

Getting to the Point  
of  
Injection Recommendations

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Rose Marie Caffrey, RN MSN CDE

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- Objectives**
- Apply the evidenced based global injection recommendations to your practice
  - Describe the benefits of BD Needle Technology
  - Apply the "one-handed, straight in" no pinch technique for all your patients
  - Describe the issues with needle reuse

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New Evidence Based Findings  
are  
Changing Best Injection  
Practices

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## Last Decade....

### DCCT 1983 - 1993

- Type and dose of insulin delivered
- Selection of appropriate device
- Education

### International Injection Technique Workshop 1998

- Insulin injection approached in a scientific way
- Suggested performing the injection correctly is equally important to good glycemic control

### ADA Target Values

A1C	<7%
Pre-prandial capillary plasma glucose	70-130mg/dl
Peak Post-prandial capillary plasma glucose	<180 mg/dl




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## Second Injection Technique Workshop

### Questionnaire Survey

- Over 8 months
- More than 4300 insulin-injecting patients participated
- One of the largest multi-centered studies of its kind

Survey results and initial draft of recommendations presented at Third Injection Technique Workshop in Athens (TITAN)

- Group of dedicated injection experts
  - 127 doctors, nurses, educators and psychologists
  - From 27 countries
- Met to discuss and debate these proposals

Diabetes & Metabolism. 2010;36 (suppl.): S1-S29.

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## Global Injection Recommendations



- Consensus document
- Thoroughly evidenced based given our current state of knowledge
- Published, September, 2010

Recent years – major shift toward shorter length needles

New Injection Recommendations:

1. Provide clear recommendations in specific patient populations
2. Stress the need for correct technique in every injection
3. Technique is critical for achieving optimal control of diabetes

Diabetes & Metabolism. 2010;36 (suppl.): S1-S29.

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## Take a closer look...



- **Method**
  - Systematic literature study-peer reviewed studies and publications
  - By international group of experts
  - Met regularly over two year period
- **Results**
  - 292 articles reviewed, 157 found to meet criteria of relevance
- **Conclusion**
  - "These injecting recommendations provide practical guidance and fill an important gap in diabetes management. If followed they should help ensure more comfortable, effective and largely complication free injections."

Diabetes & Metabolism: 2010;36 (suppl.): S1-S29, pg.

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## Opening Editorial



**Jaime A. Davidson<sup>1</sup>**

- HCPs rarely instruct patients on proper injection technique
- Time constraints
  - Scarcity of guidelines

"Many of the recommendations which do exist have little or no scientific underpinning and are based as much on habit and tradition as on evidence."

Diabetes & Metabolism: 2010;36 (suppl.): S2.

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## Opening Editorial



**Jaime A. Davidson<sup>1</sup>**

Most of our time during brief patient education

- Discussing dosing
- Patient's ability to read units
- How to use insulin

**"If we (HCP) discuss injection technique at all it is usually only site rotation and not the full range of important issues."**

Diabetes & Metabolism: 2010;36 (suppl.): S2.

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## Dr. Davidson Need to Remember.....



Patients get their supplies from many sources, hospital, local pharmacy, doctor's offices, mail order, internet suppliers

- Patient are provided whatever needles are available OR
- Patient chooses the least expensive one

### QUESTION:

1. How many times do we ask ourselves whether glucose fluctuations might be due to inconsistencies in injection technique?
  - Changing needle sizes
  - Using a needle that is too long
2. How many times do we wave our finger at the patient, blaming the patient for not taking the insulin correctly?

**Rarely do we explain the importance of using a particular needle length nor do we write this on their scripts**

Diabetes & Metabolism 2010;36 (suppl.): S2

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## Emphasize the importance of...



