

HOMECOMING 2019

COMMON PROBLEMS IN DIABETIC CARE

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Dr. Kirila has no disclosures
or conflicts of interest

LEARNING OBJECTIVES

Upon completion, the Learner will be able to do the following.

1. Develop strategies to help patients to avoid acute and long-term complications
2. Discuss psychosocial determinates affecting ability to control blood sugars
3. Monitor patients according to current evidence-based guidelines
4. Determine cost effective alternatives for patient's medication options
5. Formulate a plan with the patient to achieve step-wise success toward goals

COMMON COMPLICATIONS IN DIABETES

- Macro and microvascular disease
- Nephropathy
- Neuropathy – peripheral and autonomic
- Retinopathy
- Foot damage, ulcers, amputations
- Hearing impairment

COMMON CHALLENGES

- PATIENTS!!! In a good way!
- All are individuals
- Unique circumstances/frames of reference/family/work settings
- Variable education/insight/motivation to work together with health care team to manage their diabetes (and not just their sugars!)
- Monitor regularly to not only avoid complications, but also to encourage patient and care-givers and trouble shoot for pitfalls
- Realize expense even of co-pay may manifest as non-compliance

DIABETES MONITORING – ADA GUIDELINES

ANNUAL

- A. Dilated eye exam
- B. Fasting lipids
- C. Liver functions
- D. Urine albumin/creatinine ratio
- E. Serum creatinine

In Type 1, Consider:

