



Polymeric PDC Technology

An Integrated approach to autoinjector design

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Trends in drug development present opportunities and challenges to injection devices

- + The proportion of drugs that are delivered parenterally has been steadily increasing
- + Health-care cost pressures will make autoinjector products increasingly desirable
- Future growth in injectables could become constrained by existing autoinjector platforms

Product Rank	2004		2009		2014	
	Product	Sales	Product	Sales	Product	Sales
1	Lipitor	11,727	Lipitor	12,651	Humira	12,543
2	Zocor	5,197	Plavix	9,455	Sovaldi	10,283
3	Plavix	5,110	Enbrel	8,489	Remicade	9,916
4	Norvasc	4,463	Advair	7,792	Enbrel	8,949
5	Zyprexa	4,420	Abilify	6,600	Lantus	8,435
6	Advair	4,019	Remicade	6,419	Abilify	8,404
7	Nexium	4,382	Diovan	6,091	Rituxan	7,553
8	Pravachol	3,679	Avastin	5,745	Advair	7,035
9	Epogen	3,589	Rituxan	5,620	Avastin	7,023
10	Prevacid	3,455	Humira	5,563	Herceptin	6,868
	Total	50,041		74,425		87,009

Worldwide Product Sales, 2004-2014 (USD millions)

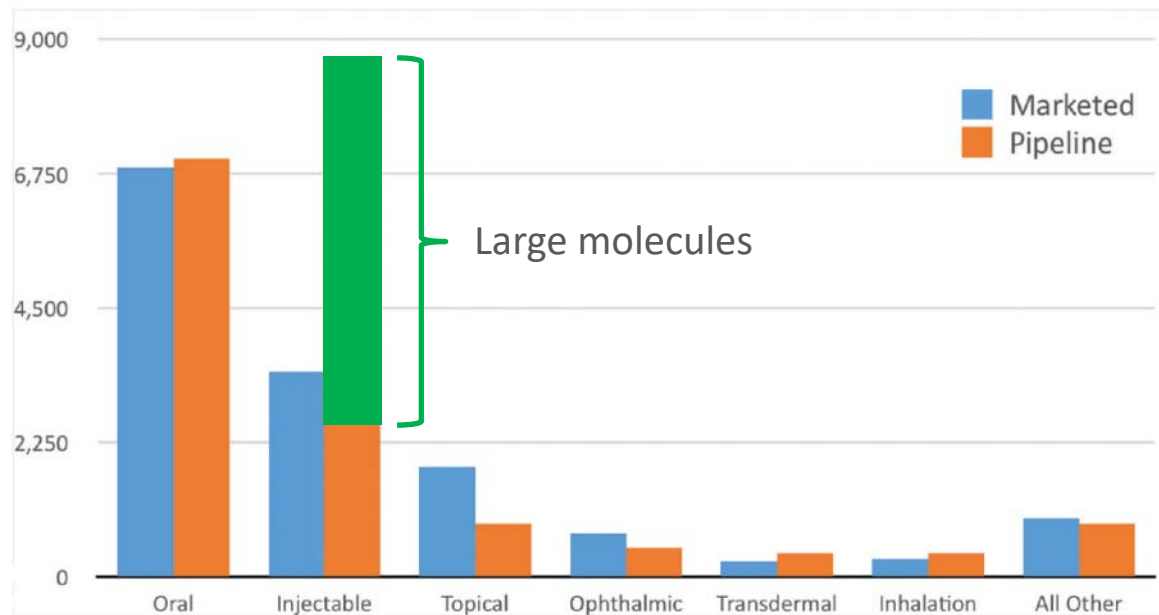
Source: PharmaCircle Apr 2016; "Injectables: The New Oral?"; Kararli, Sedo & Bossart



Sources: Genetic Engineering & Biotechnology News, Annual Reports, Company Websites, SEC Filings and Press Releases

The pipeline for injectable drugs outnumbered all other routes of delivery in 2016

- ~70% of those products in development are large molecules, with more viscous formulations
- Emerging technologies for long acting formulations also result in increased viscosities



Marketed and Pipeline Pharmaceutical Programs – 2016

Source: PharmaCircle Apr 2016; "Injectables: The New Oral?"; Kararli, Sedo & Bossart

