

UPDATES IN ENDOCRINE PHARMACOLOGY

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University of North Carolina Medical Center



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DISCLOSURES

- Kathryn Kreider
 - Madrigal Pharmaceuticals (Advisor)
 - liver disease/metabolic dysfunction
- Anne M. Komé
 - Consultant for Lexi-Comp/Wolters-Kluwer
 - Endocrinology (all conditions)
 - Speakers Bureau for Dexcom Incorporated
 - Diabetes/CGM
 - Advisory Board for Camurus Pharmaceuticals
 - Acromegaly



All relevant financial relationships have been mitigated.

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OBJECTIVES

- NPs will recognize the latest updates in prescribing and management of **testosterone replacement** in men with hypogonadism
- NPs will identify the most **recent insulin options**, as well as options on the horizon, and describe opportunities for use
- NPs will identify the important pharmacologic updates from the latest **diabetes guidelines** and synthesize opportunities for use
- NPs will describe the most pertinent uses for **continuous glucose monitoring** and discuss prescribing/monitoring of these devices for people with diabetes
- NPs will synthesize **prescribing options for weight loss medications** and identify methods to increase access to these agents



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UPDATES IN TESTOSTERONE TREATMENT

- Testosterone decline begins in the mid-30's and continues at 1.6% per year
- 20% of men over age 60 have low testosterone
- Family practice is the highest prescriber of testosterone (Internal Medicine, Urology, Endocrinology, Nurse Practitioners)
- Prescribers of testosterone therapy is growing by ~9% per year since the 2018 guidelines
- APP's comprise only 7.5% of Medicare testosterone prescriptions



Sellke, N., Omil-Lima, D., Sun, H. H., Tay, K., Rhodes, S., Loeb, A., & Thirumavalavan, N. (2024). Trends in testosterone prescription during the release of society guidelines. *International journal of impotence research*, 36(4), 380-384.

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UPDATES IN TESTOSTERONE THERAPY

- American Urologic Association (2018)
- Endocrine Society (2018)
- American College of Physicians (2020)



Image from Microsoft PowerPoint 365



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CONTROVERSIES IN "T" TREATMENT

- Lots of men's vitality clinics popping up with unclear assessment and management of patients
- Lack of clear understanding of the benefit of T replacement in men with normal age-related low testosterone
- Testosterone should not be used solely for weight loss, vitality/energy, physical function or cognition
- History of cardiovascular risks in some clinical trials



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CARDIOVASCULAR RISK

- CV safety data conflicting and inconclusive
- Recent studies: no CV risk: FDA just removed labeling
- Increased risk of venous thromboembolism (VTE) with testosterone replacement therapy and erythrocytosis
- Large case control and large retrospective cohort studies found no increased VTE risk
- Studies have shown low testosterone has CV risks

Baillargeon, Jacques et al. (2015). Risk of Venous Thromboembolism in Men Receiving Testosterone Therapy. *Mayo Clinic Proceedings*, 90(8), 1038 – 1045.

Morgentaler, Abraham et al. (2015). Testosterone Therapy and Cardiovascular Risk: Advances and Controversies. *Mayo Clinic Proceedings*, Volume 90, Issue 2, 224 – 251.

Sharma, Rishi et al. (2016). Association Between Testosterone Replacement Therapy and the Incidence of DVT and Pulmonary Embolism. *CHEST*, 150(3), 563 – 571.



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TRAVERSE STUDY

Testosterone Replacement Therapy for Assessment of Long-Term Vascular Events and Efficacy Response in Hypogonadal Men

- Conducted in response to FDA queries about CV safety
- RCT study: 5246 men aged 45 to 80 with total testosterone levels < 300 ng/dL.
- Study men received either placebo or testosterone gel 1.62%, which was dosed to keep therapeutic levels between 350 and 750 ng/dL.
- After a mean treatment of 22 months, the percentage of myocardial infarctions, strokes, or CV-related death adverse events (AEs) was 7.0% for testosterone vs 7.3% for placebo.

Wechsler, M. E., Ford, L. B., Maspero, J. F., Pavord, I. D., Papi, A., Bourdin, A., ... & Hardin, M. (2022). Long-term safety and efficacy of dupilumab in patients with moderate-to-severe asthma (TRAVERSE): an open-label extension study. *The Lancet Respiratory Medicine*, 10(11), 11-25.



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SIGNS & SYMPTOMS OF TESTOSTERONE DEFICIENCY

- Decreased libido and/or erectile dysfunction
- Azoospermia, male infertility
- Depressed mood, decreased concentration
- Increased body fat, gynecomastia, decrease in muscle mass/strength
- Fatigue, decreased endurance
- Loss of bone mass
- Decreased hair growth
- Gynecomastia
- Hot flashes



Image from Microsoft PowerPoint 365



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HISTORY

- Normal vs delayed puberty
- Biological children
- Head injuries
- Testicular trauma
- Chemotherapy or radiation to head or testicular region
- Opioids
- Alcohol intake
- Depression S&S, antidepressant use
- OSA



Image from Microsoft PowerPoint 365



Dandona, P. & Rosenberg, M.T. (2010). A practical guide to male hypogonadism in the primary care setting. *The International Journal of Clinical Practice*, 64(6), 682-696.

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KNOWLEDGE QUESTION

- John is a 55 year old male who comes to your clinic with concern for low testosterone. His urologist checked his T level and found it to be 275 ng/dL. He reports low libido and weight gain in the last 6 months.
- **What is your best first step?**
 - A. Start testosterone therapy daily
 - B. Check FSH/LH/prolactin
 - C. Assess timing of testosterone lab
 - D. Recheck a 2nd random testosterone level



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DIAGNOSTIC TESTS

- Total testosterone at 8 AM (due to circadian rhythm, level will be highest)
- Total Testosterone 2 hours after waking if shift worker
- LH
- FSH
- Prolactin
- TSH

Must have low total testosterone levels on 2 separate occasions- **must be early AM sample for most accuracy**



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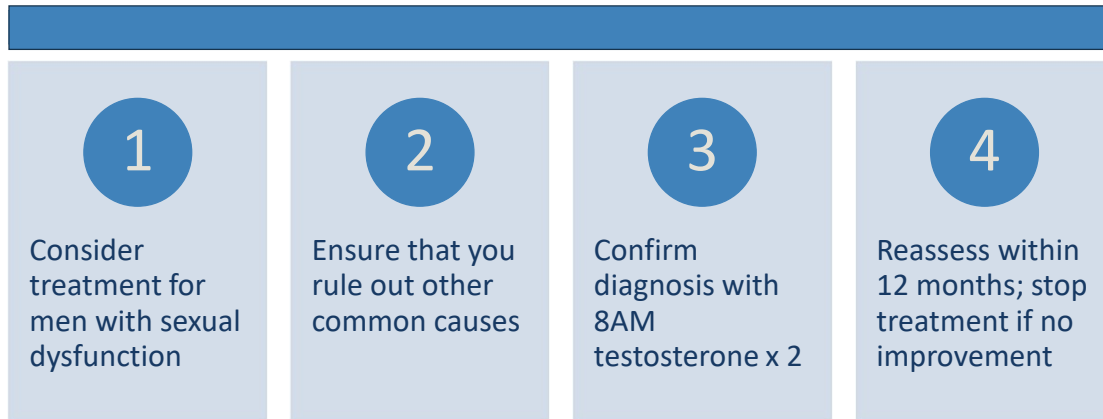
BENEFITS OF REPLACEMENT THERAPY IN THOSE WITH CONFIRMED HYPOGONADISM

- Increased well being and vitality
- Restores libido and erectile dysfunction
- Produced/maintains virilization
- Increased energy and improved mood
- Improved body composition (decreased fat mass, increased lean muscle mass & strength)
- Stabilizes or increases bone density



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AGE-RELATED HYPOGONADISM



Qaseem, A., Horwath, C. A., Vijan, S., Etxeandia-Ikobaltzeta, I., Kansagara, D., & Clinical Guidelines Committee of the American College of Physicians*. (2020). Testosterone treatment in adult men with age-related low testosterone: a clinical guideline from the American College of Physicians. *Annals of Internal Medicine*, 172(2), 126-133.

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SIDE EFFECTS

Acne or oily skin

Fluid retention

Stimulation of prostate (urinary symptoms)

Gynecomastia

Worsening of sleep apnea

Decreased sperm count, small testicles

Increased PSA and red blood cell counts

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TESTOSTERONE FORMULATIONS AVAILABLE IN US

FORMULATION	DOSE
Intramuscular Injections (\$)	75-100 mg weekly, 100-200 mg biweekly
Subcutaneous Injections (\$)	100 mg weekly
Transdermal Patches	2.5-7.5 mg once daily (discontinued end of 2024)
Transdermal Gel (\$\$)	10-100 mg daily (pending concentration)
Nasal Gel (\$\$\$)	1 pump (5.5 mg) each nostril three times daily
Oral Gel Capsules (\$\$\$)	158-396 mg BID
Subcutaneous Pellets (typically urology) (\$\$\$)	6-10 (75 mg) pellets implanted subQ every 3-6 months



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KNOWLEDGE QUESTION

- Jack is a 60 year old male who returns to your clinic for testosterone therapy monitoring. His most recent morning testosterone was 550 mg/dL. He is currently taking 100 mg testosterone cypionate IM every 2 weeks. He reports that he is concerned that he starts to feel very tired by the end of the 2 week period and starts to have some issues with sexual function. What is your best response?
- A. Increase the dose to 150 mg/every 2 weeks
- B. Check labs for thyroid, CBC, etc
- C. Screen him for depression
- D. Discuss alternate testosterone delivery options



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- Jack is a 60 year old male who returns to your clinic for testosterone therapy monitoring. His most recent morning testosterone was 550 mg/dL. He is currently taking 100 mg testosterone cypionate IM every 2 weeks. He reports that he is concerned that he starts to feel very tired by the end of the 2 week period and starts to have some issues with sexual function. What is your best response?
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- C. Screen him for depression
- D. Discuss alternate testosterone delivery options



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WHICH OPTION TO PICK?

Daily Formulations	Pros	Cons
Weekly Formulations (IM or SQ Injection)	Cheap Effective	Peak and trough (symptoms may follow) Tend to spike the HCT more
Daily Formulations (oral, gel)	More steady state, similar to normal physiology	Consider absorption and adherence issues



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IM OR SQ?

- IM testosterone has been available for 8 decades (!)
- 95% of men discontinue IM treatment within 12 months
- Subcutaneous has proven a safe and effective alternate option
- Use either enanthate and cypionate
- Injection tip: 1-mL Luer-Lok syringes with a 20- or 25-gauge 5/8-inch needle to inject into abdomen or thigh
- Starting dose typically 75 mg/week



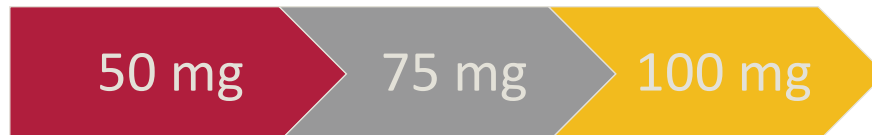
Figueiredo, M. G., Gagliano-Jucá, T., & Basaria, S. (2022). Testosterone therapy with subcutaneous injections: a safe, practical, and reasonable option. *The Journal of Clinical Endocrinology & Metabolism*, 107(3), 614-626.