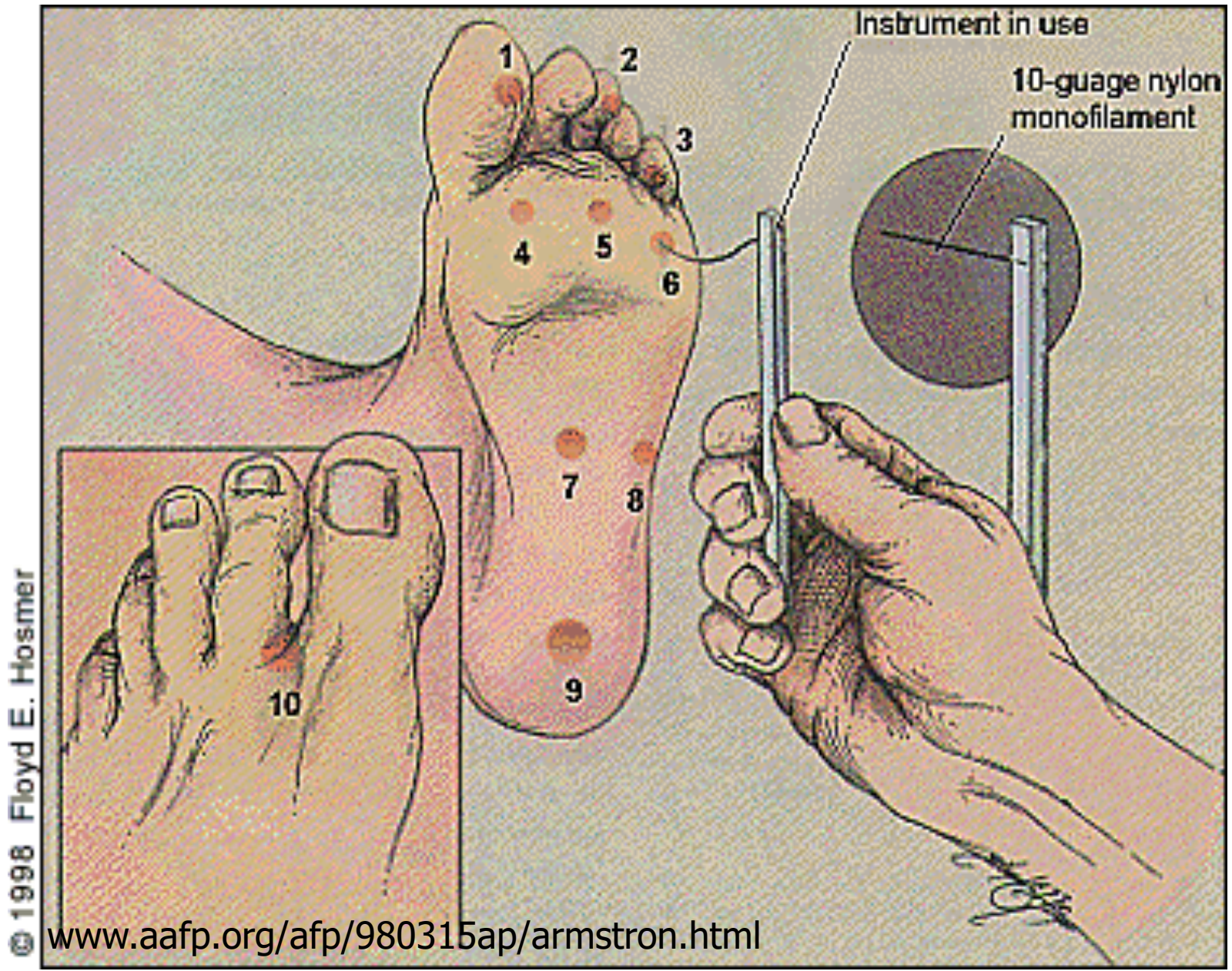
TSH

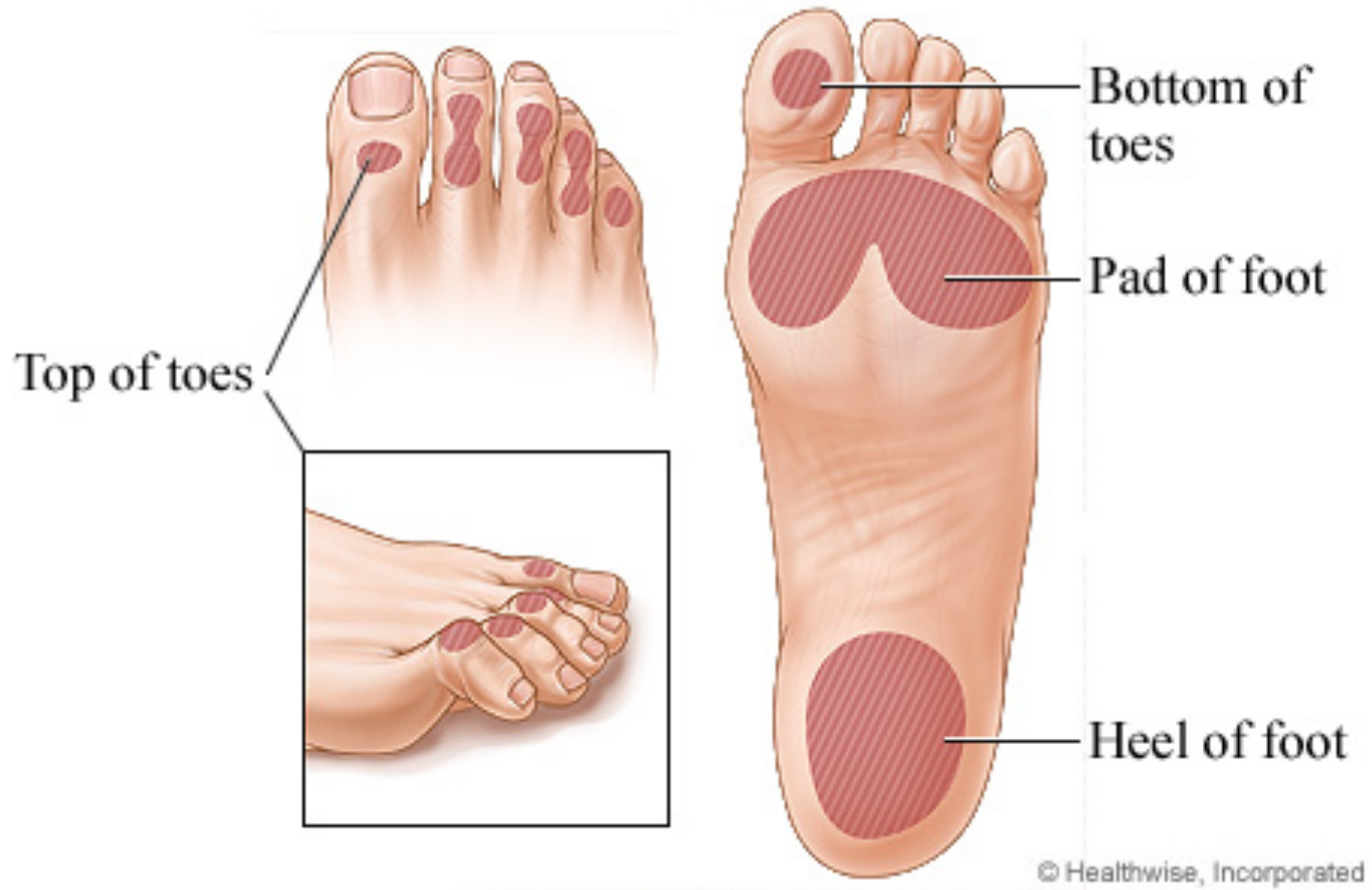
Celiac disease

DIABETES MONITORING – ADA GUIDELINES - 2

QUARTERLY (every 3 months)

- A. HbA1c
- B. Foot check
 - A. Skin integrity
 - B. Monofilament testing
- C. Blood pressure





Aspects of management in the overall care of the diabetic foot

1. Primary prevention
2. Improving the healing of DFU's (Diabetic Foot Ulcers)
3. Secondary prevention: reducing new ulceration after healing
4. Improved well-being: the patient agenda
5. Improving long-term survival

Adapted from Current Challenges and Opportunities in the Prevention and Management of Diabetic Foot Ulcers. <https://doi.org/10.2337/dc17-1836>

PRIMARY PREVENTION OF DIABETIC FOOT ULCERS

- Key to avoid complications, alterations in self image, lifestyle, quality of life and mental status
 - Monitor quarterly
 - Optimize sugars
 - Stop nicotine products
 - Avoid trauma
 - Podiatry evaluate and treat
 - Prescription footwear
 - Consider revascularization

