Long Acting Injectables & Intramuscular (IM) Injections

What You Need To Know
Learning Objectives

Review current hypothesis for medication treatment of schizophrenia and psychotic disorders

Review current Long-Acting Injectable Antipsychotic Clinical Recommendations for Clinicians.

Review current available Long Acting Injectables in Canada

Review land marking techniques for the five injection sites used for all IM Injections and which sites are best for LAI’s

Discuss and review Administration Information and Techniques.

What ifs?

Now the fun begins Practice Time for Injections
Overview
Schizophrenia Disease State

Chronic, severe brain disorder that is considered one of the most disabling of the serious mental illnesses.

Associated with both positive and negative symptoms

**Positive symptoms:** delusions, hallucinations, disorganized thinking, disorganized behavior and catatonic movements

**Negative symptoms:** alogia, avolition, affective flattening, anhedonia, dysphoric mood, difficulty concentrating
The Dopamine Hypothesis of Schizophrenia

- The dopamine (DA) hypothesis is the oldest and most established of the schizophrenia hypotheses. It has evolved from clinical observations, and received empirical validation from antipsychotic treatment and more direct testing from imaging studies. Although clearly not sufficient to explain the complexity of this disorder, it offers a direct relationship to symptoms and to their treatment.

Anissa Abi-Dargham; Schizophrenia Research Forum 2012
Major Brain Dopamine Pathways and Schizophrenia

Nigrostriatal pathway\(^{1,2}\)
- Controls motor movement

Mesocortical pathway\(^{1,2}\)
- Associated with cognition and motivation

Mesolimbic pathway\(^{1,2}\)
- Associated with memory and emotional behaviors\(^{1}\)

Tuberoinfundibular pathway\(^{1,2}\)
- Controls prolactin secretion

Negative symptoms
- Alogia
- Affective flattening
- Avolition

Positive symptoms
- Delusions
- Hallucinations
- Disorganized speech/thinking
- Disorganized or catatonic behavior

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Schizophrenia is associated with impaired dopaminergic neurotransmission in the brain. 

Hypoactivity in mesocortical pathway - Negative symptoms - Impaired learning and memory

Hyperactivity in the mesolimbic pathway - Positive symptoms

Normal dopamine activity in tuberoinfundibular pathway (involved in prolactin regulation)

Normal dopamine activity in nigrostriatal pathway (involved in movement regulation)

Improvement of positive symptoms

Dopamine Antagonism in the Mesolimbic Pathway Improves Positive Symptoms

Dopamine Antagonism in the Mesocortical Pathway May Worsen Negative Symptoms

Possible exacerbation of negative symptoms

Likely Mechanism of Action of Aripiprazole in Schizophrenia

**Hypoactivity in mesocortical pathway**
- Negative symptoms
- Impaired learning and memory

**Normal dopamine activity in tuberoinfundibular pathway**
Little effect on dopamine receptors in the nigrostriatal and tuberoinfundibular system: little effect on motor function and prolactin

**Hyperactivity in the mesolimbic pathway**
- Positive symptoms

**Normal dopamine activity in nigrostriatal pathway**

↑ Stimulation of dopamine receptors in the mesocortical system: improvement in -ve symptoms

↓ Causes blockade of dopamine receptors in mesolimbic system: improvement in +ve symptoms

LONG-ACTING INJECTABLE ANTIPSYCHOTICS

CLINICAL RECOMMENDATIONS

Introduced May 2013 in the Canadian Journal of Psychiatry

Developed by a consortium of psychiatrists across Canada discussing Evidence of Effectiveness of LAI.

Two studies of Experiences With and Perceptions Regarding Long-Acting Injectable Antipsychotics from the Patient and Physician.