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TESTOSTERONE INJECTION (XYOSTED)

- Auto-injector device (SQ)
- Testosterone enanthate
- Available in 50 mg, **75 mg**, 100 mg
- 90% of men had normal T levels within 12 weeks of treatment



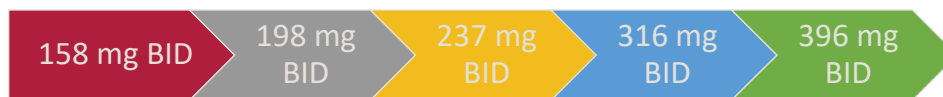
Xyosted Health Care Provider Reference 2025

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FIRST ORAL OPTION: TESTOSTERONE UNDECONOATE (JATENZO)

- Difficulty with IM or SQ injections
- Patients experiencing peak and trough symptoms with injections
- Approved March 2019, available February 2020
- Take twice daily with food



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TESTOSTERONE UNDECONOATE (JATENZO)

- Bypass first-pass liver metabolism, no effect on LFTs
- 87% of men in the study achieved normal T levels
- Well tolerated (N=166), Headache (5%), Increased HCT (5%), Hypertension (4%), decreased HDL (3%)
- Take with high fat meal to increase absorption
- Coverage: Approved commercial may pay \$0
- If commercial coverage rejects, patients may pay up to \$150/month
- GoodRx: \$1,000 per month



Jatenzo Health Care Professional Resources 2025

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ADDITIONAL ORAL OPTIONS

Testosterone Undecanoate (Tlando)

- FDA approved 2022
- No dose titration
- No need for high fat meals
- GoodRx: \$730/month

Testosterone Undecanoate (Kyzatrex)

- FDA approved 2022
- No need for high fat meals
- GoodRx: \$968/month



NASAL TESTOSTERONE GEL (NATESTO)

- One pump in each nostril three times daily
- Taken 6-8 hours apart
- No drip gel
- Each pump is 5.5 mg (= 33 mg/day)
- Cash pay price of \$140/month
- Headache, rhinorrhea, epistaxis, nasal discomfort, nasopharyngitis, bronchitis, upper respiratory tract infection sinusitis, and nasal scab (all were 3.8%).



BEWARE OF SUPPLEMENTS AND OFF-LABEL USE OF ADDITIONAL THERAPIES

- Ask about testosterone boosters/supplements
- Use of anastrozole is not FDA-approved
- Consider monitoring estradiol if patients have signs/symptoms of feminization; keeping T levels in mid normal range will help avoid this issue



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ONGOING MONITORING

- Testosterone levels
- Hematocrit
- Liver function
- PSA
- Lipids
- Bone density
- Fertility plans

Daily formula: Check 4-6 hours
after application

Injection: Check testosterone
midway through injection cycle



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CONTRAINDICATIONS

- Prostate cancer
- Elevated PSA (>4 or >3 in high risk)
- Breast cancer
- Uncontrolled heart failure
- Untreated obstructive sleep apnea
- Abnormal finding on prostate exam that has not been worked up
- Polycythemia/erythrocytosis (Hct >50%)
- Severe lower urinary tract symptoms
- Personal/FMH VTE/thrombophilia
- Desire for fertility



WHEN TO STOP THERAPY?

- Increasing PSA
- Hematocrit >54%
- Severe urinary symptoms
- New breast or prostate CA diagnosis
- Worsening HF symptoms
- Worsening OSA
- No improvement in S&S after 6 months of TRT
- Change therapy: if fertility plans change



FERTILITY SPARING TREATMENTS

- Clomiphene Citrate 25-50 mg daily
- Anti estrogen, tricks body into thinking testosterone levels are lower than they are
- Pituitary gland releases more FSH and LH
- Increased FSH helps maintain fertility and sperm counts, and the LH helps increase testosterone
- Ineffective in pts with primary hypogonadism (already have increased levels of LH)



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IT IS OK TO SAY NO!

Total testosterone
is in therapeutic
range

Replacement is
not clinically
indicated

Testosterone is
replaced for
disease states, not
to optimize

Optimizing is a
form of doping

Must adhere to
professional
society clinical
guidelines

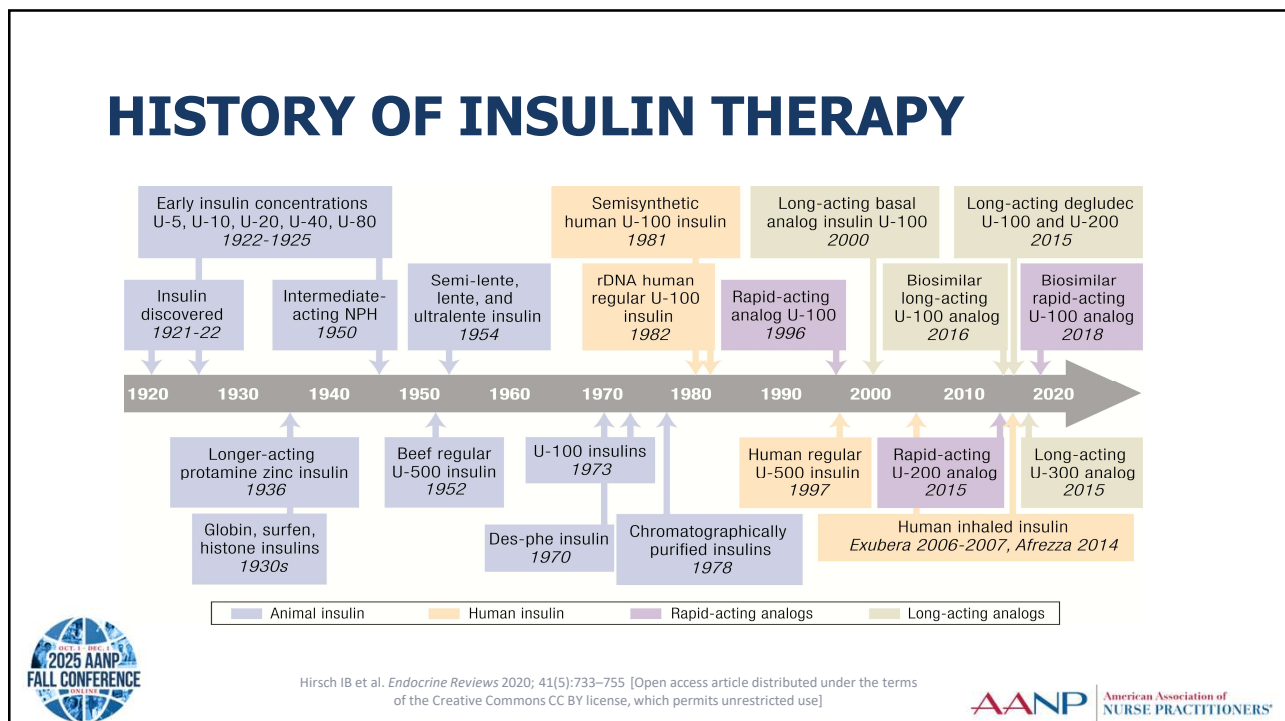
Deviation from
guidelines is
medically
negligent



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CURRENT INSULIN THERAPIES

Insulin	Brand Name	Source	Action	Onset (min)	Peak (hr)	Duration (hr)
Inhaled	Afrezza	Human	Ultra-rapid	12	0.5 – 0.9	1.5 – 3
Aspart	Fiasp*, Novolog	Analog	Ultra-rapid*, Rapid	16 – 30*, 15	1.5 – 2.2*, 1 – 3	5 – 7*, 3 – 5
Glulisine	Apidra	Analog	Rapid	12 – 30	1.5	5.3
Lispro	Admelog, Humalog	Analog	Rapid	15 – 30	1 – 3	3.5
Lispro-aabc	Lyumjev	Analog	Rapid	15 – 30	1 – 3	3.5
Regular	Humulin R, Novolin R	Human	Short	30 – 60	2 -4	5 -8
Regular, U-500	Humulin R U-500	Human	Short	30 – 60	2 -4	5 -8
NPH	Humulin N, Novolin N	Human	Intermediate	60 – 120	2 – 8	14 – 24
Detemir	Levemir	Analog	Long	---	Not pronounced	7.6 – 24
Glargine	Lantus	Analog	Long	---	Not pronounced	24
Glargine-fygn	Semglee	Analog	Long	---	Not pronounced	24
Glargine, U-300	Toujeo	Analog	Long	---	Not pronounced	36
Degludec	Tresiba	Analog	Ultra-long	---	Not pronounced	42



*Related to Fiasp only
Levemir discontinued from the U.S. market 12/2024

Adapted from Hirsch IB et al. *Endocrine Reviews* 2020; 41(5):733–755

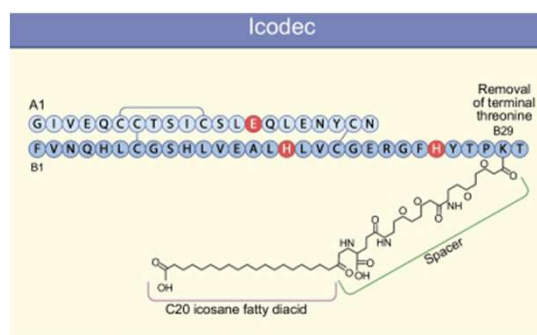
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ONCE WEEKLY INSULINS

INSULIN ICODEC

- Manufactured by Novo Nordisk®
- Ultra-long-acting basal insulin analog
- Three amino-acid substitutions and C20 isocane fatty diacid chain allow for reversible binding to albumin
- Provides molecular stability, minimizes enzymatic breakdown, and reduce receptor-mediated clearance



Trevisan R et al. *Diabetologia* 2024;67(8):1480–1492 Hirsch IB et al. *Endocrine Reviews* 2020; 41(5):733–755 [Open access article distributed under the terms of the Creative Commons CC BY license, which permits unrestricted use]

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INSULIN ICODEC: ONWARDS TRIALS

Trial	Diabetes	Duration	Diabetes	Population	Comparator Group
ONWARDS 1	Open label	78 weeks	Type 2	Insulin-naïve	Insulin glargine U-100
ONWARDS 2	Open label	26 weeks	Type 2	Insulin-treated	Insulin degludec
ONWARDS 3	Double-blind	26 weeks	Type 2	Insulin-naïve	Insulin degludec
ONWARDS 4	Open label	26 weeks	Type 2	Basal-bolus switch	Insulin glargine U-100, insulin lispro
ONWARDS 5	Open label	52 weeks	Type 2	Insulin-naïve	Once daily basal insulins
ONWARDS 6	Open label	52 weeks	Type 1	Insulin-treated	Insulin degludec

ONWARDS 1, Rosenstock J et al. *N Engl J Med* 2023;389:297-308 | ONWARDS 2, Philis-Tsimikas A et al. *Lancet Diabetes Endocrinol* 2023;11(6):414-425 | ONWARDS 3, Lingvay I et al. *JAMA* 2023 Jul 18;330(3):228-237 | ONWARDS 4, Mathieu et al. *The Lancet* 2023; 401(10392):1929 – 1940 | ONWARDS 5, Bajaj HS et al. *Ann Intern Med* 2023;176(11):1476-1485 | ONWARDS 6, Russell-Jones D et al. *The Lancet* 2023; 402(10413):1636 – 1647



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INSULIN ICODEC: ONWARDS TRIALS

Trial	Results (A1c Reduction)	Hypoglycemia
ONWARDS 1	Non-inferiority and superiority vs. insulin glargine U-100	No difference
ONWARDS 2	Non-inferiority and superiority vs. insulin degludec	No difference
ONWARDS 3	Non-inferiority and superiority vs. insulin degludec	No difference
ONWARDS 4	Non-inferiority and superiority vs. insulin glargine U-100	No difference
ONWARDS 5	Non-inferiority and superiority vs. once daily basal insulins	No difference
ONWARDS 6	Non-inferiority vs. insulin degludec (type 1 diabetes)	Higher with insulin icodec

ONWARDS 1, Rosenstock J et al. *N Engl J Med* 2023;389:297-308 | ONWARDS 2, Philis-Tsimikas A et al. *Lancet Diabetes Endocrinol* 2023;11(6):414-425 | ONWARDS 3, Lingvay I et al. *JAMA* 2023 Jul 18;330(3):228-237 | ONWARDS 4, Mathieu et al. *The Lancet* 2023; 401(10392):1929 – 1940 | ONWARDS 5, Bajaj HS et al. *Ann Intern Med* 2023;176(11):1476-1485 | ONWARDS 6, Russell-Jones D et al. *The Lancet* 2023; 402(10413):1636 – 1647



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INSULIN ICODEC [AWIQLI®]

- **Strength:** 700 units/mL
- **Dosing:** 10 to 700 units subQ once weekly
 - Round current basal insulin dose to nearest 10
- **Duration of action:** 196 hours (8.2 days)
- **Onset (peak):** 2 to 4 days
- **Half-life:** 1 week (dose-dependent)
- **Approval:** Switzerland and Canada (March 2024); Europe (May 2024)
 - Rejected by FDA (July 2024) due to hypoglycemia risk in people with type 1 diabetes



