

April 9, 2019

# Why Is Insulin So Expensive?

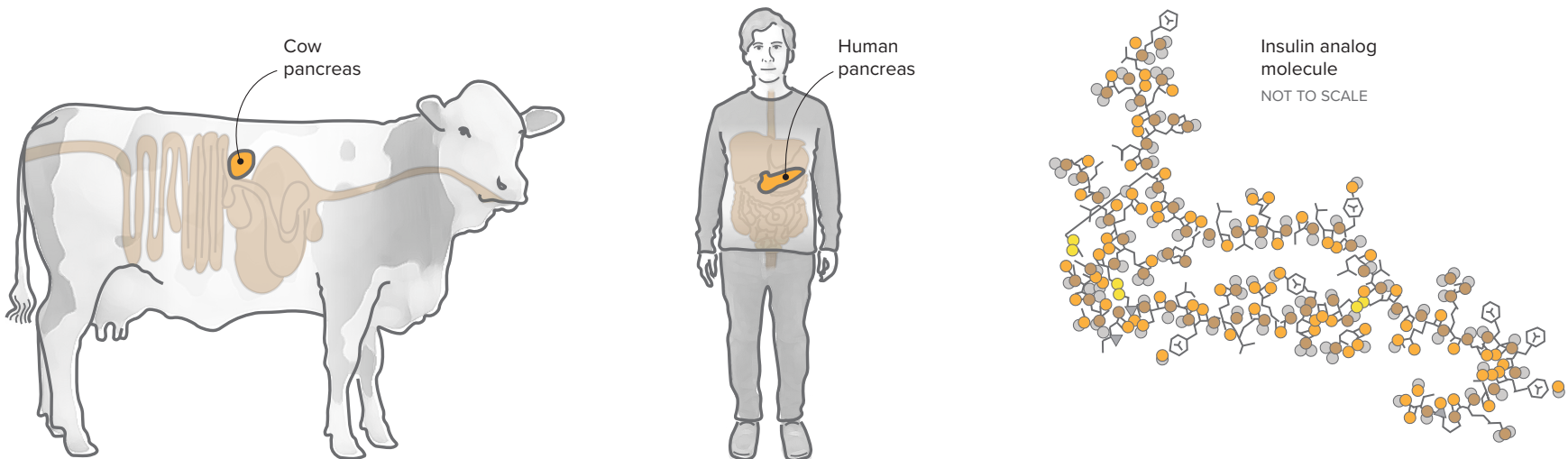
BY TUCKER DOHERTY, POLITICO PRO DATAPOINT

More than 1.2 million Americans have Type 1 diabetes, a chronic condition in which the pancreas produces little or no insulin — the hormone that regulates the body’s absorption of sugars from carbohydrates. Type 1 diabetes has no cure, and those who have the condition need lifelong insulin therapy.

Lawmakers and consumer advocates have increasingly called attention to the rising cost of insulin for patients. During the past two decades, the list prices of the most commonly-prescribed insulins have increased by more than 700 percent after adjusting for inflation, leaving patients with severe financial burdens. According to the Health Care Cost Institute, individuals with Type 1 spent an average of \$5,705 on insulin in 2016.

While the original inventors of medical insulin sought to make their discovery cheaply and widely available, subsequent research has produced more specialized — and more expensive — forms of insulin that create fewer side effects and respond better to patient needs. Furthermore, like many other prescription drugs, insulin is often sold through contractual arrangements that can drive up list prices.

## The major forms of insulin that can be used to treat diabetes



### Animal insulin

First extracted in 1922

The first insulin used to treat diabetes was isolated from animal pancreases by Canadian scientists Frederick Banting and Charles Best, who won a Nobel prize for their work in 1923.

Early animal insulin was obtained from cow and pig pancreases. The original patent for this method of insulin production was sold to the University of Toronto for only one dollar, so that it could be produced cheaply and made widely affordable.

### Human insulin

First synthesized in 1978

Biotechnology company Genentech pioneered a method to create “human” insulin by inserting human DNA into bacteria, which could then produce the insulin hormone.

