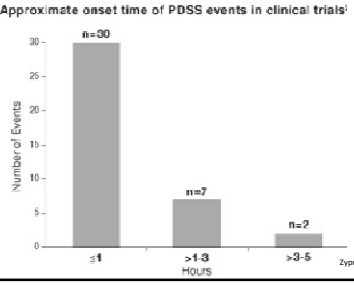
Zyprexa Relprevv package insert.

Post-Injection Delirium/Sedation (PDSS) – Black Box Warning

- Incidence <0.1% per injection, 2% per patient
- Related to excessive olanzapine plasma concentrations



Zyprexa Relprevv package insert.

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Zyprexa Relprevv Regulations (Olanzapine Pamoate)

- Must be given in registered healthcare facility with ready access to emergency response services
- Must observe patient for at least 3 hours once administered
- Prior to releasing patient, healthcare professional must confirm alertness, orientation, and lack of signs/symptoms of PDSS
- DO NOT administer if patient will not be accompanied on release
- REMS medication distributed through Zyprexa Relprevv Patient Care Program, which requires registration of:
  - Prescriber, healthcare facility, patient, and pharmacy

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Zyprexa Relprevv package insert.

Zyprexa Relprevv Adverse Effects (Olanzapine Pamoate)

- Injection site reaction
- PDSS
- Sedation
- Orthostasis
- Anticholinergic
- High metabolic risk

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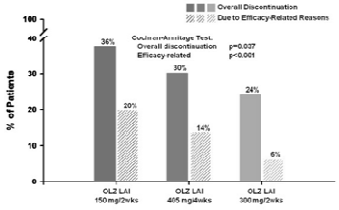
Zyprexa Relprevv package insert.

Zyprexa Relprevv: Efficacy (Olanzapine Pamoate)

- Similar to oral olanzapine and haloperidol in symptom reduction
- Similar to Risperdal Consta in 1 year treatment-completion rates
- Dose-related rate of discontinuation due to lack of efficacy



Hill et al. BMC Psychiatry 2011;11:28.

Detke et al. BMC Psychiatry 2012;12:51.
Ascher-Svanum et al. Int J Gen Med 2012;5:391.

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ZYPREXA RELPREVV: CLINICAL UTILITY
(OLANZAPINE PAMOATE)

PROS	CONS
Helps with adherence	Registration requirements
Up to once monthly dosing	Long observation period
No oral overlap required	High metabolic risk
	Unclear guidance for doses greater 20mg orally

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LATUDA
(LURASIDONE)

- Oral tablet
  - 20mg, 40mg, 80mg, 120mg
- Indication: schizophrenia
- Partial agonist at 5-HT_{1A} and antagonist at 5-HT_7 and α_{2c} receptors
- Once daily dosing
  - 99% protein bound
  - Poor absorption: 9-19%, peak plasma concentrations 1-3 hours
  - Metabolized by CYP3A4 into ID-14283 and ID-14326
  - Elimination half-life: 18 hours

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Latuda package insert.

LATUDA: DOSING
(LURASIDONE)

- Initial dose: 40mg PO daily
- Target dose: 40-160mg PO daily
- Maximum dose: 160mg/day
- Take with food (at least 350 calories)
- Dosage adjustments
  - CrCl ≤ 49ml/min - reduce 50%
  - Moderate hepatic impairment – reduce 50%
  - Severe hepatic impairment – initiate 20mg, max 40mg/day
  - Moderate CYP3A4 inhibitor – reduce 50%
  - CONTRAINDICATED with strong CYP3A4 inhibitors or inducers

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Latuda package insert.

LATUDA: ADVERSE EFFECTS
(LURASIDONE)

- Akathisia
- Parkinsonism
- Somnolence
- Dizziness
- Low metabolic risk
- Nausea
- Dizziness

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Latuda package insert.

LATUDA: EFFICACY
(LURASIDONE)

- Comparable to olanzapine, quetiapine XR, and ziprasidone in decreasing PANSS-T from baseline to endpoint at 6 weeks

STUDY DURATION	LURASIDONE REGIMEN	ACTIVE COMPARATOR	OUTCOME (BASELINE TO ENDPOINT)
6 weeks	80mg/day 160mg/day	Quetiapine XR 600mg/day	Sign. improv in MADRS for all groups vs plac ($p<0.001$)
6 months	80mg/day 160mg/day	Quetiapine XR 600mg/day	Luras 160mg superior to plac and QXR on composite cognitive functioning measure UPSA-B scores superior to plac for all groups
21 days	120mg/day	Ziprasidone 80mg BID	Statistical trend for luras to improve SCoRS ($p=0.058$)

Luras = lurasidone, QXR = quetiapine XR, plac = placebo, sign. improv = significant improvement
MADRS = Montgomery-Asberg Depression Rating Scale
UPSA-B = UCSD Performance-based Skills Assessment, Brief
SCoRS = Schizophrenia Cognition Rating Scale

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Latuda package insert.
Caccia et al. Neuropsychiatr Dis Treat 2012;8:155. Yasui-Furukori et al. Drug Des Devel Ther 2012;6:107.

LATUDA: CLINICAL UTILITY
(LURASIDONE)

PROS	CONS
Once daily dosing	Must take with food
Low metabolic risk	

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ABILIFY MAINTENA
(ARIPIPRAZOLE)

- Long-acting formulation of aripiprazole
  - 300mg, 400mg
- Indication: schizophrenia
- Partial agonist at D_2 and 5-HT_{1A} receptors
  - Potential to lower prolactin levels and improve mood
- Once monthly injection
  - 99% protein bound
  - Metabolized by CYP2D6 and CYP3A4 to dehydro-aripiprazole
  - Peak plasma concentrations at 5-7 days
  - Elimination half-life: 29.9 days (300mg), 46.5 days (400mg)

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Abilify Maintena package insert.