Ten Recommendation for Clinicians when offering LAI as one of the choices of treatment to patients with a psychotic disorder. Also 6 case studies accompany these recommendations. We will briefly focus on the recommendations.
Ten Recommendations

1. For All Phases of the illness
2. Informed Patient Decision
3. Clinical Stability and Patients’ Change in Opinions and Attitudes
4. Physicians’ Knowledge and Attitude
5. Nonadherence
6. Involuntary Treatment During Acute Phase Psychosis
7. Engagement With Psychosocial Interventions and Rehabilitation
8. Oral Supplementation and Stabilization
9. Monitoring
10. Special Situations
Long Acting Injectables Available in Canada

Typical (oil based)
• zuclopenthixol (Clopixol)
• haloperidal (Haldol LA)
• flupenthixol (Fluanxol)
• fluphenazine (Modecate)

Atypical (aqueous based)
• Risperdal Consta
• Invega Sustenna
• Abilify Maintena
Characteristics of SGA-LAIs and FGA-LAI (1 of 2)

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Paliperidone LAI</th>
<th>Risperidone LAI</th>
<th>Aripiprazole LAI</th>
<th>Fluphenazine Decanoate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment Initiation from oral</strong></td>
<td>Aqueous-based nanocrystal</td>
<td>Microsphere aqueous-based</td>
<td>Lyophilized powder</td>
<td>Ester (prodrug) in sesame oil</td>
</tr>
<tr>
<td>150 mg Day 1 &amp; 100 mg Day 8; no oral supplementation required</td>
<td>25 mg 3 weeks oral antipsychotic supplementation</td>
<td>400mg (160-300 mg special situations) 2 weeks oral antipsychotic supplementation</td>
<td>Oral antipsychotic supplementation for 4-6 weeks</td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance Dosing</strong></td>
<td>4 weeks</td>
<td>2 weeks</td>
<td>4 weeks</td>
<td>2-4 weeks</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td>Deltoid &amp; gluteal IM, no Z-track required</td>
<td>Deltoid &amp; gluteal IM, no Z-track required</td>
<td>Gluteal, no Z-track required</td>
<td>Gluteal, Z-track required</td>
</tr>
</tbody>
</table>

Based on individual Canadian product monographs.
## Characteristics of SGA-LAIs and an FGA-LAI (2 of 2)

<table>
<thead>
<tr>
<th>Dosage Range (Volume)</th>
<th>Paliperidone LAI</th>
<th>Risperidone LAI</th>
<th>Aripiprazole LAI</th>
<th>Fluphenazine Decanoate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dosage Range</strong></td>
<td>50, 75, 100, 150 mg eq (0.5, 0.75, 1.0, and 1.5 mL)</td>
<td>12.5, 25, 37.5, and 50 mg (2 mL for all doses)</td>
<td>160, 200, 300, 400 mg (0.8, 1.0, 1.5, 2.0 mL)</td>
<td>Initial: 12.5 mg Subsequent doses individualized (12.5-100 mg)</td>
</tr>
<tr>
<td><strong>Kits</strong></td>
<td>No reconstitution required; pre-filled syringes</td>
<td>Reconstitution required with supplied diluent</td>
<td>Reconstitution required with supplied diluent</td>
<td>1 mL ampoules containing 100 mg/mL fluphenazine decanoate</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>No refrigeration required</td>
<td>Refrigeration required</td>
<td>No refrigeration required</td>
<td>No refrigeration required</td>
</tr>
<tr>
<td><strong>Needle Supplied or Recommended</strong></td>
<td>1” 23G (deltoid &lt; 90 kg or 1.5” 22G if &gt;90 kg) 1.5” 22G (gluteal &lt;90 kg or 2” 21G &gt; 90 kg) standard needle</td>
<td>2” 20G (gluteal) or 1” 21G (deltoid) wide bore, slim wall special needle (supplied)</td>
<td>1.5” 21G (gluteal) standard or 2.0” 21G (gluteal) if obese standard needle</td>
<td>1.5” 21 or 22G (gluteal) or 2” 21G Standard needle (filter)</td>
</tr>
</tbody>
</table>

Based on individual Canadian product monographs.
Use of LAI and Oral Antipsychotics Across Canada