While both animal and human insulin can be used to treat diabetes, doctors soon preferred to prescribe the latter to avoid certain side effects, despite its greater expense. By 2006, drugmakers had voluntarily ceased manufacturing animal-derived insulins in the United States.

### Insulin analogs

First approved in 1996

Pharmaceutical researchers began to genetically alter human insulin in order to create new versions that respond to specific patient needs.

Some analogs act more rapidly once the dose begins — others act more uniformly over a long period of time.

As with the introduction of human insulin, many doctors soon began prescribing insulin analogs in order to take advantage of their unique properties, despite its considerably greater cost.

## Varying patient needs make it difficult to switch to cheaper forms of insulin

Patients treating Type 1 diabetes need to carefully manage their use of insulin to account for their personal metabolism, food intake, exercise and other factors. Having either too much or too little insulin in the bloodstream is dangerous, and patients frequently test their blood to track their sugar levels.

Fast-acting insulin analogs, such as Lispro, enable patients to adjust their insulin levels shortly before or after a meal, letting them tailor their intake to specific meals as needed. This fact-acting insulin is usually paired with long-acting insulin analogs, like Glargine, that maintain insulin levels between meals and during sleep.

Some patients who cannot afford the more expensive analogs try to save money by taking cheaper forms of human insulin, sometimes called “Walmart” insulin because of its retail availability and lower price.

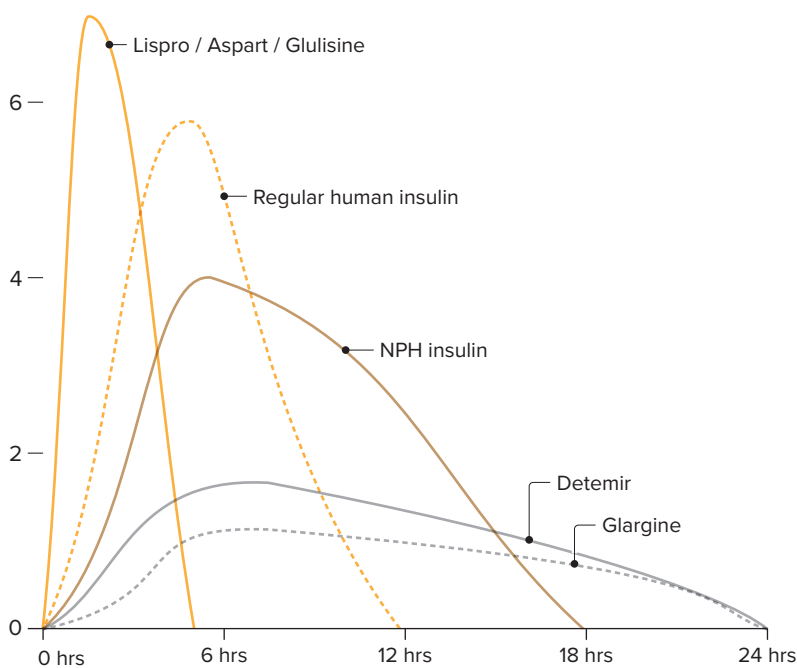
However, the slower-acting nature of regular human insulin means that users may need to plan their meals hours in advance, and puts them at greater risk of sudden blood sugar spikes after eating.

While doctors will prescribe human insulin to patients based on their particular needs, some patients who switched their insulin without medical supervision have suffered from severe and potentially fatal complications when their efforts to regulate their insulin levels fell short.

### How rapidly different forms of insulin take effect

Glucose infusion rate, milligrams per kilogram per minute

Fast-acting Intermediate-acting Long-acting



## Rebate incentives encourage drugmakers to increase their list prices

Like many other products, insulin is sold at high prices and then discounted after-the-fact with price rebates for insurers.

The middlemen, called pharmacy benefit managers, decide which drugs are covered by insurance plans and they make a portion of their profits by keeping a percentage of the rebate before passing the rest to the insurer. The insurer then uses rebate revenues to lower premiums for all enrollees.