ABILIFY MAINTENA: DOSING
(ARIPIPRAZOLE)

- Must establish efficacy/tolerability on oral aripiprazole first
- 300-400mg IM (gluteal) q4 weeks
- Oral aripiprazole overlap x2 weeks
  - Upon initiation or if missed dose occurs
- Dose adjustments
  - CYP2D6 poor metabolizers
  - Strong CYP2D6 or CYP3A4 inhibitor >14 days
  - Combination of CYP2D6 or CYP3A4 inhibitor >14 days
  - AVOID use with CYP3A4 inducers >14 days

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Abilify Maintena package insert.

ABILIFY MAINTENA: ADMINISTRATION (ARIPIPRAZOLE)

- Suspend Abilify Maintena with appropriate amount of sterile water for injection
- Shake vigorously for 30 seconds until suspension is uniform
  - Visually inspect for particles/discoloration
  - Opaque and milky white
- Inject immediately after reconstitution
  - Otherwise, keep at room temperature and shake at least 60 seconds to re-suspend
- Attach vial adapter to syringe and draw up recommend volume
- Attach 21 gauge needle and slowly administer into gluteal muscle

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Abilify Maintena package insert.

ABILIFY MAINTENA: ADVERSE EFFECTS (ARIPIPRAZOLE)

- Injection site reaction
- Akathisia
- Low metabolic risk

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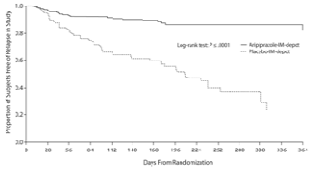
Abilify Maintena package insert.

ABILIFY MAINTENA: EFFICACY (ARIPIPRAZOLE)

- 52-week randomized, double-blind, placebo-controlled trial
  - Terminated early
- Time to impending relapse significantly delayed (p<0.0001)
- Relapse rates significantly lower (10.0% arip. vs 39.6% placebo)



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Kane et al. J Clin Psychiatry 2012;73:617.

ABILIFY MAINTENA: CLINICAL UTILITY (ARIPIPRAZOLE)

PROS	CONS
Helps with adherence	More akathisia compared to other antipsychotics
Administered monthly	Oral overlap required
Depot formulation with lowest metabolic risks	
May improve mood	
Reduces prolactin levels	

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VERSACLOZ
(CLOZAPINE)

- Oral suspension formulation
  - 50mg/ml
- Indications:
  - Treatment-resistant schizophrenia
  - Recurrent suicidal behavior in schizophrenia & schizoaffective disorder
- Slow dose titration similar to other clozapine formulations
- Side effects similar to other clozapine formulations
- REMS program due to agranulocytosis risk
  - Prescribers, patients, and dispensing pharmacies must be registered

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Versacloz package insert.

VERSACLOZ: CLINICAL UTILITY
(CLOZAPINE)

PROS	CONS
Effective for treatment-resistant schizophrenia	Registration requirements Frequent blood monitoring Multiple black box warnings Slow dose titration High metabolic risk

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ATYPICAL FORMULATIONS

	PO	ODT	ORAL LIQUID	SHORT-ACTING IM	LONG-ACTING IM
Clozapine	√	Fazaclo	Versacloz		
Risperidone	√	M-tab	√		Consta
Olanzapine	√	Zydis		√	Relprevv
Quetiapine	IR, XL				
Ziprasidone	√			√	
Aripiprazole	√	Discmelt	√	√	Maintena
Paliperidone	XR				Sustenna
Iloperidone	√				
Asenapine	SL				
Lurasidone	√				

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ODT = orally disintegrating tablet; IM = intramuscular
IR = immediate release; XR/XL = extended release; SL = sublingual

Product package inserts.

RELATIVE METABOLIC RISK

- **High risk**
- **Medium risk**
- **Low risk**

Clozapine
Olanzapine
Quetiapine
Risperidone
Paliperidone*
Iloperidone*
Aripiprazole*
Ziprasidone*
Asenapine*
Lurasidone*

* Limited long-term data exists

56

American Diabetes Association. Diabetes Care 2004;27:596.
Product package inserts.

CONCLUSIONS

- Place in therapy of newer agents largely limited by lack of head-to-head trials
- Fanapt, Saphris, and Latuda appear to be "me-too" agents
  - Dosing and administration restrictions
  - More data needed for efficacy of negative and cognitive symptoms
- Sustenna, Relprevv, and Maintena have provided for longer dosing interval of q4 weeks compared to previous IMs
  - Relprevv use limited due to need for registration and monitoring
  - Maintena has low metabolic risk, but still requires oral overlap
- Versacloz provides another formulation option for patients with treatment-resistant schizophrenia

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POST-TEST: QUESTION 1

Blockade of which receptor makes lurasidone a novel antipsychotic, due to the belief that it improves cognition?

A. $5\text{-}HT_7$
B. $5\text{-}HT_{2A}$
C. $5\text{-}HT_{1A}$
D. D_2

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POST-TEST: QUESTION 2

Which of the following antipsychotics is NOT available as a long-acting injectable?

A. Olanzapine
B. Aripiprazole
C. Paliperidone
D. Quetiapine

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POST-TEST: QUESTION 3

Which of the following is a black box warning for Zyprexa Relprevv (olanzapine), requiring that a patient be observed for at least 3 hours after administration?

A. Acute dystonia
B. Post-injection delirium/sedation syndrome
C. Hyperglycemia
D. Increased mortality in elderly patients with dementia-related psychosis

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