Trevisan R et al. *Diabetologia* 2024;67(8):1480–1492 | Awikli Prescribing Information [European Medicines Agency] 2025

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ONCE WEEKLY INSULINS

INSULIN EFSITORA ALFA [BIF]

- Under development by Lilly®
- Ultra-long-acting basal insulin analog
- Homodimer of single-chain insulin molecules fused with Fc region of human IgG2
- Promotes longevity and stability

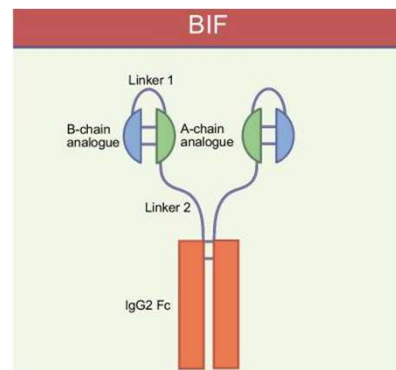


Photo from: Trevisan R et al. *Diabetologia* 2024;67(8):1480–1492



Trevisan R et al. *Diabetologia* 2024;67(8):1480–1492 Hirsch IB et al. *Endocrine Reviews* 2020; 41(5):733–755 [Open access article distributed under the terms of the Creative Commons CC BY license, which permits unrestricted use]

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INSULIN EFSITORA ALFA: QWINT TRIALS

Trial	Diabetes	Duration	Diabetes	Population	Comparator Group
QWINT-1	Open label	52 weeks	Type 2	Insulin-naïve	Insulin glargine U-100
QWINT-2	Open label	52 weeks	Type 2	Insulin-naïve	Insulin degludec
QWINT-3	Open label	78 weeks	Type 2	Basal switch	Insulin degludec
QWINT-4	Open label	26 weeks	Type 2	Basal-bolus	Insulin glargine, insulin lispro
QWINT-5	Open label	52 weeks	Type 1	Basal-bolus	Insulin degludec

**QWINT-2 and 5 published in 2024,
QWINT-1, 3, and 4 published in June 2025**



QWINT-1, Rosenstock J et al. DOI: 10.1056/NEJMoa2502796 | QWINT-2, Wysham C et al. *N Engl J Med* 2024;391:2201-2211 | QWINT-3, Philis-Tsimikas A et al. *The Lancet* 2025; 405(10497):P2279-2289 | QWINT-4, Blevins T et al. *The Lancet* 2025; 405(10497): P2290-2301 | QWINT-5, Bergenstal RM et al. *The Lancet* 2024;404(10458):P1132-1142

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INSULIN EFSITORA ALFA: QWINT TRIALS

Trial	Results (A1c Reduction)	Hypoglycemia
QWINT-1	Non-inferiority vs. insulin glargine	Higher with glargine
QWINT-2	Non-inferiority vs. insulin degludec	No difference
QWINT-3	Non-inferiority vs. insulin degludec	Level 1 alerts higher with efsitora alfa
QWINT-4	Non-inferiority vs. insulin glargine + insulin lispro	Level 1 alerts higher with efsitora alfa
QWINT-5	Non-inferiority vs. insulin degludec (type 1 diabetes)	Higher with insulin efsitora alfa



QWINT-1, Rosenstock J et al. DOI: 10.1056/NEJMoa2502796 | QWINT-2, Wysham C et al. *N Engl J Med* 2024;391:2201-2211 | QWINT-3, Philis-Tsimikas A et al. *The Lancet* 2025; 405(10497):P2279-2289 | QWINT-4, Blevins T et al. *The Lancet* 2025; 405(10497): P2290-2301 | QWINT-5, Bergenstal RM et al. *The Lancet* 2024;404(10458):P1132-1142

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INSULIN EFSITORA ALFA

- **Strength:** 500 units/mL or 1000 units/mL [?]
- **Dosing:** TBD
 - Loading dose, fixed vs. flexible dosing
 - Start at 100 units subQ weekly [?]
- **Half-life:** 17 days
- **Approval:** None

**UNDER
CONSTRUCTION!**

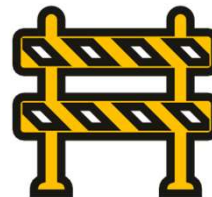


Image from Microsoft PowerPoint 365

Lilly plans to submit efisitora alfa for treatment of type 2 diabetes to global regulatory agencies (E.U., U.S., Japan) by the end of 2025



Trevisan R et al. *Diabetologia* 2024;67(8):1480–1492 |
Leohr et al. *Diabetes* 2025;74(Supplement_1):801-P

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WEEKLY INSULIN CONSIDERATIONS



Potential to change practice:

- Improves glycemic control with BG monitoring
- Reduces injection burden
- Increases adherence
- Improves patient satisfaction

Caution in individuals with:

- High hypoglycemia risk
- Type 1 diabetes
- Advanced kidney disease
- Complex medication, medical history
- Need to prioritize weight loss



Trevisan R et al. *Diabetologia* 2024;67(8):1480–1492

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INSULIN PUMP UPDATES



-  **Beta Bionics: iLet Bionic Pancreas (2023)**
-  **Insulet: Omnipod DASH (2018), **Omnipod 5 (2022; 2024 for T2D)****
-  **Medtronic: MiniMed 630G (2016), MiniMed 770G (2020), MiniMed 780G (2023)**
-  **Tandem: t:slim X2 (2019), **Mobi (2023), rolled out in 2024****
-  **Sequel Med Tech: twiist automated insulin delivery system (2024, roll out 7/7/2025)**



Kesavadev et al. Diabetes Ther 2020 May 14;11(6):1251–1269 | Berget C et al. Diabetes Spectr 2019;32(3):194–204
| Panther Device Comparison Chart <https://www.pantherprogram.org/device-comparison>, Accessed 7/1/2025.

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HYPOGLYCEMIA CLASSIFICATION

-  **Level 1**
 - Glucose <70 mg/dL (<3.9 mmol/L) and ≥54 mg/dL (≥3.0 mmol/L)
-  **Level 2**
 - Glucose <54 mg/dL (<3.0 mmol/L)
-  **Level 3**
 - Severe event characterized by altered mental and/or physical status requiring assistance for treatment, regardless of glucose level



Glycemic Goals and Hypoglycemia: Standards of Care in Diabetes – 2025.
Diabetes Care 2025;48(Supplement_1):S128–S145

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HYPOGLYCEMIA SYMPTOMS

Shaking, trembling	Sweating	Rapid heart rate	Dizziness	Hunger
Fatigue	Nausea	Irritability, anxiety	Headache	Blurry vision
Confusion	Poor coordination	Pallor	Numbness	Seizures



American Diabetes Association: Signs, Symptoms, and Treatment for Hypoglycemia. <https://diabetes.org/living-with-diabetes/hypoglycemia-low-blood-glucose/symptoms-treatment>. Accessed 6/25/2025.

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GLUCAGON FORMULATIONS

Name and Formulation	Device	Route	Dosing	Approval and Storage
Glucagon Emergency Kit Powder for reconstitution	Vial and syringe	IM, SQ	1 mg	- All ages - Keep in orange/red case
Glucagon (Baqsimi®) Nasal glucagon powder	Intranasal device	NAS	3 mg	- Age ≥4 years - Keep in shrink-wrapped tube
Glucagon (Gvoke HypoPen®) Glucagon solution	Autoinjector, prefilled syringe	SQ	0.5 mg, 1 mg	- Age ≥2 years - Keep in foil pouch
Dasiglucagon (Zegalogue®) Dasiglucagon solution	Autoinjector, prefilled syringe	SQ	0.6 mg	- Age ≥6 years - Store in red protective case

May repeat after 15 minutes using new device. Educate patient and caregivers on proper use. Prescribe annually.



Glucagon for Injection Prescribing Information 2025 | Baqsimi Prescribing Information 2025 | Gvoke Prescribing Information 2025 | Zegalogue Prescribing Information 2025

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KNOWLEDGE QUESTION

Amanda is a 26-year-old female with a history of type 1 diabetes. She takes insulin glargine 22 units daily at bedtime and insulin lispro 6 units before meals with correctional insulin 1:50>150. She checks her blood glucose using a glucometer before meals and at bedtime but often holds doses of her basal insulin if her blood sugars are close to the lower limit of normal due to concerns for hypoglycemia. Which of the following is the least favorable recommendation for Amanda?

- A. Change timing of insulin glargine to the morning and add CGM
- B. Change insulin glargine to insulin icodec and add CGM
- C. Change insulin glargine to insulin degludec and continue glucometer use
- D. Change insulin glargine to insulin degludec and add CGM

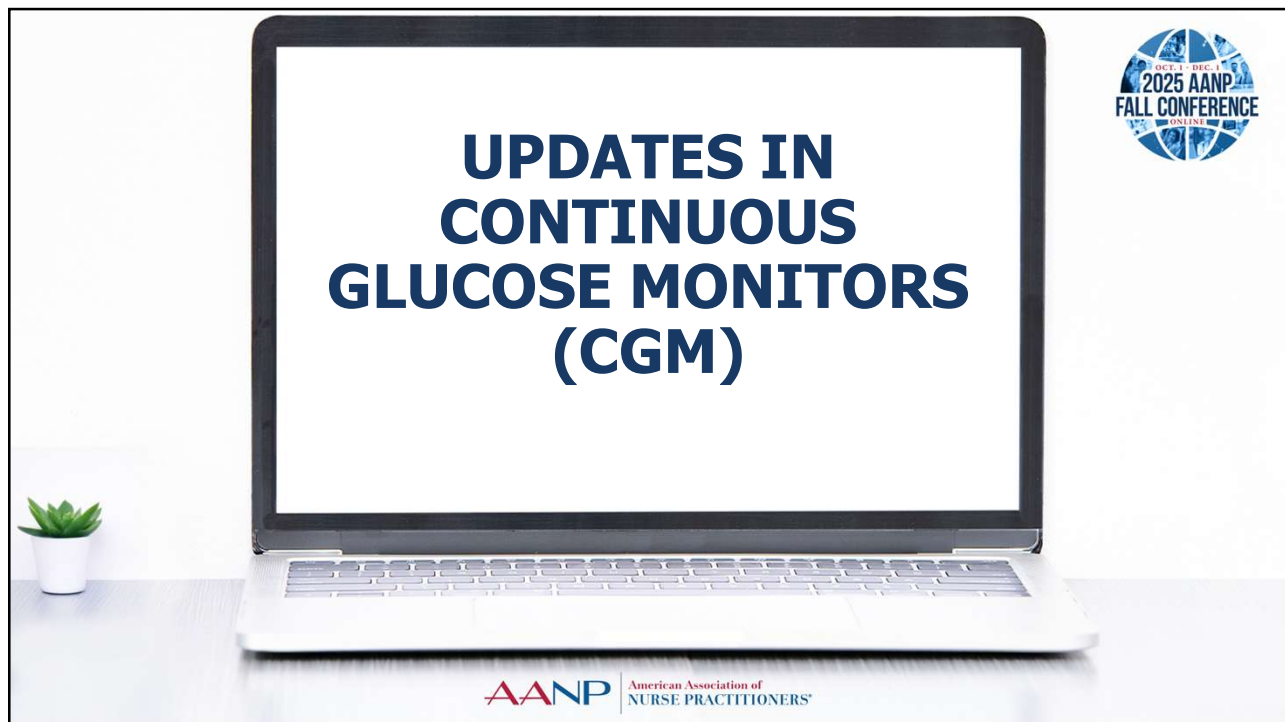


KNOWLEDGE QUESTION

Amanda is a 26-year-old female with a history of type 1 diabetes. She takes insulin glargine 22 units daily at bedtime and insulin lispro 6 units before meals with correctional insulin 1:50>150. She checks her blood glucose using a glucometer before meals and at bedtime but often holds doses of her basal insulin if her blood sugars are close to the lower limit of normal due to concerns for hypoglycemia. Which of the following is the least favorable recommendation for Amanda?