Dr. Davidson:

All aspects of injection technique from the first visit onwards

- Proper needle size
- Correct injection process
- Complication avoidance

**"Proper injection technique must be addressed at every patient visit"**

Diabetes & Metabolism 2010;36 (suppl.): S2

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## Issues Addressed



- Role of the professional
- Psychological challenges
- Education
- Site care
- Storage
- Suspension and priming
- Injecting process
- Proper use of pens and syringes
- Insulin analogues
- Human and premixed insulins
- GLP-1 analogs
- Needle length
- Skin folds
- Lipohypertrophy
- Rotation
- Bleeding and bruising
- Pregnancy
- Safety and disposal

Diabetes & Metabolism 2010;36 (suppl.): S1-S29

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## Needle Lengths



No medical rationale for using needles >6mm

**No** consistent evidence to date in patients using short needles of increased:

- leakage of insulin
- pain
- poor diabetes management
- other complications

Diabetes & Metabolism 2010;36 (suppl.): S8

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## Needle Lengths



- "Shorter needles are safer and often better tolerated"
- "Even in obese patients, studies have confirmed equal efficacy and safety/tolerability with shorter length needles as compared to longer ones"
- "Randomized, controlled clinical prospective trials demonstrate the lack of any change in overall glycemic control when using shorter length needles."

Diabetes & Metabolism 2010;36 (suppl.): S8

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## Adult needle length



- Skin thickness is constant averaging 1.9-2.4mm across injection sites, ages, races, BMI and gender;
- 4 mm pen needle shown to be safe and efficacious in adults of all sizes including the obese
- Injections with shorter needles should be given in adults straight in (at 90°) to the skin surface\*
- Slim individuals and those injecting into a limb may need to lift a skin fold, especially when using a 5 or 6 mm needle

**Initial therapy should begin with shorter length needles**

Diabetes & Metabolism 2010;36 (suppl.): S8, S9, S13  
\*Tested with adults of BMI 20-49

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## Needle Lengths cont.



- The depth of injection (shallow versus deep S C tissue) does not appear to affect the absorption or pharmacokinetics of insulin

Diabetes & Metabolism. 2010;36 (suppl.): S12.

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## Pediatric Needle Length



### Children and adolescents

- Skin thickness is slightly less than adults increasing the risk of IM injections
- A 4 mm inserted at 90° without a skin fold can be used in many pediatric patients
- No medical reason for recommending needles > 6 mm
- Slim children may require skin fold with 5 and 6 mm needles

\*\*Arms should be used for injections only if skin fold has been lifted, which requires injection by a third party A3. (Author's recommendation, consult your practice guidelines.)

Diabetes & Metabolism. 2010;36 (suppl.): S9, S13.

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## Pregnancy



### Recommendations

- Pregnant women should avoid injecting into the abdomen until ultrasound confirms there is sufficient S C tissue – *more studies needed*
- Pregnant women with diabetes of any type who continue to inject into the abdomen, should give all injections using a raised skin fold
- Avoid using abdominal sites around the umbilicus during the last trimester

Diabetes & Metabolism. 2010;36 (suppl.): S11.

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## Lifted Skin Fold

Muscle not lifted

Correct lifted skin fold
Incorrect lifted skin fold

Diabetes & Metabolism. 2010;36 (suppl.): S10.

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## Proper Use of Pens

### Recommendations

1. Insulin pens should be primed to ensure unobstructed flow
2. Insulin pens are for single use and should never be shared
3. Pen needles should be used only once and disposed of immediately after use

**Getting the start to make sure you get the most out of your pen:**

Get the start to make sure you get the most out of your pen:

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Diabetes & Metabolism. 2010;36 (suppl): S7  
Ginsberg, H.H., Parker, H., Spaniolis, C. The kinetics of insulin administration by insulin pens. *Diabetes Metab Res* 1994; 24:584-587

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## Proper Use of Pens cont.

### Recommendations, cont.

4. After pushing the thumb button down completely, patients should count to 10 before withdrawing the needle
  - > Counting past 10 may be necessary for higher doses.

**What does this mean to the patient:**

- > Delivery of the full dose
- > Prevent leakage

Diabetes & Metabolism. 2010;36 (suppl.): S7.

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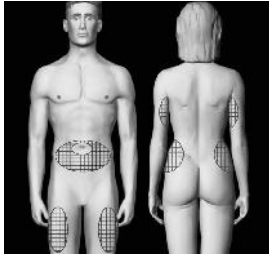
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## Injection Sites



Diabetes & Metabolism: 2010;36 (suppl.): S6.