<table>
<thead>
<tr>
<th>Province</th>
<th>% of total antipsychotic prescriptions</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SGA LAI</td>
<td>FGA LAI</td>
<td>Oral SGA</td>
<td>Oral FGA</td>
</tr>
<tr>
<td>Alberta</td>
<td>1.5</td>
<td>1.1</td>
<td>91.8</td>
<td>5.6</td>
</tr>
<tr>
<td>British Columbia</td>
<td>1.9</td>
<td>1.1</td>
<td>89.8</td>
<td>7.2</td>
</tr>
<tr>
<td>Manitoba</td>
<td>0.7</td>
<td>0.8</td>
<td>88.7</td>
<td>9.8</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>1.8</td>
<td>1.0</td>
<td>89.6</td>
<td>7.6</td>
</tr>
<tr>
<td>Newfoundland &amp; Labrador</td>
<td>0.5</td>
<td>2.5</td>
<td>85.6</td>
<td>11.3</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>1.5</td>
<td>1.6</td>
<td>84.3</td>
<td>12.6</td>
</tr>
<tr>
<td>Ontario</td>
<td>1.4</td>
<td>1.1</td>
<td>89.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>2.0</td>
<td>0</td>
<td>81.7</td>
<td>16.3</td>
</tr>
<tr>
<td>Quebec</td>
<td>1.0</td>
<td>1.1</td>
<td>89.1</td>
<td>8.9</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>1.6</td>
<td>3.5</td>
<td>86.4</td>
<td>8.4</td>
</tr>
<tr>
<td>National</td>
<td>1.3</td>
<td>1.1</td>
<td>89.4</td>
<td>8.2</td>
</tr>
</tbody>
</table>

SGA: second-generation antipsychotic; FGA: first-generation antipsychotic; LAI: long-acting injectable
Based on IMS Data.
Proper Needle Length
What is the most common length and gauge of needle used for gluteal injections

A) 21 gauge 38 mm needle
B) 22 gauge 32 mm needle
C) 23 gauge 25 mm needle
D) 22 gauge 38 mm needle
E) None of the Above
What is the most common length and gauge of needle used for gluteal injections:

D) 22 gauge 38 mm needle
MRI Scan of Dorsogluteal Injection

- The distance from
  - skin to muscle in
  - this patient (line marked 1) is 42mm

- An injection given
  - with a 21 gauge 38mm
  - (1 1/2”) needle
  - stayed in the fatty
  - SC tissue
V.O. Chan (2006)

- Overall, only 32% ($n = 16/50$) of patients had intramuscular injections, with the majority of injections (68%, $n = 34/50$) being subcutaneous. When analyzed by gender, 56% ($n = 14/25$) of males had intramuscular injections while in females, the efficacy rate was significantly lower at 8% ($n = 2/25$).

v.o. chan, et al. (2006) Intramuscular injections into the buttocks: Are they truly intramuscular?
# Recommended Needle Length

<table>
<thead>
<tr>
<th>Patient Weight</th>
<th>DELTOID Recommended Needle</th>
<th>GLUTEAL Recommended Needle</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 90 kg (≥200 lb)</td>
<td>1 ½ inch, 22 gauge</td>
<td>1 ½ - 2 inch, 22-21 gauge</td>
</tr>
<tr>
<td>&lt; 90 kg (&lt;200 lb)</td>
<td>1 inch, 23 gauge</td>
<td>1 ½ inch, 22 gauge</td>
</tr>
</tbody>
</table>
Needle Length
**Needle length**

**THE IMPORTANCE OF INJECTING INTO MUSCLE**

- **Epidermis**
- **Dermis**
- **Subcutaneous Tissue**
- **Muscle**
Always Use a New Needle
Z-track Injection Technique

Displacing the skin for Z-track injection

By blocking the needle pathway after an injection, the Z-track technique allows IM injection while minimizing the risk of subcutaneous irritation and staining from such drugs as iron dextran. The illustrations below show how to perform a Z-track injection.

Before the procedure begins, the skin, subcutaneous fat, and muscle lie in their normal positions.