- A. Change timing of insulin glargine to the morning and add CGM
- B. Change insulin glargine to insulin icodec and add CGM
- C. Change insulin glargine to insulin degludec and continue glucometer use
- D. Change insulin glargine to insulin degludec and add CGM





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CONTINUOUS GLUCOSE MONITORS

Disposable, wearable medical device

Measures glucose concentrations continuously via interstitial fluid

Includes sensor, transmitter, and receiver/reader device with intermittently scanned (isCGM) or real-time (rtCGM) data capabilities

Uses predictive modeling (for impending hypo- or hyperglycemia), provides education, early diagnostics, personalized treatment (guides decision making)

Guideline-recommended as standard of care individuals with diabetes



Diabetes Technology: Standards of Care in Diabetes - 2025. *Diabetes Care* 2025;48(Supplement_1):S146–S166 | Blander et al. *Diabetology* 2025, 6(3), 17; <https://doi.org/10.3390/diabetology6030017>



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ABBOTT CGM HISTORY



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ABBOTT CGM: FREESTYLE LIBRE

Features	Libre 2	Libre 2 PLUS	Libre 3	Libre 3 PLUS
Approved Age	≥ 4 years	≥ 2 years	≥ 4 years	≥ 2 years
Site	Back of upper arm	Back of upper arm	Back of upper arm	Back of upper arm
Warm-up period	1 hour	1 hour	1 hour	1 hour
BG readings	Every 1 minute	Every 1 minute	Every 1 minute	Every 1 minute
Sensor Lifespan	14 days	15 days	14 days	15 days
Sensor + Transmitter	Combined	Combined	Combined	Combined
Interactions	Vitamin C > 500 mg daily	Vitamin C > 1000 mg daily	Vitamin C > 500 mg daily	Vitamin C > 1000 mg daily
AID Compatibility	No	Yes	No	Yes



Table excludes FreeStyle Libre 14-day system which is still commercially available

FreeStyle Libre Prescribing Information 2025 | AACE Guide to CGM – CGM Device Comparison,
<https://pro.aace.com/cgm/toolkit/cgm-device-comparison>, Accessed 7/1/2025.

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ABBOTT CGM

Freestyle Libre Apps:

Libre: For patients

LibreView: For HCPs and patients

LibreLinkUp:
For family, friends, and caregivers

Integration:

- **Insulin pumps:** Libre 2 Plus – Omnipod 5, Tandem; Libre 3 Plus – iLet Bionic Pancreas, twiist
- **Health and Lifestyle Management:** WeightWatchers
- **Can be worn during imaging: CT scan, MRI, X-Rays as of 10/30/2024**



FreeStyle Libre Prescribing Information 2025 | AACE Guide to CGM – CGM Device Comparison, <https://pro.aace.com/cgm/toolkit/cgm-device-comparison>, Accessed 7/1/2025.

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DEXCOM CGM HISTORY

2007: Dexcom SEVEN 7-day CGM

2012: Dexcom G4 PLATINUM

2016: Dexcom G5

2018: Dexcom G6, 10-day rtCGM

2022: Dexcom G7 rtCGM

2024: Dexcom Stelo (OTC)



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DEXCOM CGM: G6 AND G7

Features	Dexcom G6	Dexcom G7
Approved Age	≥ 2 years	≥ 2 years
Site	Abdomen (all); upper buttocks (ages 2 - 17 years)	Back of upper arm (all); upper buttocks (ages 2 - 6 years)
Warm-up period	2 hours	30 minutes
BG readings	Every 5 minutes	Every 5 minutes
Sensor Lifespan	10-days	10-days with 12-hour grace period 15-day wear coming soon!
Sensor + Transmitter	Separate	Combined
Interactions	Hydroxyurea, acetaminophen >1 g every 6 hours	Hydroxyurea, acetaminophen >1 g every 6 hours
AID Compatibility	Yes	Yes



Dexcom CGM Prescribing Information 2025 | AACE Guide to CGM – CGM Device Comparison, <https://pro.aace.com/cgm/toolkit/cgm-device-comparison>, Accessed 7/1/2025.

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DEXCOM CGM

Dexcom Apps:

G6 and G7: For patients

Clarity: For healthcare providers and patients

Follow: For Friends, family, and caregivers

Integration:

- **Insulin pumps:** iLet Bionic Pancreas, Omnipod 5, Tandem Mobi and t:slimX2
- **Smartpens:** Medtronic Inpen, Lilly Tempo
- **Health and Lifestyle Management:** Apple Health, Google Health, Garmin, Happy Bob, Glooko, Sugarmate, etc.

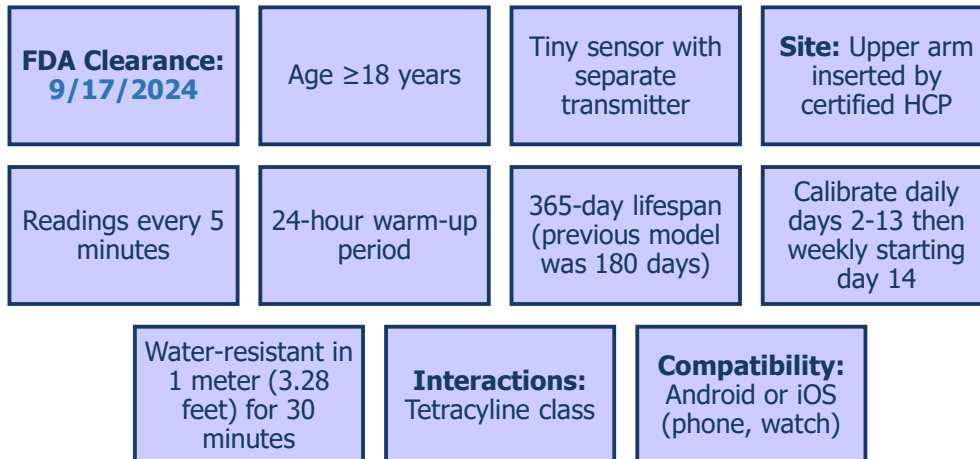


Dexcom CGM Prescribing Information 2025 | AACE Guide to CGM – CGM Device Comparison, <https://pro.aace.com/cgm/toolkit/cgm-device-comparison>, Accessed 7/1/2025.

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EVERSENSE® 365

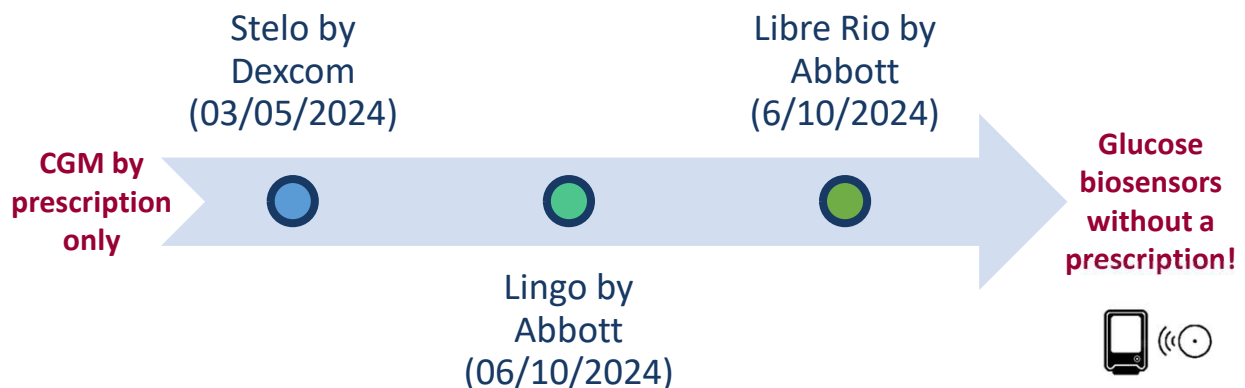


Eversense 365 Prescribing Information 2025 | AACE Guide to CGM – CGM Device Comparison, <https://pro.aace.com/cgm/toolkit/cgm-device-comparison>, Accessed 7/1/2025.

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OVER-THE-COUNTER BIOSENSORS



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STELO



- **Approval:** Age $\geq$ 18 years on back of upper arm
- **Ideal for:** Type 2 diabetes not on insulin, prediabetes, individuals interested in glucose-related health insights
 - Avoid if on insulin, dialysis, or with problematic hypoglycemia
- **Features:**
 - 15-day lifespan with 30-minute warm-up period, 12-hour grace period at end of session, waterproof up to 8 feet (2.4 meters), data every 15 minutes
 - Alert-free, data-sharing, personalized insights tailored to individual needs
 - Compatibility: Android, iOS, Oura Ring



stelo.com, Accessed 7/1/2025. | AACE Guide to CGM – CGM Device Comparison, <https://pro.aace.com/cgm/toolkit/cgm-device-comparison>, Accessed 7/1/2025.

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LINGO



- **Approval:** Age $\geq$ 18 years on back of upper arm
- **Ideal for:** General health and wellness
 - Avoid use with diabetes
- **Features:**
 - 14-day biosensor, minute-by-minute data, water resistant up to 3 feet for 30 minutes
 - Alert free, personalized insights, individualized coaching; uses Lingo app with no data sharing
 - Compatible with iOS phone only



hellolingo.com, Accessed 7/1/2025. | AACE Guide to CGM – CGM Device Comparison, <https://pro.aace.com/cgm/toolkit/cgm-device-comparison>, Accessed 7/1/2025.

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LIBRE RIO

- **Approval:** Age $\geq$ 18 years on back of upper arm
- **Ideal for:** Type 2 diabetes not in insulin
 - Avoid if on dialysis, using implanted medical devices (pacemakers), or if critically ill
- **Features:**
 - 15-day biosensor, minute-by-minute data, 1-hour warm-up period, water resistant
 - Alert free, uses Libre Rio app with data access in LibreView
- **Unavailable in the U.S. market**



Freestyle Libre Rio Materials (from Abbott Medical Affairs) 2025 <https://www.abbott.com/corpnewsroom/strategy-and-strength/abbott-enters-us-consumer-biowearables-market-with-lingo-and-libre-rio.html>, Accessed 7/1/2025

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OVER-THE-COUNTER BIOSENSORS

Lingo

Stelo

Available
online: 5% off
first purchase

\$49 for 1
sensor or \$89
for 2 sensors
(one-time
shipment)

\$249 for 6
sensors
(subscription)

Available
online and on
Amazon (soon
at local
pharmacies)

\$99 for 2
sensors (one-
time
shipment)

\$89 for 2
sensors or
\$252 for 6
sensors
(subscription)



hellolingo.com, Accessed 7/1/2025. | stelo.com, Accessed 7/1/2025.

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FUTURE DIRECTIONS

Dual Glucose Ketone Sensor

- Under development
- Intended to detect ketones early to avoid diabetic ketoacidosis
- Planned integration with automated insulin delivery systems



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KNOWLEDGE QUESTION

Macy is a 37-year-old female with a history of type 2 diabetes. She takes metformin 1000 mg BID, insulin degludec 25 units every morning, and semaglutide 1 mg weekly. She is interested in CGM but prefers a system that offers a long lifespan. Which of the following CGM systems is best for Macy?

- A) Dexcom
- B) Freestyle Libre
- C) OTC biosensors (Lingo, Stelo)
- D) Eversense



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KNOWLEDGE QUESTION

Macy is a 37-year-old female with a history of type 2 diabetes. She takes metformin 1000 mg BID, insulin degludec 25 units every morning, and semaglutide 1 mg weekly. She is interested in CGM but prefers a system that offers a long lifespan. Which of the following CGM systems is best for Macy?