- Best way to safeguard normal tissue is to properly and consistently rotate injecting sites
- Absorption rates differ

### Best practices:

- Rotate injection sites
  - > Move the injection by a finger's width from the last injection point
  - > Change site every week

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## Insulin Analogues and GLP-1 Agents



### Rapid acting insulin analogues

- May be given at any site absorption rates do not appear to be site specific

### NPH:

- Avoid IM injections - rapid absorption - serious hypoglycemia
- Thigh and buttocks are preferred sites as a basal insulin
- Should be given at bedtime to avoid risk of nocturnal hypoglycemia

### Regular Insulin:

- Abdomen is preferred site

### Premixed Insulins

- Morning -- abdomen
- PM thigh or buttock

### GLP-1 agents

- May be given at any injection site as the pharmacokinetics do not appear to be site specific

**IM injections of long acting insulin analogues must be avoided**

Diabetes & Metabolism: 2010;36 (suppl.): S6.

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Diabetes & Metabolism: 2010;36 (suppl. 1): S8

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- Slim individuals and those injecting into a limb may benefit from shorter needles when used at an angle.

Diabetes & Metabolism: 2010;36 (suppl. 1): S8, S9, S13  
\* Tested with adults of BMI 20-49

**Initial therapy should begin with shorter length needles**

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Diabetes & Metabolism: 2010;36 (suppl. 1): S12

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## Proper Use of Pens cont.



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Diabetes & Metabolism: 2010;36 (suppl.): S7.

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## Needle Technology

**Enabling initiation and better outcomes with injectable diabetes therapy**

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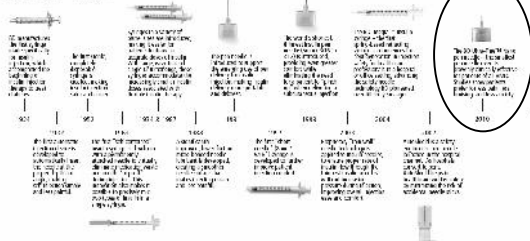
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## Heritage Of Innovation And Leadership

RFD Innovation - Time-Line




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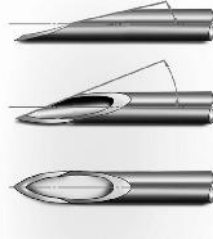
## Fine Point Geometry

### BD Ultra-Fine™ Needles

- > Have a precision made tri-bevel tip
- > Side bevels are long and slender
- > Are designed to displace tissue equally in three directions

### Result: your patient will experience

- > Reduced pressure allows easier insertion
- > Less tissue tear less pain




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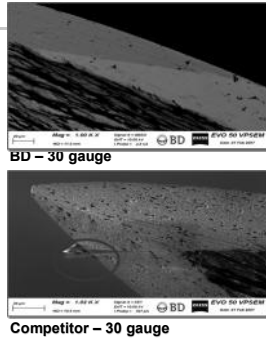
## Electro-Polishing

### Ultra-Fine™ Needles:

- Treated with an electro-chemical process
- Polishes the needle
- Removes microscopic burrs from the normal manufacturing process

### Result: your patient will experience

A smoother injection




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## Micro-bonded Lubricating Layer

### Use a proprietary technique

- Every needle coated with a microscopic film of lubricant

### Result: your patient will experience

- Less friction
- More glide




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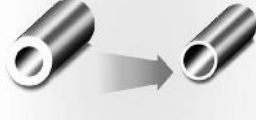
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## Thin Wall Technology

### Ultra-Fine™ Needles:

- Have a wider, increased inner diameter
  - ✓ Same outer diameter with bigger inner diameter



### What does this mean to your patient?

- Improved insulin flow rate
- Lower force required to push plunger down

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## Benefits Of Technology

- Greater comfort
- Less pain
- Consistency
- Convenience
- Helps patient make an easier transition to injection therapy

**47% of Patients With Diabetes (PWD) would be more likely to administer their injections regularly if a product was available that would ease the pain and discomfort of injections<sup>1</sup>**

1. 2007 AADE Injection Impact Survey

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## One Pen Needle For All Diabetes Pens One Brand For Life

Tested in accordance with The International Standards Organization for connectivity and dose accuracy

- Guaranteed to fit all insulin pens and dosers sold in the U.S.\*
- Over 1/3 of all pen users use more than one pen
- Never need to think about which needle goes with what pen

**BD Ultra-Fine™ Pen Needles fit all pens sold in the U.S.†**



\*For all U.S. pen and doser models with standard or standard plus injection volumes. †All pen and doser models of the major brands.