DIABETIC FOOT ULCERS (DFU)

- Average time to healing without surgery is 12 weeks
 - Huge effect on patient's activity and lifestyle, perhaps ability to work
- Five year survival of patient can be 50-60 % after a new DFU (worse than many cancers)
- One VA study showed mortality and DFU association stronger than mortality from any macrovascular disease and diabetes



DFU financial impact is significant

- Estimated that 1/3 of diabetic expenses in the US is spent on Diabetic Foot Ulcers
- In 2017-2018 the US spent between 9 – 13 billion dollars on diabetic foot care

IMPROVING HEALING OF DFU'S

- Multiple efforts to study various treatment methods and no clear front runner other than off-loading pressure areas
- Encourage multidisciplinary approach including wound care specialty if available
- Hyperbaric oxygen therapy benefit is debated, particularly regarding cost vs benefit



OMM CONSIDERATIONS

- Holistic approach as with all our patients
- Benefits of gentle manipulations techniques as indicated/tolerated
 - Optimize alignment and gait
 - Maximize tissue oxygenation and waste removal

PREVENTING RECURRENCE of DFU

- 40 % recurrence in the 12 months after the initial event
- Studies of initial diabetic foot ulcer risk factors, incidence, details and treatment successes have been difficult to have validity due to multiple variables
- Antibiotics and re-vascularization procedures are well accepted and widely used, but unable to actually show evidence in studies
- Off-loading, particularly with plantar involvement is the only treatment able to be proven from a study standpoint at this time

MAJOR AMPUTATIONS

- Used as a surrogate marker for failure to heal in a diabetic foot ulcer
- UK study demonstrated a significant decrease in major amputations after implementing a single multi-disciplinary service for care and encouraging early referral to that service
- When those resources were withdrawn, a resurgence in major amputations was seen
- It has been suggested that when DFU is healed, Diabetic Foot Disease be thought of as IN REMISSION instead of “cured” since close surveillance is still so important

Amputations – Medical Dictionary Online

- **major amputation:** amputation of the lower limb above the ankle or of the upper limb above the wrist
- **minor amputation:** amputation of a hand or foot, or of a part thereof

PATIENT WELL-BEING

- DFU occurrence in itself as well as the necessary treatments can have dramatic effects emotionally as well as physically
 - Self image
 - Vulnerability
 - Activity level
 - Quality of life

ADDITIONAL FACTORS AFFECTING “COMPLIANCE”

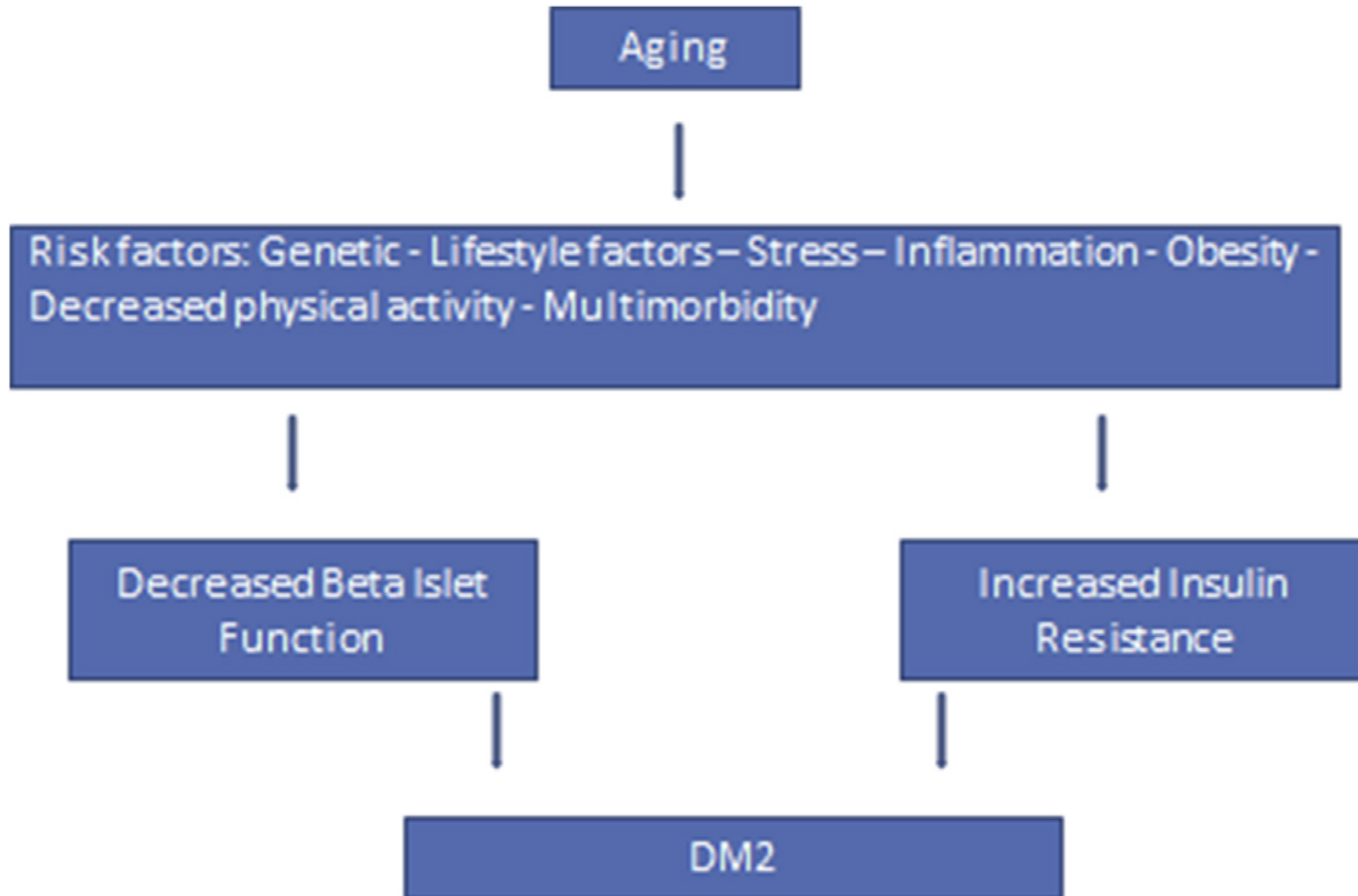
- Cognition
 - Innate vs impaired d/t comorbidities
- Dementia