- A) Dexcom
- B) Freestyle Libre
- C) OTC biosensors (Lingo, Stelo)
- D) Eversense



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UPDATES TO AMERICAN DIABETES ASSOCIATION PRESCRIBING GUIDELINES



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KNOWLEDGE QUESTION

- Which of the following represents new guidance from the American Diabetes Association about medication prescribing for patients with diabetes?
 - A. All patients should have HbA1c levels <7%
 - B. All patients should be on metformin and a GLP-1 RA as first-line therapy
 - C. GLP-1 RA and SGLT-2 medications should be considered for cardiorenal risk reduction, regardless of A1c levels
 - D. Metformin should be discontinued in patients with a GFR <60



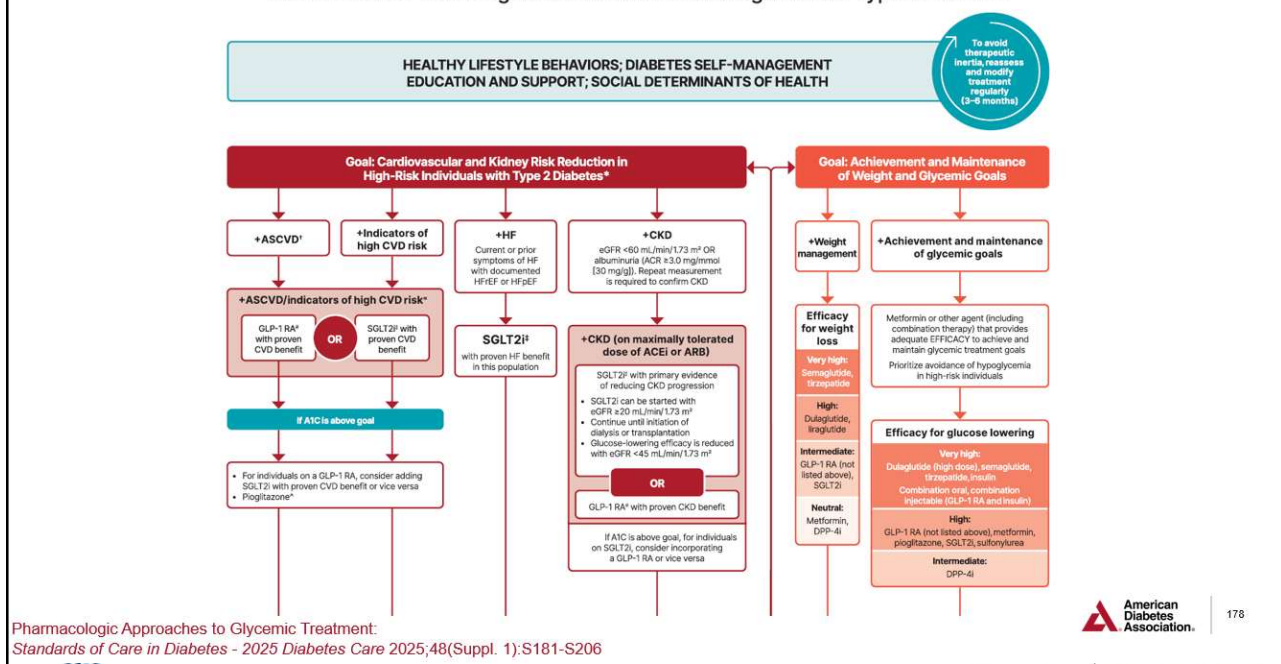
KNOWLEDGE QUESTION

- Which of the following represents new guidance from the American Diabetes Association about medication prescribing for patients with diabetes?
 - A. All patients should have HbA1c levels <7%
 - B. All patients should be on metformin and a GLP-1 RA as first-line therapy
 - C. GLP-1 RA and SGLT-2 medications should be considered for cardiorenal risk reduction, regardless of A1c levels
 - D. Metformin should be discontinued in patients with a GFR <60



9. Pharmacologic Approaches to Glycemic Treatment

Use of Glucose-Lowering Medications in the Management of Type 2 Diabetes



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SUMMARY OF RECENT MAJOR STANDARDS PRESCRIBING CHANGES

- Metformin no longer ideal first line therapy
- Use agents with proven cardiovascular/cardiorenal protection **despite A1c levels**
- Consider an obesity-centered management plan
- Avoid hypoglycemia



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9. Pharmacologic Approaches to Glycemic Treatment

Table 9.2—Features of medications for lowering glucose in type 2 diabetes

Medication (route of administration)	Glucose-lowering efficacy ^a	Hypoglycemia risk	Weight effects ^a	CV effects		Kidney effects		MASH effects	Clinical considerations and adverse effects
				Effect on MACE	Effect on HF	Progression of CKD	Dosing/use considerations ^a		
Metformin (oral)	High	No	Neutral (potential for modest loss)	Potential benefit	Neutral	Neutral	Contraindicated with eGFR <30 mL/min/1.73 m²	Neutral	- GI side effects: mitigate with slow dose titration, extended-release formulations, and administration with food. - Potential for vitamin B12 deficiency: monitor and replete as appropriate.
SGLT2 inhibitors (oral)	Intermediate to high	No	Loss (intermediate)	Benefit: canagliflozin, empagliflozin	Benefit: canagliflozin, dapagliflozin, empagliflozin, ertugliflozin	Benefit: canagliflozin, dapagliflozin, empagliflozin	- See labels of individual agents for dosage considerations for kidney function - Glucose-lowering effect is minimal at eGFR <45 mL/min/1.73 m² and lower; continue for cardiovascular and kidney benefit until dialysis or transplantation	Unknown	- DKA risk in individuals with insulin deficiency (rare in T2D): discontinue, evaluate, and treat promptly if suspected; be aware of predisposing risk factors and clinical presentations (including euglycemic DKA); mitigate risk with sick-day planning; discontinue before scheduled surgery (e.g., 3–4 days), during critical illness, or during prolonged fasting. - Genital mycotic infections: mitigate risk with genital hygiene and avoid use in high-risk individuals. - Necrotizing fasciitis of the perineum (Fournier gangrene): rare; prompt treatment if suspected. - Intravascular volume depletion: attention to volume status and blood pressure, particularly when ill or fasting; adjust other volume-contracting agents as applicable; monitor kidney function upon initiation.

Pharmacologic Approaches to Glycemic Treatment:

Standards of Care in Diabetes - 2025 Diabetes Care 2025;48(Suppl. 1):S181-S206



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9. Pharmacologic Approaches to Glycemic Treatment

Table 9.2 (continued)

GLP-1 RAs (SQ; semaglutide also available in oral formulation)	High to very high	No	Loss (intermediate to very high)	Benefit: dulaglutide, liraglutide, semaglutide (SQ)	Neutral	Benefit for renal end points in CVOTs, driven by albuminuria outcomes: dulaglutide, liraglutide, semaglutide (SQ)	- See labels of individual agents for dosage considerations for kidney function - No dose adjustment for dulaglutide, liraglutide, or semaglutide - Monitor kidney function when initiating or escalating doses in individuals with kidney impairment reporting severe adverse GI reactions	Potential benefit	- Thyroid C-cell tumors identified in rodents; human relevance not determined. - Ileus: risk level is not well established; provide guidance on discontinuation prior to surgical procedures. - Pancreatitis: acute pancreatitis has been reported, but causality has not been established. Do not initiate if at high risk for pancreatitis, and discontinue if pancreatitis is suspected. - Biliary disease: evaluate for gallbladder disease if cholelithiasis or cholecystitis is suspected; avoid use in at-risk individuals. - Diabetic retinopathy: close monitoring of retinopathy in those at high risk (older individuals and those with longer duration of T2D [≥10 years]). - Impact on drug absorption: orally administered drug absorption may be impaired during dose titration (including of oral contraceptives).
				Neutral: exenatide once weekly, lixisenatide		Demonstrated benefit for progression of CKD for semaglutide (SQ)			
Dual GIP and GLP-1 RA (SQ)	Very high	No	Loss (very high)	Under investigation	Under investigation	Under investigation	- See labels of individual agents for dosage considerations for kidney function - No dose adjustment - Monitor kidney function when initiating or escalating doses in individuals with kidney impairment reporting severe adverse GI reactions	Potential benefit	GI side effects: counsel on potential for GI side effects; provide guidance on dietary modifications to mitigate GI side effects (reduction in meal size, mindful eating practices [e.g. stop eating once full], decreasing intake of high-fat or spicy food); consider slower dose titration for those experiencing GI challenges. Not recommended for individuals with gastroparesis.
DPP-4 inhibitors (oral)	Intermediate	No	Neutral	Neutral	Neutral (potential risk: saxagliptin)	Neutral	- Dose adjustment required based on kidney function (saxagliptin, saxagliptin, alogliptin) - No dose adjustment required for linagliptin	Unknown	- Pancreatitis has been reported, but causality has not been established. Discontinue if pancreatitis is suspected. - Postmarketing concerns about joint pain (consider discontinuing if debilitating and other treatment options are feasible) and bullous pemphigoid (discontinue if suspected).

Pharmacologic Approaches to Glycemic Treatment:

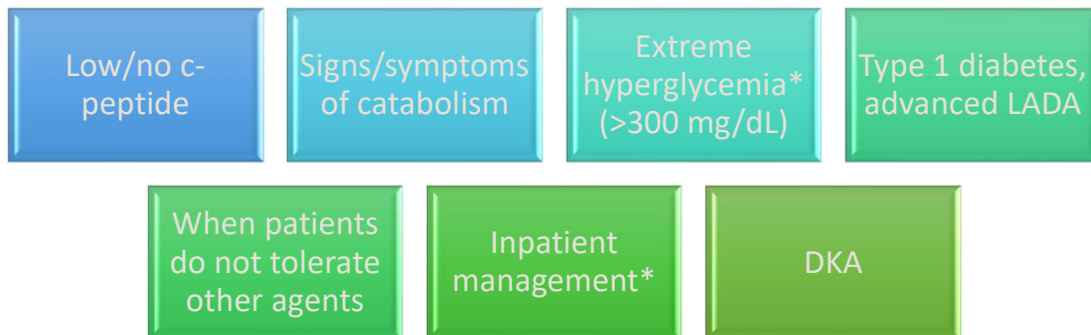
Standards of Care in Diabetes - 2025 Diabetes Care 2025;48(Suppl. 1):S181-S206



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IN THE GLP1 ERA, WHEN IS INSULIN DEFINITELY NEEDED?



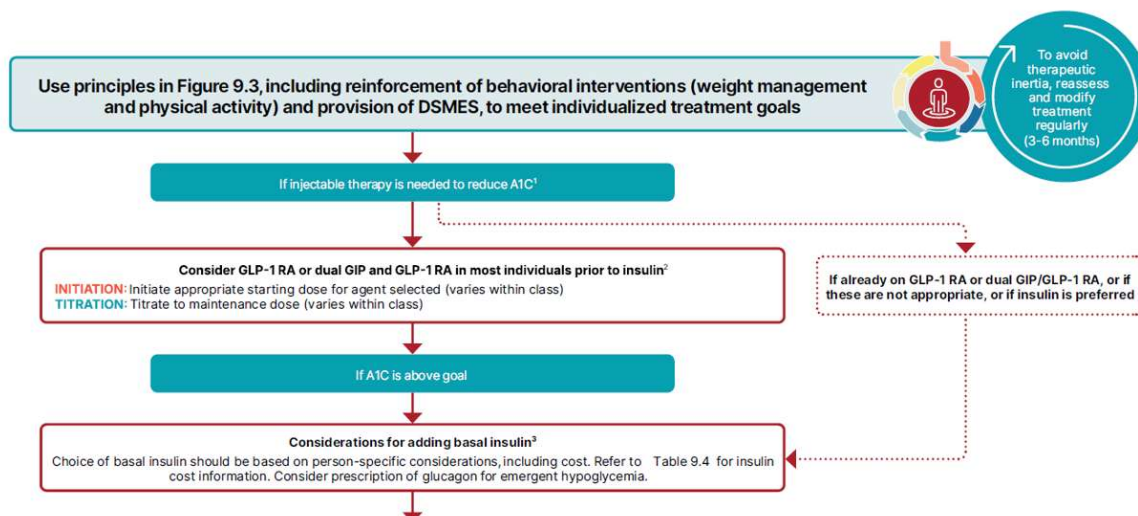
*Situation dependent



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9. Pharmacologic Approaches to Glycemic Treatment