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# Nano

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For all patients, at all injection sites,  
one injection technique

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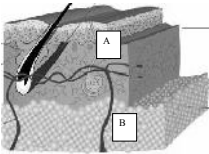
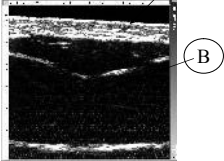
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**Evidenced Based...**

2009 BD Skin and Subcutaneous Thickness Ultrasound Study\*

- Largest ultrasound study of adults with diabetes,

- **Conclusion:**
- Skin thickness varies minimally and is <2.8 mm in virtually all patients
- S C thickness ranges are much greater

\* Gibney MA, Arce CH, Byron KJ, Hirsch LI. Skin and subcutaneous adipose layer thickness in adults with diabetes at sites used for insulin injections: implications for needle length recommendations. Curr Med Res Opin. 2010; 26 (6): 1519-1530.

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## Take a closer look.....

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- Type 1 and type 2 for  $\geq 1$  yr
- 350 subjects
- BMIs of 18 – 50
- Male and females
- 3 age groups: 18-39, 40-59, and 60-85
- All races/ethnic groups: White, Black, Asian, Hispanic
- Insulin users and non- insulin users

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## Take a closer look....

At the four common insulin injection sites (arm, abdomen, thigh, buttock)

Objectives:

- Measure skin thickness (epidermis-dermis) using high frequency 2D ultrasonography
- Measure S C adipose tissue
- Determine impact of BMI on skin thickness and S C tissue
- Determine the impact of other demographic factors on skin and S C thickness

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## Analysis of Key Findings

### Skin thickness

- Statistically significant effects:
  - Body site: thigh thinnest, buttocks thickest (difference ~ 0.6 mm)
  - Gender: male > female ~ 0.3 mm
  - BMI:  $\Delta$  10 BMI units accounts for ~ 0.2 mm change

### S C thickness

- Statistically significant effects:
  - Body site: arm thinnest, buttocks thickest (difference ~ 5.2 mm)
  - Gender: female > male ~ 5.1 mm
  - BMI:  $\Delta$  10 BMI units accounts for ~ 4.0 mm change

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## Summary

- Skin Thickness
  - > 95% Confidence Interval for all subjects and sites  
Skin = 2.8mm
  - > Does not differ by clinically significant degrees in different demographic groups
- S C Thickness
  - > Ranges are much greater than for skin thickness;  
95% Confidence Interval for all subjects and sites
  - > Arm = thigh < abdomen < buttocks

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## Conclusions

- Needles  $\geq 8$  mm, when inserted perpendicularly ( $90^\circ$ ) may enter the muscle, especially in the thigh, arm and abdomen in thin persons (BMI < 25)
- In adults with diabetes, needles 4-5 mm are long enough to penetrate the skin and enter the S C tissue, assuming perpendicular insertion, with minimal risk of IM injection

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## Evidenced Based...

2009 BD Safety and Efficacy Study of a new 4mm by 32G Pen Needle\*

- Evaluated the safety, efficacy and patient ratings of the 4mm by 32G Pen Needle

### Conclusion:

- Clinically proven as effective as longer pen needles for patients of ALL sizes (20-49 BMI)
- No difference in insulin leakage compared to 5mm and 8mm pen needles
- Less intimidating
- Proven less painful
- Preferred by patients

\*Hirsch LJ, Gibney MA, Albanese J, et al. Comparative glycemic control, safety and patient ratings for a new 4 mm x 32G insulin pen needle in adults with diabetes. Curr Med Res Opin. 2010; 26 (6): 1531-1541.

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## Take a closer look....

**Objective:** evaluate the safety, efficacy and patient ratings of the new 4mm x 32G BD Pen Needle, Nano

### Research design:

- Type 1 and type 2 PWDs
  - A1Cs of 5.5% to 9.5%
  - 18 to 75 years of age
  - BMIs 18 to 50 kg/m<sup>2</sup>
  - 173 PWDs randomized, 168 completed study
- Subjects were either
  - "Low dose" group  $\leq 20$  units
  - "Regular" dose group 21 – 40 units
- Randomized crossover design, 4mm x 32G BD Pen Needles and either
  - 5mm x 31G BD Pen Needle
  - 8mm x 31GBD Pen Needle
- Primary endpoint percent absolute change in serum fructosamine

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## For all patients

4mm pen needle was shown to be safe and efficacious in adult patients of all sizes\*

- Nano proven effective for all patients
  - ✓ Clinically proven effective in maintaining glycemic control for patients of all sizes (20-49 BMI)
  - ✓ No increased leakage when compared to the 8mm and 5mm
- Proven less painful
  - ✓ Preferred by 72% of patients
- Shown to be less intimidating
  - ✓ 88% of patients were "not at all anxious"



Tested with adults of BMI 20-49.