DIABETIC FOOT ULCERS AND RENAL FAILURE

- There seems to be close timing between onset of DFU and Dialysis initiation
- Thought most likely due to inflammation associated with ulcer that triggers final decline in renal functions
- Mortality has been reported 290% higher after undergoing major amputation if on dialysis

FOOT CARE RECOMMENDATIONS

- Avoid going barefoot, even at home
- Test water temperature before stepping into bath
- Trim toenails to shape of the toe; remove sharp edges with nail file,
Do not cut cuticles
- Wash and check feet daily
- Shoes should be snug but not tight and customized if feet are misshapen or have ulcers
- Socks should fit and be changed daily



DIABETES IN THE AGING PATIENT

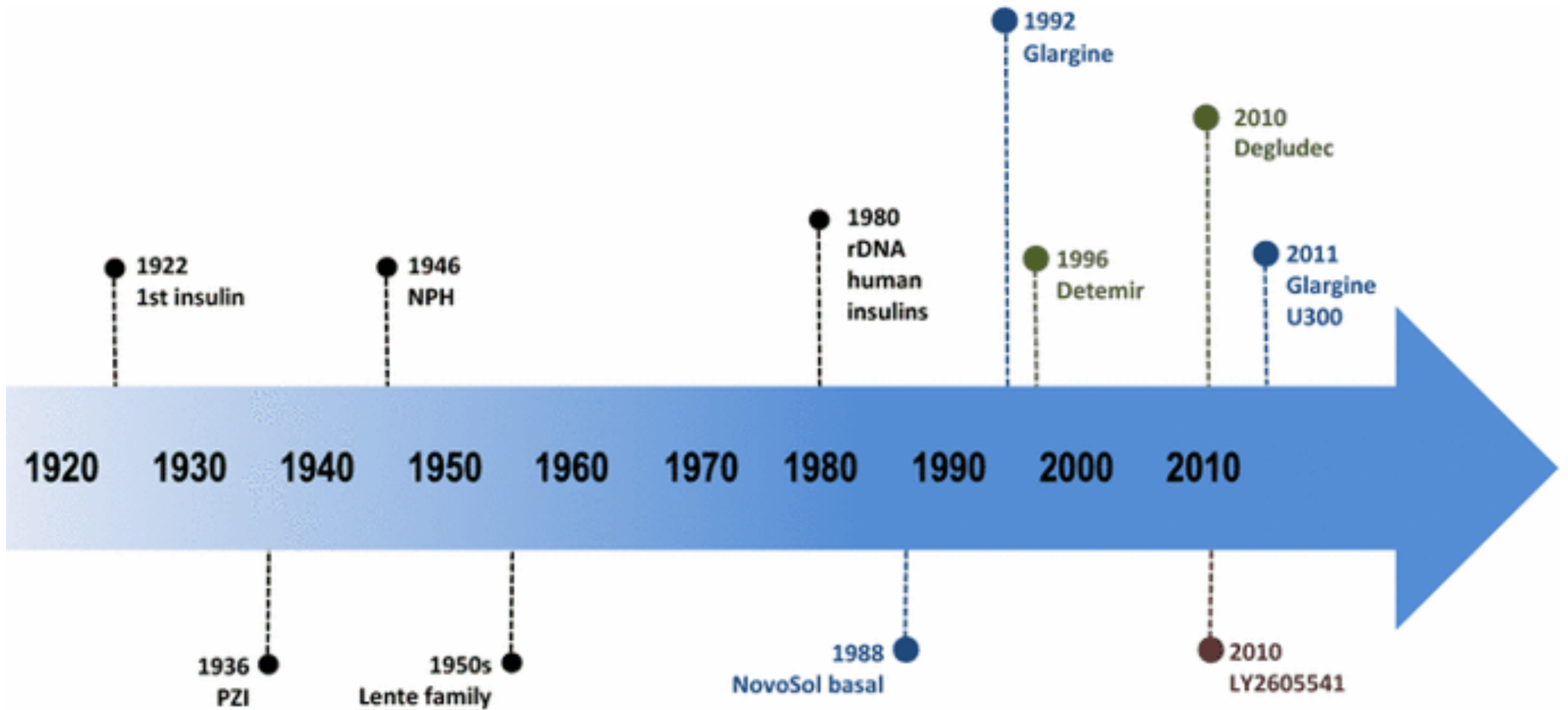
- A1c target needs to be individualized
 - Concern for hypoglycemia
 - Concern for falls
 - Concern if living alone
- Age and life expectancy
- Quality of life
- Comorbidities
- Diabetes duration