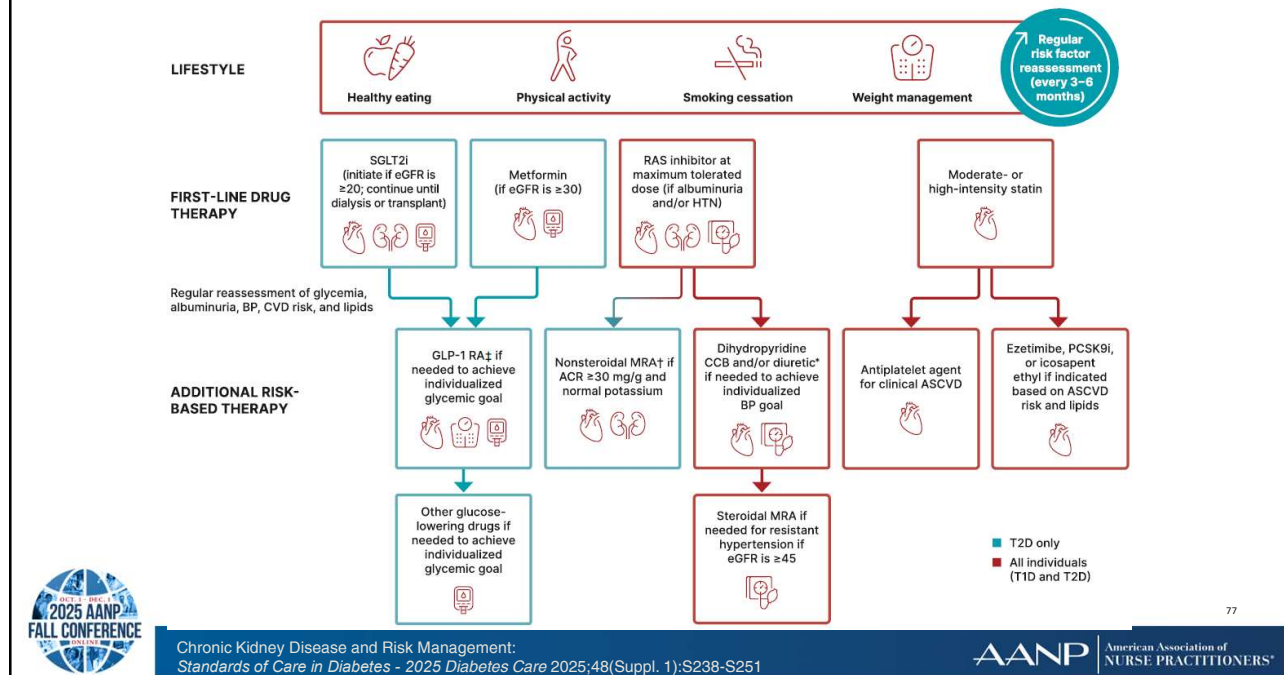


Pharmacologic Approaches to Glycemic Treatment:
 Standards of Care in Diabetes - 2025 Diabetes Care 2025;48(Suppl. 1):S181-S206

American Diabetes Association 184

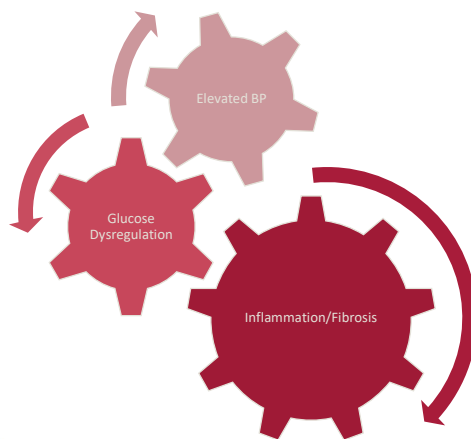
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11. Chronic Kidney Disease and Risk Management



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FOCUS ON RENAL OUTCOMES: FINERENONE



What are the key drivers of cardiovascular and renal risk?

Inflammation/Fibrosis mediated by mineralocorticoid (MR) overactivation?



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FINERENONE (KERENDIA)

- Selectively blocks MR overactivation in the heart and kidneys
 - Compared to older MR agents like spironolactone
 - No affinity for androgen, progesterone, estrogen or glucocorticoid receptors
- Now considered standard of care, along with ACE/ARB and SGLT2
- Use on patients with persistent microalbuminuria (>30mg/dL)
- Clinical trial data: 18% relative risk reduction for renal events/renal progression
- Decreased hospitalizations for heart failure by 29%, CV death by 10%



Filippatos, G., Anker, S. D., Agarwal, R., Pitt, B., Ruilope, L. M., Rossing, P., ... & FIDELIO-DKD Investigators. (2021). Finerenone and cardiovascular outcomes in patients with chronic kidney disease and type 2 diabetes. *Circulation*, 143(6), 540-552.

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FINERENONE (KERENDIA)

GFR > 60: 20 mg starting dose

GFR 25- 60: 10 mg starting dose

GFR <25: 5 mg starting dose

Check potassium
after 4 weeks, dose
adjustment if
needed



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FINERENONE (KERENDIA)

Hyperkalemia (14% vs.
7%)

Hypotension (5% vs 4%)

Hyponatremia (1% vs <1%)



Filippatos, G., Anker, S. D., Agarwal, R., Pitt, B., Ruilope, L. M., Rossing, P., ... & FIDELIO-DKD Investigators. (2021). Finerenone and cardiovascular outcomes in patients with chronic kidney disease and type 2 diabetes. *Circulation*, 143(6), 540-552.

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GLP-1 UPDATES



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WEIGHT OR DIABETES? OR BOTH?

Weight Loss Version

- Semaglutide (Wegovy)
- Tirzepatide (Zepbound)
- Liraglutide (Saxenda)

Diabetes Version

- Semaglutide (Ozempic, Rybelsus)
- Tirzepatide (Mounjaro)
- Liraglutide (Victoza)
- Dulaglutide (Trulicity)



Image from Microsoft PowerPoint 365



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IMPORTANT UPDATES

- Tirzepatide approved to treat OSA
 - In patients with moderate OSA, reduced apneic events by 20-24 events per hour compared to placebo (baseline was AHI 51/hour)
- Semaglutide approved in adults with DM and CKD to reduce GFR decline, end stage renal disease and CV death
- Cash pay options now available through Lilly and Novo direct
 - Semaglutide: \$499/mo
 - Tirzepatide: \$349 (2.5 mg), then \$499/mo
- Liraglutide now generic (\$380/month)
- Access/coverage improving
- Exciting studies on the horizon: substance abuse disorders, arthritis, Alzheimers, PCOS, a-fib



Malhotra, A., Grunstein, R. R., Fietze, I., Weaver, T. E., Redline, S., Azarbarzin, A., ... & Bednarek, J. (2024). Tirzepatide for the treatment of obstructive sleep apnea and obesity. *New England Journal of Medicine*, 391(13), 1193-1205.

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COMPOUNDED GLP-1

- Shortage started in 2022
- FDA allows for compounded medications in shortage
- Late 2024 (tirzepatide) and early 2025 (semaglutide) the shortages were resolved



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COMPOUNDED GLP-1 PRODUCTS- WHY YOU STILL MIGHT SEE THEM

1. Pharmacies were given a grace period (ended May 2025)
2. Some HCP are using a workaround such as microdosing
3. Some compounded versions contain extra ingredients to make them different than original (B12, vitamins)
4. Shortages can wax and wane



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FUTURE GUIDANCE FOR COMPOUNDED PRODUCTS

- Statement released in Feb 2025 by the ADA

Should require a valid prescription

Pharmacy should be licensed by state board

Licensed pharmacist on staff to answer questions

"Too good to be true" probably is

Should have clear instructions, expiration date, appear intact



Neumiller, J. J., Bajaj, M., Bannuru, R. R., McCoy, R. G., Pekas, E. J., Segal, A. R., & ElSayed, N. A. (2025). Compounded GLP-1 and dual GIP/GLP-1 receptor agonists: a statement from the American Diabetes Association. *Diabetes Care*, 48(2), 177-181.

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FUTURE GUIDANCE FOR COMPOUNDED PRODUCTS

- Statement released in Feb 2025 by the ADA
- Verify that the compounding pharmacy is registered with the FDA (503B compounding facilities) or licensed with an applicable state board of pharmacy (503A compounding facilities).
- <https://www.fda.gov/drugs/humandrug-compounding/registeredoutsourcing-facilities>
- <https://www.fda.gov/drugs/besaferx-your-sourceonline-pharmacy-information/locatestate-licensed-online-pharmacy>



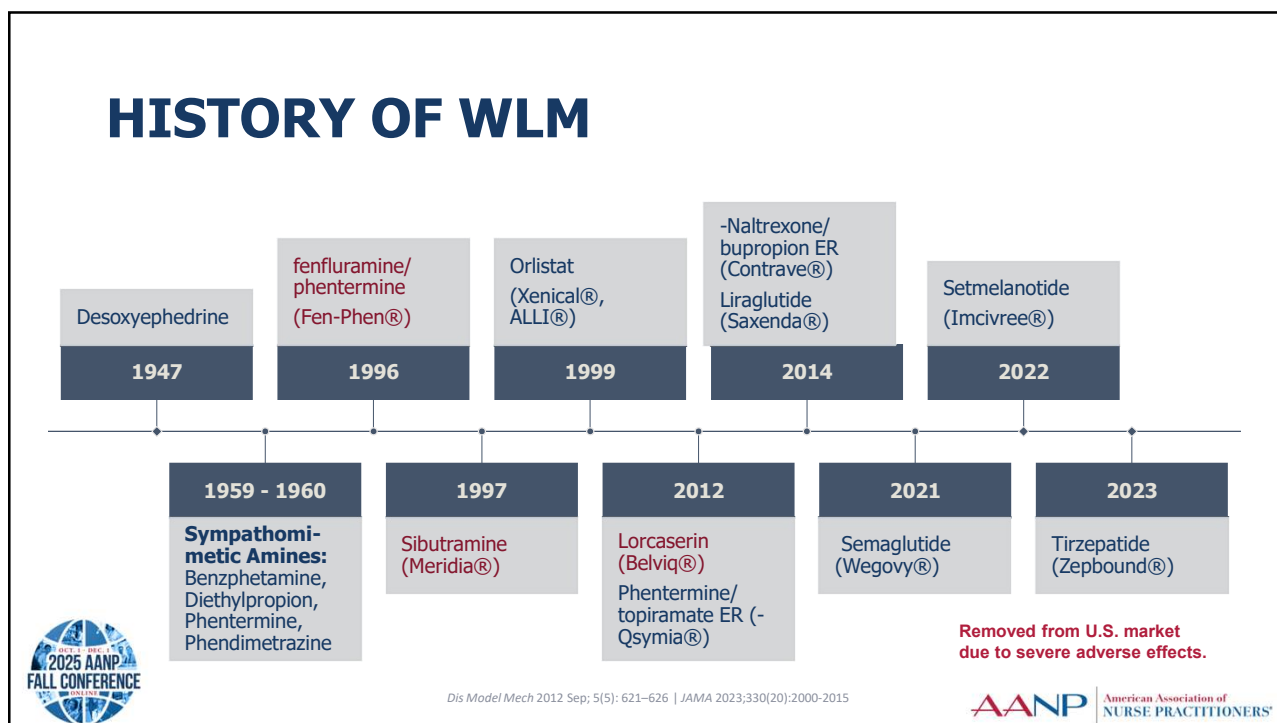
Neumiller, J. J., Bajaj, M., Bannuru, R. R., McCoy, R. G., Pekas, E. J., Segal, A. R., & ElSayed, N. A. (2025). Compounded GLP-1 and dual GIP/GLP-1 receptor agonists: a statement from the American Diabetes Association. *Diabetes Care*, 48(2), 177-181.