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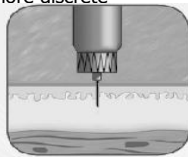
## One injection technique

Single handed, straight in, no pinch for all of your patients:<sup>1</sup>

- Simple for patients to do
- Simple to remember
- Opens up more sites allowing patients more discrete injections with greater convenience

What does this mean to your Patients?

Increased site flexibility



<sup>1</sup> 2009 BD Safety and Efficacy Study of a new 4mm by 32G Pen Needle

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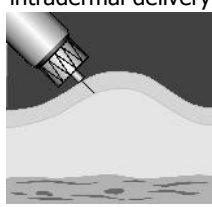
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## Straight In Injection Technique

90° straight-in injections with Nano result in a SC injection 99.5%



45° may result in inadvertent intradermal delivery



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## All injection sites

Best way to safeguard normal tissue is to properly and consistently rotate injecting sites  
 BD Nano -- Single handed, straight in, no pinch technique Allows greater site flexibility



Result: more robust site rotation regimen which improves skin health

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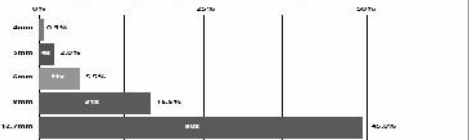
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## No-pinch injection technique

Minimizes the chance of an intramuscular injection

- When compared to other short needles, BD Nano significantly reduces the chance of IM injections

Calculated percentage\* of achieved IM injections utilizing a 90°, no-pinch technique



The 5mm length needle is 4 times more likely to deliver an IM injection than the new 4mm BD Nano.

\*Rounded to the nearest half percent

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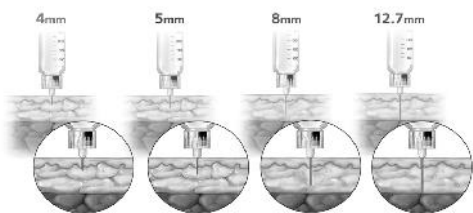
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## Selecting a Pen Needle



Shorter pen needles reduce the risk of IM injection

Trade & White

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## Computerized Tomography



Injecting with an 8 mm needle in the thigh:  
 • **Without a lifted skin fold** ( ) results in an intramuscular (IM) injection.  
 • **With a lifted skin fold** ( ) the injection is in the S C tissue.

**Result:**

- A higher risk of intramuscular injection in sites where the subcutaneous tissue is thin
- Needle length and skin fold determine if the injection will be in the subcutaneous or intramuscular tissue.

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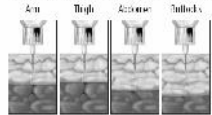
## Misconception

We need longer needles to go deeper for larger BMI patients  
 • 8 and 12.7 mm needles have frequently been used to “ensure” S C medication delivery

Global injection recommendations show this is a fallacy.

The depth of injection does not affect the absorption or pharmacokinetics of insulin

The Nano achieves SQ Injection at all sites\*



- For nearly all patients, no matter what size, skin thickness is no more than 2.8mm thick
- Depth of injection into S C has no impact on the efficacy of the insulin
- Longer needles increase likelihood of IM injections

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## Insurance Coverage

- Insulin Syringes and Pen Needles are covered by virtually all insurance plans at the preferred co-pay
- For your patients on Medicare Part D: Insulin Syringes, BD Pen Needles and Alcohol Swabs are “Covered Drugs” under the Medicare Part D Prescription Drug Benefit

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One final thought.....

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In summary, The BD Nano

**For all patients, at all injection sites, one injection technique**

- The "single handed, straight in" no pinch injection technique is the best technique for all your patients
- Simple for you to teach; simple for the patient to remember
- Increases site flexibility
- Less intimidating
- Significantly reduces the chance of IM injections
- Clinically proven as effective as longer pen needles for patients of ALL sizes



Tested with adults of BMI 20-49

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