DIABETES TREATMENT

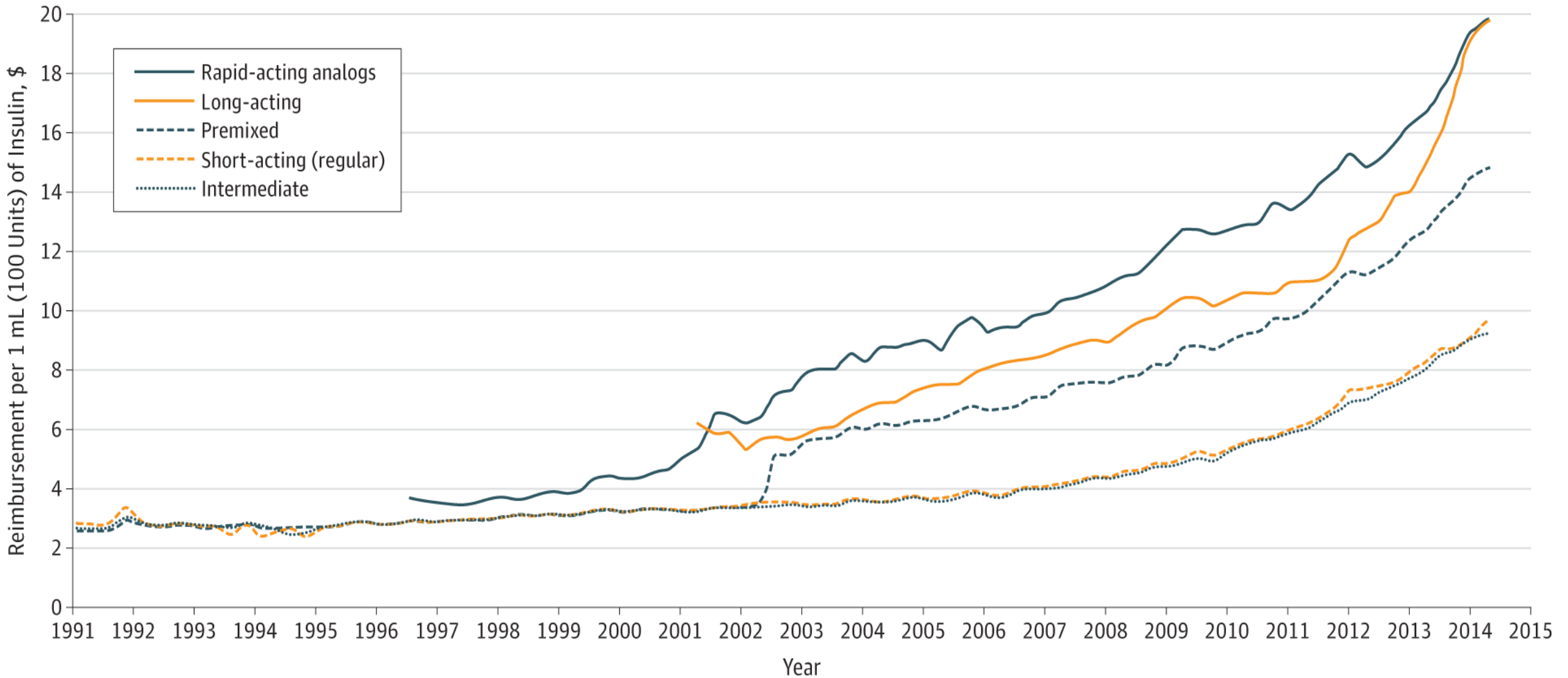
- Lifestyle modification (aka “TLC” – Therapeutic Lifestyle Changes)
 - PHYSICAL ACTIVITY
 - Dietary modification
 - Weight loss
 - Nicotine cessation
 - Psychosocial – Case manager, counsellor
 - Initial and follow-up diabetic education – including nutrition
- Medications

INSULIN background and pricing info

- Insulin was isolated in the late 1800's and first injected into a patient with diabetes in 1922
- Banting, Best & Collup licensed their patent for the process to isolate insulin for \$1.00 each as a gift to humanity rather than for a commercial profit



Change in isoelectric point towards neutral pH
Acylation of insulin with fatty acids C14-C16
PEGylated insulin



Medicaid Reimbursement Trends for Covered Insulin Products From 1991 Through 2014 Reimbursements were adjusted by the Bureau of Labor Statistics' annual Consumer Price Index for All Urban Consumers.