PBMs will sometimes favor drugs with the highest initial list prices because these drugs come with larger rebates attached to maximize their profits. To stay competitive, drugmakers rapidly increase their list prices so that they can offer larger rebates. Meanwhile, the “net price,” which represents what the drugmaker is ultimately paid by insurers, grows at a slower rate.

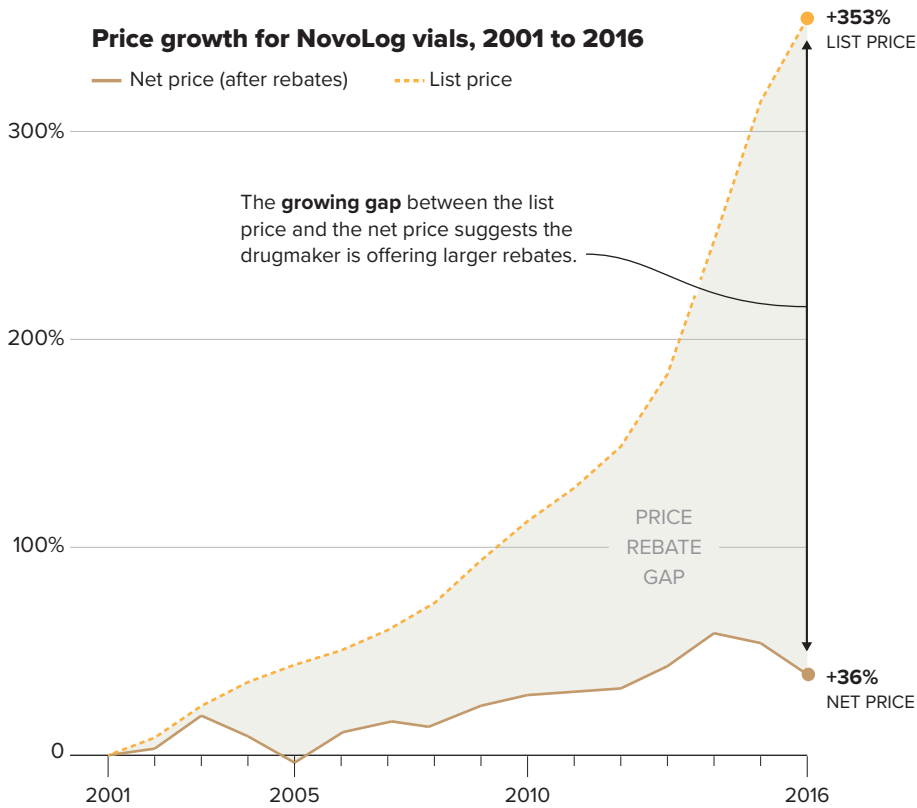
For example, the percentage change in list and net prices for the fast-acting insulin analog NovoLog (shown at right) illustrates the large price gap caused by growing price rebates to insurers and PBMs.

Although the prices paid by insurers for insulin drugs are mitigated by rebates, patients who are still meeting their deductible or are uninsured often pay the full list price for the drug. Insulin manufacturers have established several types of financial assistance and discount programs for patients paying the full list price. However, patient advocates argue these programs are too cumbersome to enroll in and unreliable for patients who face acute and unexpected needs.

While drugmakers argue that misaligned incentives from PBMs are responsible for price hikes, the PBMs themselves argue that drugmakers are responsible for their own prices and reap the vast majority of drug revenues.

### Price growth for NovoLog vials, 2001 to 2016

Net price (after rebates) List price



Sources: House Energy and Commerce Committee; American Diabetes Association; Drew Pendergrass, “How insulin became unaffordable,” Harvard Political Review; Health Care Cost Institute; Audrey Farley, “Drug prices are killing diabetics. ‘Walmart insulin’ isn’t the solution,” The Washington Post; Diabetes Teaching Center at the University of California, San Francisco

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