To begin, place your finger on the skin surface, and pull the skin and subcutaneous layers out of alignment with the underlying muscle. You should move the skin about 1/2" (1 cm).

Insert the needle at a 90-degree angle at the site where you initially placed your finger. Inject the drug and withdraw the needle.

Finally, remove your finger from the skin surface, allowing the layers to return to their normal positions. The needle track (shown by the dotted line) is now broken at the junction of each tissue layer, trapping the drug in the muscle.
Injection Landmarking
There are Five Injection sites that can be used for all IM Injections can you name them?

- Deltoid
- Dorsogluteal
- Ventrogluteal
- Vastus Lateralis
- Rectus Femoris
Land Marking for IM Injections

Which injection site?

22G x 1 ½” Safety Needle
Gray Hub
Patient weighs ≥200lb (≥90kg)

Which injection site?

23G x 1” Safety Needle
Blue Hub
Patient weighs <200lb (<90kg)
Land Marking for IM Injections

Which injection site? Which injection site?
The Deltoid Injection
Find the scapula. Locate the acromion process located on the scapula and measure 2 to 3 finger widths in the middle of the arm. Inject at a 90 degree angle.
Deltoid Demarcation

- It is suggested that the deltoid site is a better site than the gluteal muscle for small volume (2 mL or less) rapid onset injections because the deltoid has the greatest blood flow of any muscle routinely used for IM injections.
- Injury to the brachial artery and radial nerve (if the injection is given too low) and limited volume of medication, which can be administered (0.5–2 mL maximum), are highlighted as risks associated with the deltoid site.

The Dorsogluteal Injection
Dorsogluteal Injection

The dorsogluteal site is composed of the thick gluteal muscles of the buttocks.

The nurse palpates the posterior superior iliac spine then draws an imaginary line to the greater trochanter of the femur. This line is lateral to and parallel to the sciatic nerve. The injection site is, then lateral and superior to this line.

Older Teaching


Reproduced with permission
Dorsolgluteal Injection

- Dividing the buttocks into four quadrants and using the upper outer area is another land marking technique used for this site. Probably the most common land marking technique for the Dorsolgluteal site.
The Ventrogluteal Injection
Ventrogluteal Landmarking

- Have your patient palpate their Anterior Superior Iliac Spine (ASIS). Then ask if you can palpate the (ASIS). Using your index finger of the opposite hand of the side you are giving the injection palpate the ASIS then spread the middle finger along the boney ridge of the Iliac Crest as far as you can. Creating a V between your index and middle finger. Your thumb should be pointing to the groin area and your pinky to the “stinky”

- The palm or heal of your hand will then fall on the trochanter. To confirm this have the patient sway his/her hip back and forth while both feet are planted firmly on the ground (if standing). Have the patient lift their leg while bent (if lying down).
Anterior Superior Iliac Spine
Muscles of the Ventrogluteal Injection

Gluteus medius

Gluteus minimus
ventrogluteal muscle
The Vastus Lateralis Injection
Vastus Lateralis Landmarking

In an adult the Vastus Lateralis can be located by measuring a hand’s breadth laterally down from the greater trochanter and a hand’s breadth up from the knee, identifying the middle third of the quadriceps muscle as the injection site. The Rectus Femoris is in the middle third of the anterior thigh.
WHAT IF

- YOU CONTAMINATE A NEEDLE
- THE NEEDLE BECOMES BLOCKED
- PT COMPLAINS OF PAIN, BRUISING AND LUMPS AT THE INJECTION SITE
- THERE IS BLOOD AT THE INJECTION SITE
- YOU DRAW BLOOD WHEN YOU ASPIRATE PRIOR TO INJECTION
- A PATIENT IS GOING ON VACATION OUT OF PROVINCE OR COUNTRY
PRACTICE TIME

• NOW IS THE TIME TO PRACTICE LANDMARKING AND GIVING AN IM INJECTION

• WE WILL NEED 3-4 VOLUNTEERS TO HELP BY BEING OR PRACTICE MODELS
• THANK YOU

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