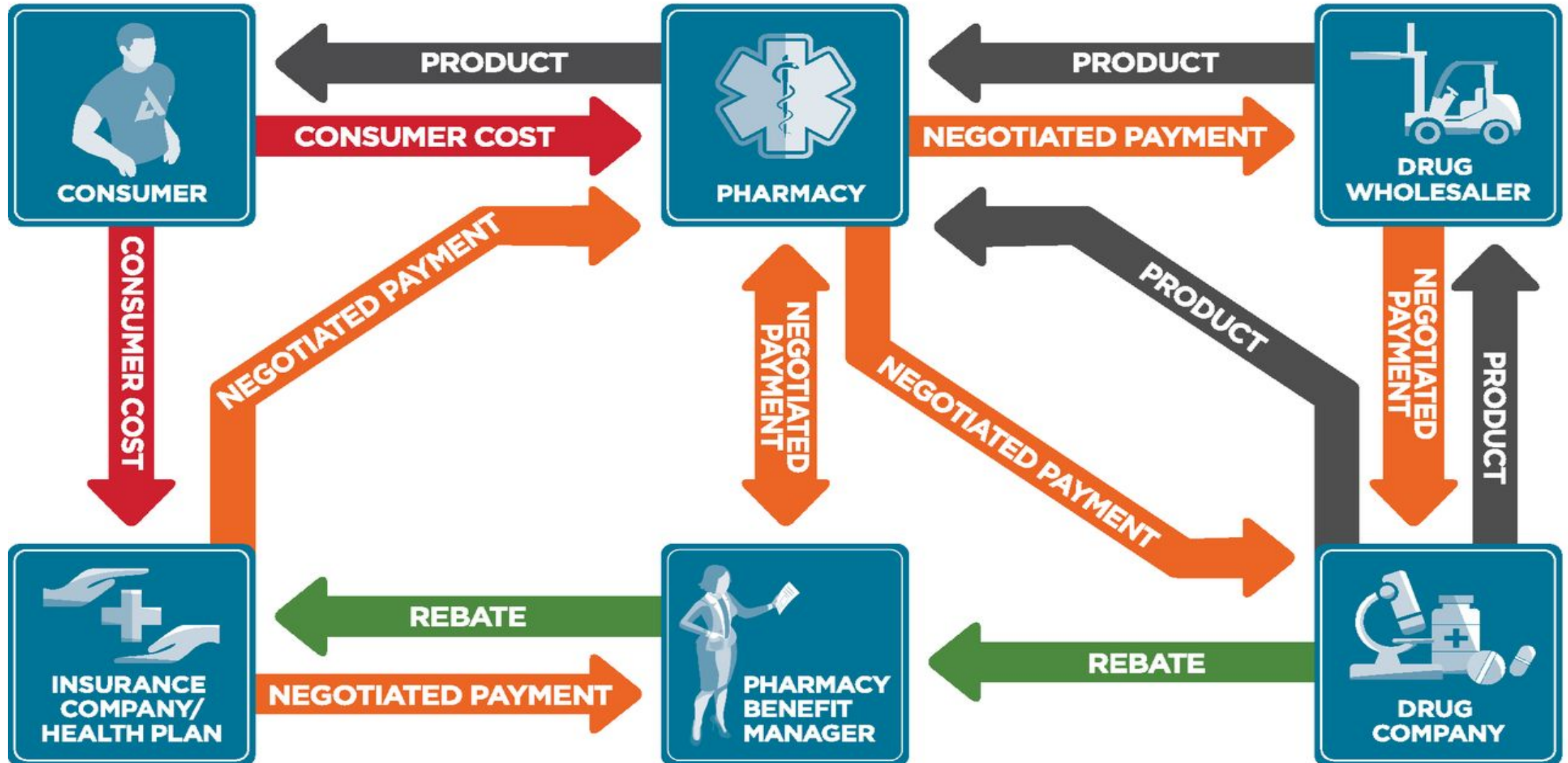
Table 2. Estimated Annual Medicaid Payments for Insulin for a Patient Requiring 40 Units per Day

Insulin	Cost at Quarter 2, \$ ^a			Change, %	
	1991	2001	2014	1991 to 2014	2001 to 2014
Rapid-acting		771	2852		370
Long-acting		891	2848		320
Premixed	370	468	229	575	455
Short-acting	399	481	1389	348	289
Intermediate	383	468	1330	347	284

^a Estimated Medicaid reimbursements for medication and dispensing fees by type of insulin comparing quarter 2, 1991, quarter 2, 2001, and quarter 2, 2014. All dollar values are adjusted by the Bureau of Labor Statistics' annual Consumer Price Index for All Urban Consumers but exclude rebates.