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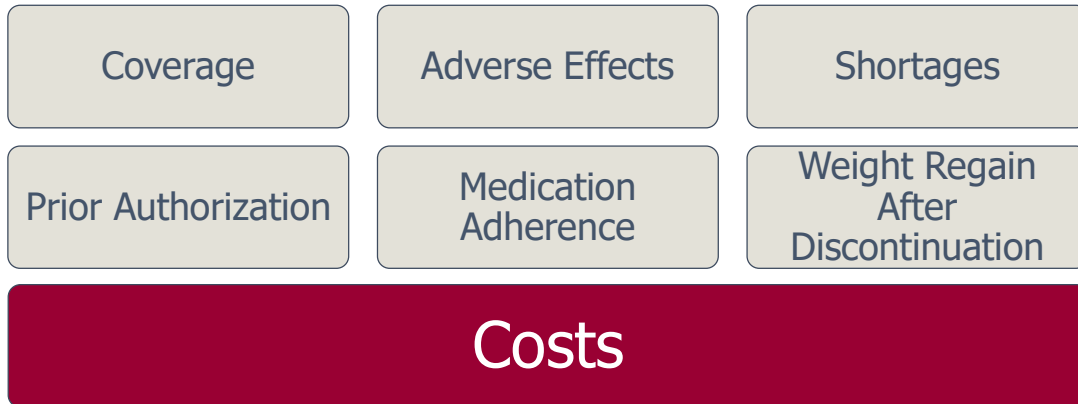


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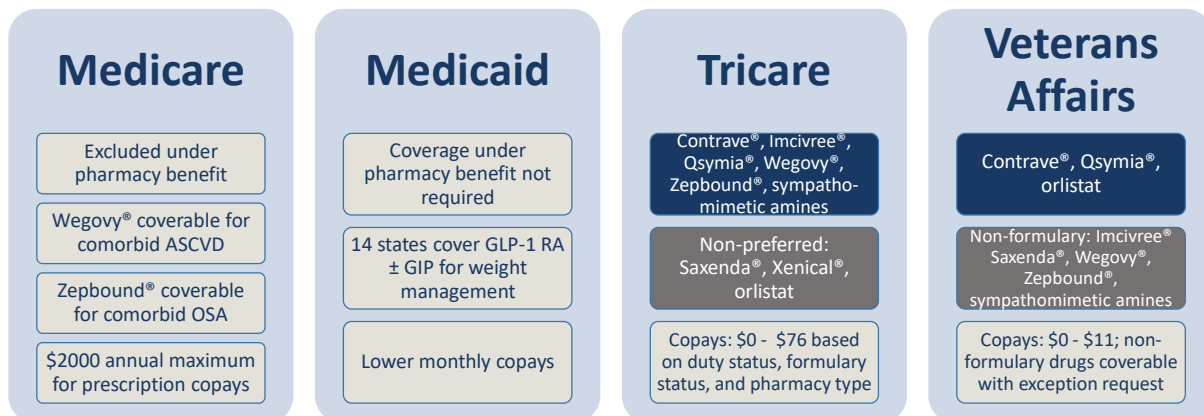
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BARRIERS TO WLM



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WLM COVERAGE BY PAYER



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WLM COVERAGE BY PAYER

• Commercial, private insurance

- Variable coverage, deductibles, out-of-pocket maximums, copays
- Employer-sponsored plans >>> Marketplace Exchange plans

• Uninsured and self-pay

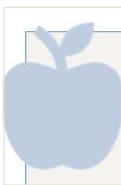
- Direct-to-consumer programs and pharmacies
- Manufacturer based programs
- Discount cards (GoodRx)
- Pharmacies with competitive pricing (Amazon Pharmacy, Cost Plus Drug Company)



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SYMPATHOMIMETIC AMINES



Benzphetamine

- 25 – 50 mg PO daily, max: 50 mg TID
- **AWP:** \$38 - \$1,070 per month



Diethylpropion

- **IR:** 25 mg PO TID, 1 hr. before meal
- **ER:** 75 mg PO daily
- **AWP:** \$47 - \$94 (IR) to \$180 (ER) per month



Phendimetrazine

- **IR:** 17.5 to 35 mg PO BID, or TID 1 hr. before meal, max: 70 mg TID
- **ER:** 105 mg PO daily
- **AWP:** \$36 - \$65 (IR) to \$119 (ER) per month



Phentermine

- **IR:** 8 mg PO BID 30 min. before meal
- **ER:** 15 to 37.5 mg PO daily
- **AWP:** \$6 - \$48 (ER) to \$70 (IR) per month



Access and Affordability: Amazon Pharmacy, GoodRx

Approved for short-term use ≤12 weeks.

Benzphetamine Prescribing Information | Diethylpropion Prescribing Information | Phendimetrazine Prescribing Information | Phentermine Prescribing Information | UpToDate Lexidrug/Wolters-Kluwer

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ORLISTAT [ALLI®, XENICAL®]



- **MOA:** Lipase inhibitor
- **Target dose:** 60 mg (OTC) or 120 mg (Rx) PO three times daily within 1 hour of fat-containing meal
- **AWP:** \$53 (OTC) to \$781 (Rx) per month
- **Access and Affordability:** Amazon Pharmacy - \$148 (brand Rx), \$209 (generic Rx)



Orlistat Prescribing Information 2025 | myalli.com, Accessed 7/1/2025 |
Pricing: US – UpToDate LexiDrug/Wolters-Kluwer

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NALTREXONE/BUPROPION [CONTRAVE®]

- **MOA:** Opioid antagonist + dopamine/norepinephrine reuptake inhibitor
- **Target Dose:** 8/90 mg, 2 tablets PO BID (titrate weekly, taper if stopped)
 - 8/90 mg daily → 8/90 mg BID → 16/180 mg qAM + 8/90 mg qPM → 16/180 mg BID
- **AWP:** \$750 per month
- **Access and Affordability:** \$20 per month for commercial insurance with coverage, \$199 per month for commercial insurance without coverage, **\$99 per month via CurxAccess® Program**



Contrave Prescribing Information 2025 |
Pricing: US – UpToDate LexiDrug/Wolters-Kluwer

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PHENTERMINE/TOPIRAMATE [QSYMIA®]

- **MOA:** Sympathomimetic amine/CNS stimulant + GABA receptor agonist
- **Target Dose:** 15/92 mg PO once daily every morning (taper if stopped)
 - 3.75/23 mg (2 weeks) → 7.5/46 mg (12 weeks) → 11.25/69 mg (2 weeks) → 15/92 mg
- **AWP:** \$270 per month
- **Access and Affordability:** \$70 per month for commercial insurance with coverage, \$75 off for commercial insurance without coverage, **\$98 per month via Qsymia® Home Delivery Pharmacy**



Qsymia Prescribing Information 2025 |
Pricing: US – UpToDate LexiDrug/Wolters-Kluwer

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GLP-1 RA ± GIP

	Liraglutide [Saxenda®]	Semaglutide [Wegovy®]	Tirzepatide [Zepbound®]
MOA	GLP- 1 RA	GLP-1 RA	GLP-1 RA ± GIP
Doses	0.6 mg, 1.2 mg, 1.8 mg, 2.4 mg, 3 mg	0.25 mg, 0.5 mg, 1 mg, 1.7 mg, 2.4 mg	2.5 mg, 5 mg, 7.5 mg, 10 mg, 12.5 mg, 15 mg
Frequency	Daily	Weekly	Weekly
AWP	\$1619 per month	\$1619 per month	\$1304 per month
Copay Card	None	Autoinjectors: \$0 per month for commercial payers with coverage)	Autoinjectors: \$0 per month for commercial payers with coverage; \$650 per month for commercial payers without coverage
Cash Pay Program	None	Autoinjectors: \$499 per month via savings card or Novocare® Pharmacy	Vials: \$349 (2.5 mg) or \$499 (5, 7.5, 10, 12.5, and 15 mg) via LillyDirect® Pharmacy



Saxenda Prescribing Information 2025 | Wegovy Prescribing Information 2025 | Zepbound Prescribing Information 2025 | Pricing: US – UpToDate LexiDrug/Wolters-Kluwer | wegovy.com, Accessed 7/1/2025. | Zepbound.lilly.com, Accessed 7/1/2025. AANP | American Association of
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SETMELANOTIDE [IMCIVREE®]

- **MOA:** Melanocortin-4 receptor (MC4R) agonist
- **Indication:** Obesity due to genetic pre-disposition confirmed by testing
 - Bardet-Beidl Syndrome; POMC, PCK1, or LEPR deficiency
- **Target dose:** 3 mg SUBQ daily
- **AWP:** \$39,319 per month
- **Access and Affordability:** Rhythm InTune Financial Assistance Program (for eligible patients)



Imcivree Prescribing Information 2025 | imcivree.com, Accessed 7/1/2025. |
Pricing: US – UpToDate LexiDrug/Wolters-Kluwer

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OFF-LABEL THERAPIES

Bupropion SR

- 100 – 300 mg PO daily (in divided doses)
- \$8/month*

Naltrexone

- 25 mg PO daily or twice daily
- Adjunct only
- \$34/month**

Topiramate

- 25 – 100 mg PO daily
- \$8/month*

Metformin ER

- 500 – 2000 mg PO daily
- \$4/month*

*Walmart \$4 list
**Cost Plus Drug Company

GLP-1 RA ± GIP approved for type 2 diabetes;
SGLT2i if indicated



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MICRODOSING OZEMPIC®

- Consider for cash payers to extend the life of Ozempic pen
- Reduces costs, improves access when GLP-1 RA not covered by insurance
- All doses should be administered SQ weekly and determined at discretion of provider
- Manufacturer recommends beyond use date of 56 days



Kome et al. Diabetes Care 2025;48(3):e25–e27. As the Author of this content, I retain the right to re-use the final version (or parts thereof) in any new publication you are authoring, co-authoring or editing (excluding journal articles) where the re-used material constitutes less than half of the total material in the publication.

Microdosing Instructions for Semaglutide-MDP

Semaglutide-MDP 0.25/0.5 mg	Number of Clicks	Dosing
0.06 mg	9 clicks	Once weekly *** weeks
0.13 mg	18 clicks	Once weekly *** weeks
0.25 mg	36 clicks	Once weekly *** weeks
0.29 mg	42 clicks	Once weekly *** weeks
0.33 mg	48 clicks	Once weekly *** weeks
0.38 mg	54 clicks	Once weekly *** weeks
0.42 mg	60 clicks	Once weekly *** weeks
0.46 mg	66 clicks	Once weekly *** weeks
0.5 mg	72 clicks	Once weekly *** weeks

Semaglutide-MDP 1 mg	Number of Clicks	Dosing
0.13 mg	9 clicks	Once weekly *** weeks
0.25 mg	18 clicks	Once weekly *** weeks
0.5 mg	36 clicks	Once weekly *** weeks
0.58 mg	42 clicks	Once weekly *** weeks
0.67 mg	48 clicks	Once weekly *** weeks
0.75 mg	54 clicks	Once weekly *** weeks
0.83 mg	60 clicks	Once weekly *** weeks
0.92 mg	66 clicks	Once weekly *** weeks
1 mg	72 clicks	Once weekly *** weeks

Semaglutide-MDP 2 mg	Number of Clicks	Dosing
0.25 mg	9 clicks	Once weekly *** weeks
0.5 mg	18 clicks	Once weekly *** weeks
1 mg	36 clicks	Once weekly *** weeks
1.17 mg	42 clicks	Once weekly *** weeks
1.33 mg	48 clicks	Once weekly *** weeks
1.5 mg	54 clicks	Once weekly *** weeks
1.67 mg	60 clicks	Once weekly *** weeks
1.83 mg	66 clicks	Once weekly *** weeks
2 mg	72 clicks	Once weekly *** weeks

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SUMMARY

- Newer dosage forms of testosterone replacement for men with hypogonadism exist
- Once weekly insulins have not been approved in the US market, but are used internationally for the treatment of type 2 diabetes
- CGM systems continue to evolve, with glucose biosensors now available without a prescription
- The ADA guidelines now recommend GLP-1 RA, SGLT2i and ns-MRA to reduce cardio-kidney-metabolic risk in people with CKD and type 2 diabetes
- Multiple methods exists to reduce costs and improved access of weight loss medications, including GLP-1 RA therapies



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REFERENCES- IN ORDER

- Sellke, N., Omil-Lima, D., Sun, H. H., Tay, K., Rhodes, S., Loeb, A., & Thirumavalavan, N. (2024). Trends in testosterone prescription during the release of society guidelines. *International journal of impotence research*, 36(4), 380-384.
- Baillargeon, Jacques et al. (2015). Risk of Venous Thromboembolism in Men Receiving Testosterone Therapy. *Mayo Clinic Proceedings*, 90(8), 1038 – 1045.
- Morgentaler, Abraham et al. (2015). Testosterone Therapy and Cardiovascular Risk: Advances and Controversies. *Mayo Clinic Proceedings*, Volume 90, Issue 2, 224 – 251.
- Sharma, Rishi et al. (2016). Association Between Testosterone Replacement Therapy and the Incidence of DVT and Pulmonary Embolism. *CHEST*, 150 (3), 563 – 571.
- Wechsler, M. E., Ford, L. B., Maspero, J. F., Pavord, I. D., Papi, A., Bourdin, A., ... & Hardin, M. (2022). Long-term safety and efficacy of dupilumab in patients with moderate-to-severe asthma (TRaverse): an open-label extension study. *The Lancet Respiratory Medicine*, 10(1), 11-25.
- Dandona, P. & Rosenberg, M.T. (2010). A practical guide to male hypogonadism in the primary care setting. *The International Journal of Clinical Practice*, 64(6), 682-696.
- Qaseem, A., Horwitch, C. A., Vijan, S., Etzeandia-Ikobaltzeta, I., Kansagara, D., & Clinical Guidelines Committee of the American College of Physicians*. (2020). Testosterone treatment in adult men with age-related low testosterone: a clinical guideline from the American College of Physicians. *Annals of internal medicine*, 172(2), 126-133.
- Figueiredo, M. G., Gagliano-Jucá, T., & Basaria, S. (2022). Testosterone therapy with subcutaneous injections: a safe, practical, and reasonable option. *The Journal of Clinical Endocrinology & Metabolism*, 107(3), 614-626.