JAMA Intern Med. 2015;175(10):1681-1687. doi:10.1001/jamainternmed.2015.4338

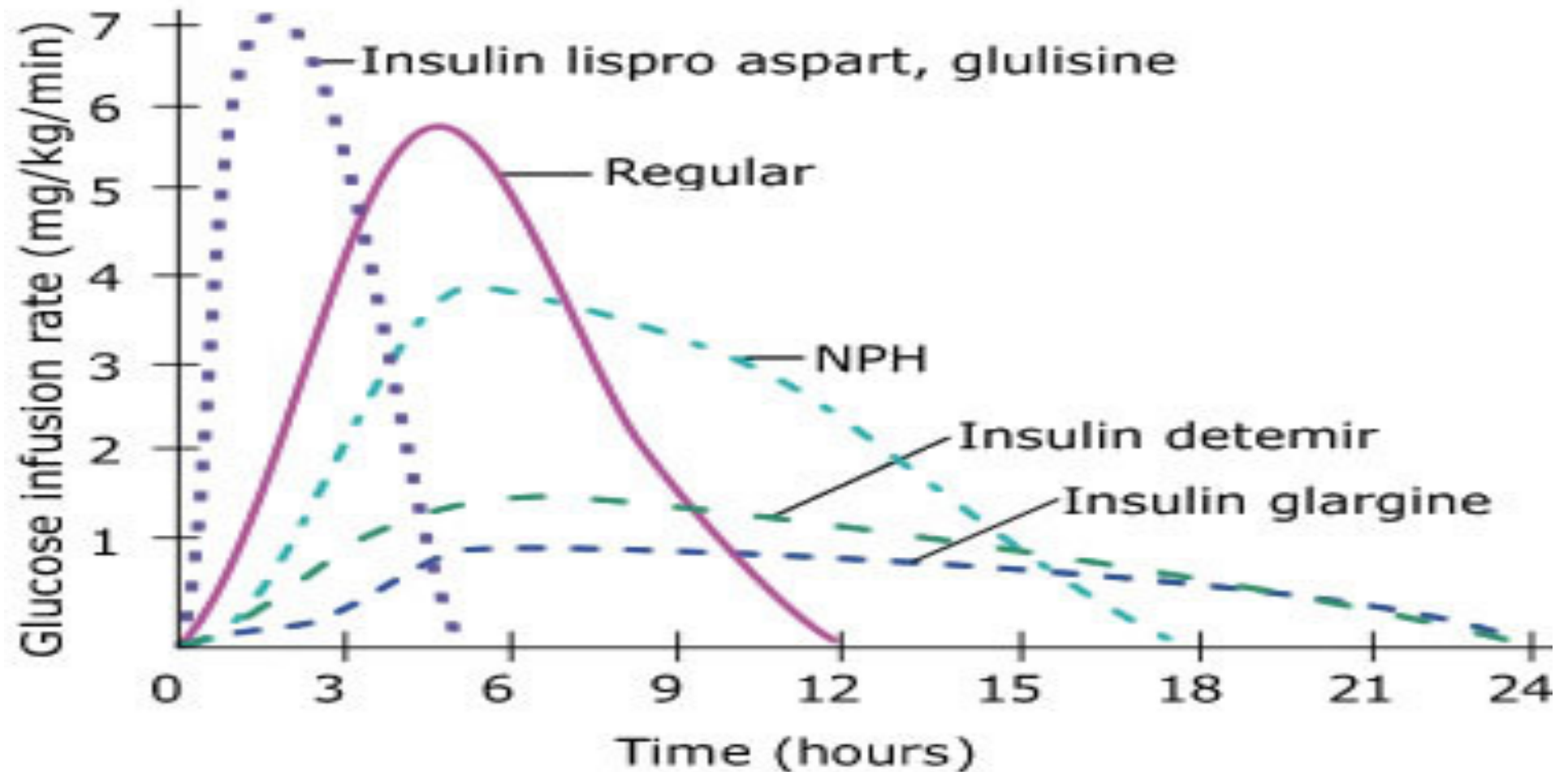
Insulin Supply Chain: A Complex System



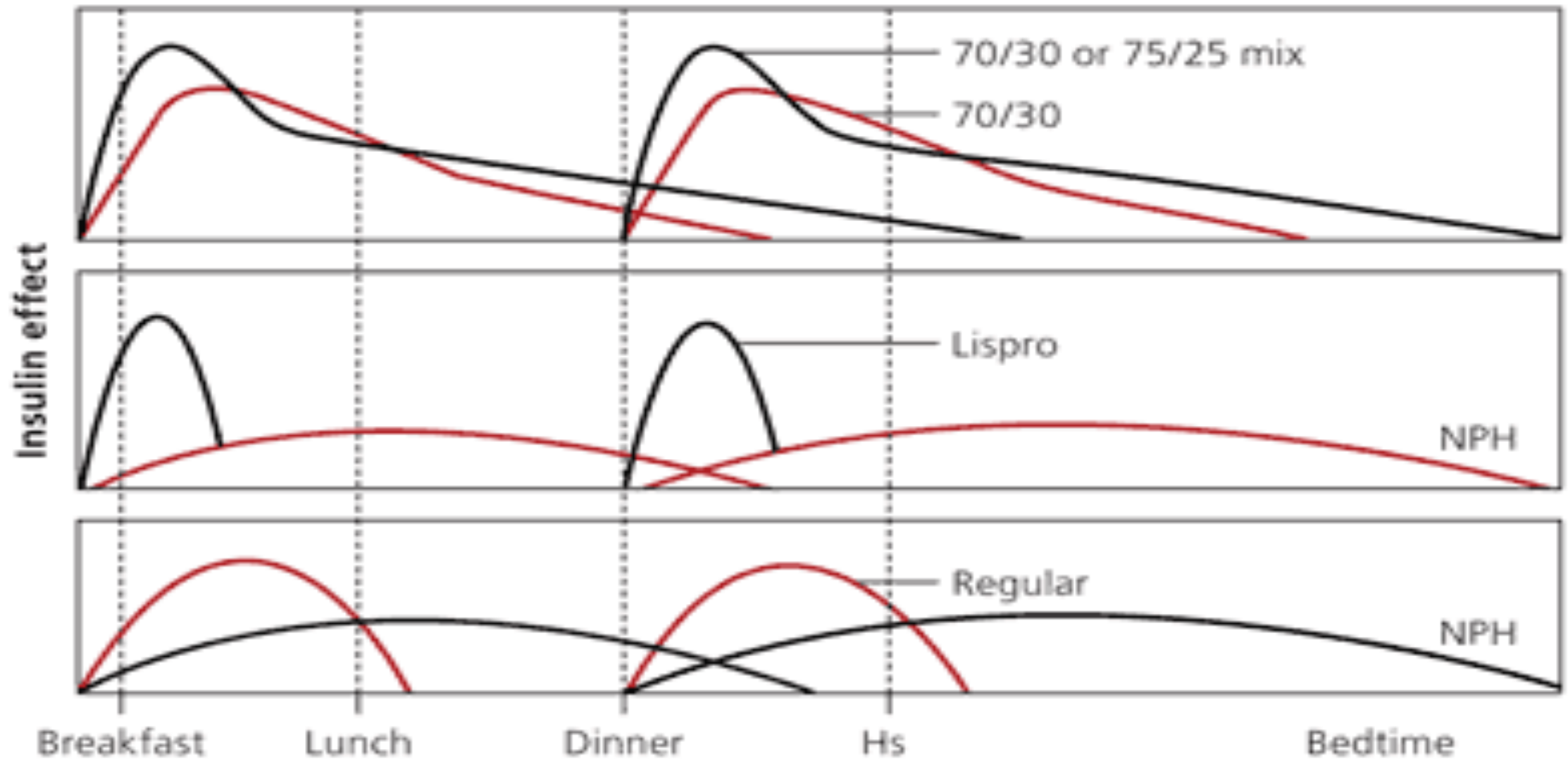
INSULIN IS INSULIN !!!

- The key variable is onset and duration
- Creative strategies can be employed to adapt the ideal regimen to patients' needs
 - Financial
 - Schedule: work, meals, snack, continuous snacking
 - Absorption variables
 - Injection sites
 - Food affected by gastroparesis
 - Excretion alteration – declining kidney function

Activity Profiles of Different Types of Insulin



Insulin Name	Onset	Peak	Duration	Notes for Use	Estimated Cost
Rapid-acting products					
Lispro	< 15 minutes	0.5–1.5 hours	3–5 hours	If mixing with NPH, rapid-acting insulin should be drawn into syringe first. Mixture should be given immediately to avoid effects on peak action.	\$103 (10-ml vial) \$198 (five 3-ml pen cartridges)
Aspart	< 15 minutes	1–3 hours	3–5 hours		\$112 (10-ml vial) \$219 (five 3-ml pen cartridges)
Glulisine	< 15 minutes	1 hour	3–5 hours		\$101 (10-ml vial) \$195 (five 3-ml pen cartridges)