103

- ANI Pharmaceuticals. (2025). Xyosted health care provider reference.
- Clarus Therapeutics. (2025). Jatenzo health care professional resources.
- Hirsch, I. B., Juneja, R., Beals, J. M., Antal, C. J., & Wright, E. E. (2020). The evolution of insulin delivery devices: A historical perspective and review of key components. *Endocrine Reviews*, 41(5), 733–755. <https://doi.org/10.1210/edrv/bnaa009>
- Trevisan, R., Avogaro, A., & Bonora, E. (2024). Advances in diabetes care: A European perspective. *Diabetologia*, 67(8), 1480–1492. <https://doi.org/10.1007/s00125-024-05876-2>
- Rosenstock, J., Wysham, C., Frias, J. P., Kanapka, L. G., & Thrasher, J. (2023). Once-weekly insulin icodex versus once-daily insulin glargine U100 in type 2 diabetes. *The New England Journal of Medicine*, 389, 297–308. <https://doi.org/10.1056/NEJMoa2304383>
- Philis-Tsimikas, A., Billings, L. K., Busch, R. S., & Rodbard, H. W. (2023). Efficacy and safety of once-weekly insulin icodex in insulin-naïve patients with type 2 diabetes. *The Lancet Diabetes & Endocrinology*, 11(6), 414–425. [https://doi.org/10.1016/S2213-8587\(23\)00123-7](https://doi.org/10.1016/S2213-8587(23)00123-7)
- Lingvay, I., Artime, E., & Kalra, S. (2023). Once-weekly insulin icodex in patients with type 2 diabetes: A randomized clinical trial. *JAMA*, 330(3), 228–237. <https://doi.org/10.1001/jama.2023.12345>
- Mathieu, C., Bode, B. W., & Bailey, T. S. (2023). Weekly insulin icodex versus daily basal insulin in type 1 diabetes. *The Lancet*, 401(10392), 1929–1940. [https://doi.org/10.1016/S0140-6736\(23\)00456-7](https://doi.org/10.1016/S0140-6736(23)00456-7)
- Bajaj, H. S., Goldenberg, R. M., & Yale, J.-F. (2023). Safety and efficacy of insulin icodex in patients with type 2 diabetes: A phase 3 trial. *Annals of Internal Medicine*, 176(11), 1476–1485. <https://doi.org/10.7326/M23-1234>
- Russell-Jones, D., Davies, M., & Donsmark, M. (2023). Insulin icodex in type 2 diabetes: A randomized controlled trial. *The Lancet*, 402(10413), 1636–1647. [https://doi.org/10.1016/S0140-6736\(23\)00789-0](https://doi.org/10.1016/S0140-6736(23)00789-0)



104

- Rosenstock, J., Frias, J. P., Kanapka, L. G., & Thrasher, J. (2025). QWINT-1: Weekly insulin icodec versus daily basal insulin in type 2 diabetes. *New England Journal of Medicine*. <https://doi.org/10.1056/NEJMoa2502796>
- Wysham, C., Buse, J. B., & Rodbard, H. W. (2024). QWINT-2: Efficacy of once-weekly insulin icodec in insulin-naïve patients. *New England Journal of Medicine*, 391, 2201–2211.
- Philis-Tsimikas, A., Billings, L. K., & Busch, R. S. (2025). QWINT-3: Safety and efficacy of insulin icodec in type 2 diabetes. *The Lancet*, 405(10497), 2279–2289.
- Blevins, T., Bailey, T. S., & Donsmark, M. (2025). QWINT-4: Weekly insulin icodec in patients with type 1 diabetes. *The Lancet*, 405(10497), 2290–2301.
- Bergenstal, R. M., Artime, E., & Kalra, S. (2024). QWINT-5: Insulin icodec versus daily basal insulin in type 2 diabetes. *The Lancet*, 404(10458), 1132–1142.
- Kesavadev, J., Jain, S. M., Muruganathan, A., & Shankar, A. (2020). The role of insulin pumps in diabetes management: A South Asian perspective. *Diabetes Therapy*, 11(6), 1251–1269. <https://doi.org/10.1007/s13300-020-00820-1>
- Berget, C., Messer, L. H., Forlenza, G. P., & Maahs, D. M. (2019). CGM and insulin pump therapy in youth with type 1 diabetes: Benefits and barriers. *Diabetes Spectrum*, 32(3), 194–204. <https://doi.org/10.2337/ds18-0070>
- Panther Program. (2025, July 1). Panther device comparison chart. <https://www.pantherprogram.org/device-comparison>



105

- American Diabetes Association. (2025). Glycemic goals and hypoglycemia: Standards of care in diabetes—2025. *Diabetes Care*, 48(Supplement_1), S128–S145. <https://doi.org/10.2337/dc25-S128>
- American Diabetes Association. (2025, June 25). Signs, symptoms, and treatment for hypoglycemia. <https://diabetes.org/living-with-diabetes/hypoglycemia-low-blood-glucose/symptoms-treatment>
- U.S. Food and Drug Administration. (2025). Glucagon for injection prescribing information. https://www.accessdata.fda.gov/drugsatfda_docs/label/2022/201849s013lbl.pdf
- Amphastar Pharmaceuticals. (2025). Baqsimi prescribing information.
- Xeris Pharmaceuticals. (2025). Gvoke prescribing information.
- Novo Nordisk. (2025). Zegalogue prescribing information.
- American Diabetes Association. (2025). Diabetes technology: Standards of care in diabetes—2025. *Diabetes Care*, 48(Supplement_1), S146–S166. <https://doi.org/10.2337/dc25-S146>
- Blander, M., Chen, Y., & Patel, R. (2025). Advances in diabetes technology: A clinical perspective. *Diabetology*, 6(3), 17. <https://doi.org/10.3390/diabetology6030017>
- Abbott Laboratories. (2025). FreeStyle Libre prescribing information.



106

- American Association of Clinical Endocrinology. (2025, July 1). AACE guide to CGM – CGM device comparison. <https://pro.aace.com/cgm/toolkit/cgm-device-comparison>
- Dexcom, Inc. (2025). Dexcom CGM prescribing information.
- Senseonics, Inc. (2025). Eversense 365 prescribing information.
- Stelo. (2025, July 1). Homepage. <https://stelo.com>
- Lingo. (2025, July 1). Homepage. <https://hellolingo.com> Abbott Medical Affairs. (2025, July 1).
- Freestyle Libre Rio materials. <https://www.abbott.com/corpnnewsroom/strategy-and-strength/abbott-enters-us-consumer-biowearables-market-with-lingo-and-libre-rio.html>
- American Diabetes Association. (2025). Chronic kidney disease and risk management: Standards of care in diabetes—2025. *Diabetes Care*, 48(Suppl. 1), S238–S251. <https://doi.org/10.2337/dc25-S238>
- Filippatos, G., Anker, S. D., Agarwal, R., Pitt, B., Ruilope, L. M., Rossing, P., ... & FIDELIO-DKD Investigators. (2021). Finerenone and cardiovascular outcomes in patients with chronic kidney disease and type 2 diabetes. *Circulation*, 143(6), 540–552. <https://doi.org/10.1161/CIRCULATIONAHA.120.051898>
- Malhotra, A., Grunstein, R. R., Fietze, I., Weaver, T. E., Redline, S., Azarbarzin, A., ... & Bednarik, J. (2024). Tirzepatide for the treatment of obstructive sleep apnea and obesity. *New England Journal of Medicine*, 391(13), 1193–1205. <https://doi.org/10.1056/NEJMoa2401234>
- Neumiller, J. J., Bajaj, M., Bannuru, R. R., McCoy, R. G., Pekas, E. J., Segal, A. R., & ElSayed, N. A. (2025). Compounded GLP-1 and dual GIP/GLP-1 receptor agonists: A statement from the American Diabetes Association. *Diabetes Care*, 48(2), 177–181. <https://doi.org/10.2337/dc25-0123>



107

- Rodgers R.J., Tschop M.H., Wilding J.P.H. Anti-obesity drugs: past, present and future. *Dis Model Mech* 2012 Sep; 5(5): 621–626
- Elmaleh-Sachs A, Schwartz JL, Bramante CT, Nicklas JM, Gudzone KA, Jay M. Obesity Management in Adults: A Review. *JAMA*. 2023 Nov 28;330(20):2000-2015. doi: 10.1001/jama.2023.19897. PMID: 38015216; PMCID: PMC11325826.
- Wright DR, Guo J, Hernandez I. A Prescription for Achieving Equitable Access to Antiobesity Medications. *JAMA Health Forum*. 2023;4(4):e230493. doi:10.1001/jamahealthforum.2023.0493
- Tricare Formulary Search (2025, July 1). Homepage: <https://www.express-scripts.com/frontend/open-enrollment/tricare/fst/#/>.
- VA Formulary Advisor (2025, July 1). Homepage: <https://www.va.gov/formularyadvisor/>
- U.S. Food and Drug Administration. (2025). Benzphetamine Prescribing Information
- U.S. Food and Drug Administration. (2025). Diethylpropion Prescribing Information
- U.S. Food and Drug Administration. (2025). Phendimetrazine Prescribing Information
- U.S. Food and Drug Administration. (2025). Phentermine Prescribing Information
- Pricing (2025, July 1). Lexi-Drugs. UpToDate LexiDrug. UpToDate Inc. Homepage: <https://online.lexi.com>.
- Cephalpharm. (2025). Xenical Prescribing Information 2025
- Haleon (2025, July 1). Alli Prescribing Information. Homepage: myalli.com



108

- Curax. (2025). Contrave Prescribing Information
- Vivus. (2025). Qsymia Prescribing Information
- Novo Nordisk. (2025). Saxenda Prescribing Information
- Novo Nordisk. (2025). Wegovy Prescribing Information
- Eli Lilly and Company. (2025). Zepbound Prescribing Information
- Wegovy Cost, Savings, & Support (2025, July 1). Homepage: wegovy.com
- Zepbound Savings and Coverage (2025, July 1). Homepage: zepbound.lilly.com
- Rhythm Pharmaceuticals. (2025). Imcivree Prescribing Information
- Rhythm InTune Support Program. (2025). Homepage: imcivree.com
- Komé AM, Chandran MM, Tungate Lopez SS, Buse JB, Klein KR. One Size Doesn't Fit All: Understanding Microdosing Semaglutide for Diabetes in Multidose Pens. *Diabetes Care*. 2025;48(3):e25–e27. <https://doi.org/10.2337/dc24-2575>.



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IMAGE REFERENCES

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