Short-acting products					
Regular	0.5–1 hour	2–4 hours	4–8 hours	May be mixed with NPH in same syringe. Mixing order should be the clear regular drawn up first, then the cloudy NPH (i.e., “clear to cloudy”).	\$53 (10-ml vial) \$121 (five 3-ml pen cartridges) \$89 (five 3-ml Innolet cartridges)
Intermediate-acting products					
NPH	2–4 hours	4–10 hours	10–18 hours	Available as pen or in vial to be used with syringe.	\$52 (10-ml vial) \$121 (five 3-ml pen cartridges) \$91 (five 3-ml Innolet cartridges)
Long-acting products					
Glargine	2–4 hours	Same action throughout the day	24 hours	Do not mix with other insulins. Available as pen or in vial. Detemir duration (clinical trial data): 6 hours (0.1 units/kg), 12 hours (0.2 units/kg), 20 hours (0.4 units/kg), 23 hours (0.8 and 1.6 units/kg)	\$104 (10-ml vial) \$188 (five 3-ml Solostar pen cartridges)
Detemir	2–3 hours	6–8 hours	Dose-dependent 5.7–23.2 hours		\$103 (10-ml vial) \$191 (five 3-ml pen cartridges)



STRATEGIES TO ENGAGE PATIENTS

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