Existing, glass syringe based autoinjector platforms are not suited to the future of injectables



Proven history of drug compatibility

Established manufacturing & filling processes

Regulatory acceptance

Inconsistent delivery depth and/or time

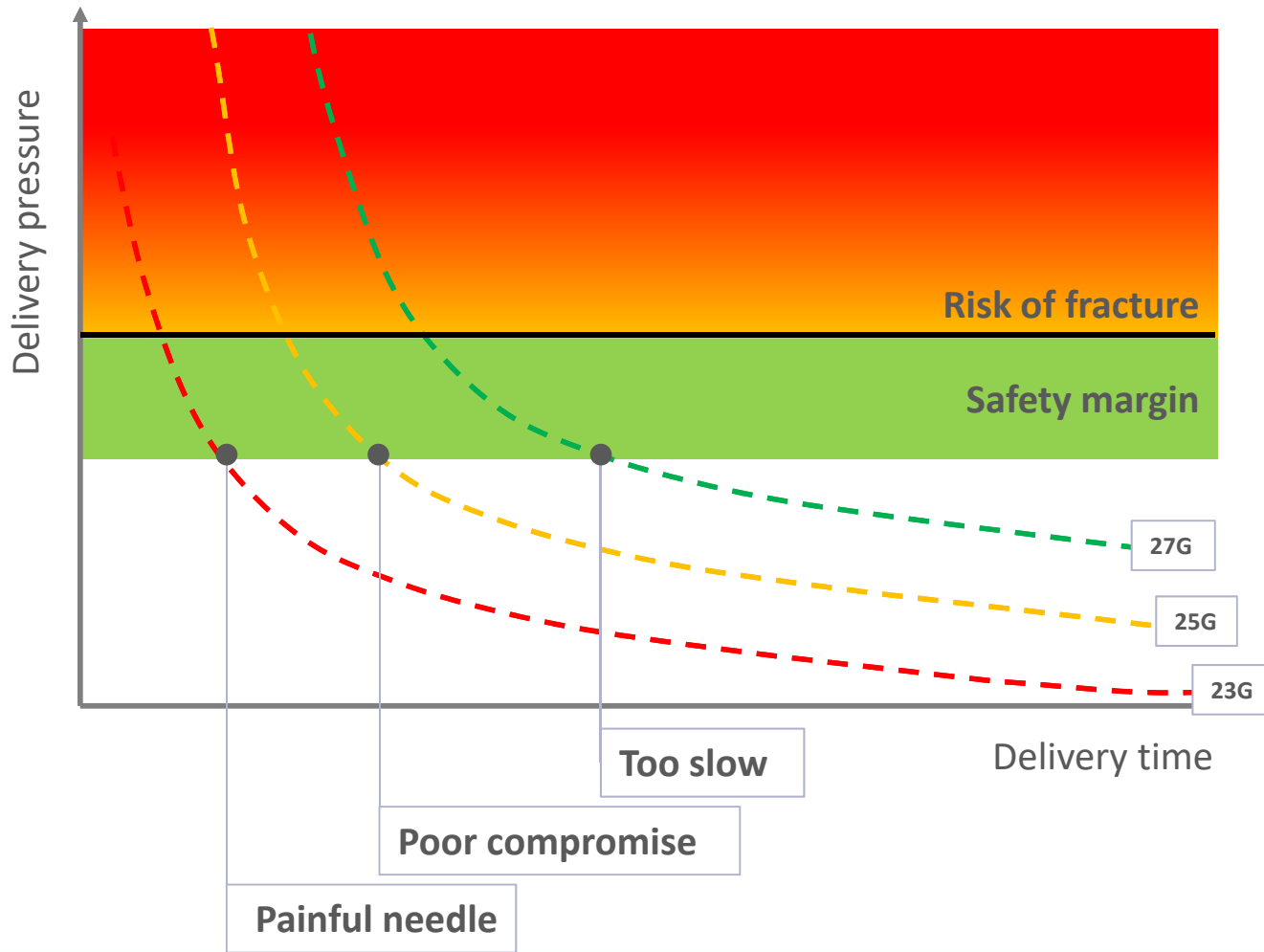
Limited device integration

Compatibility issues with sensitive biologics

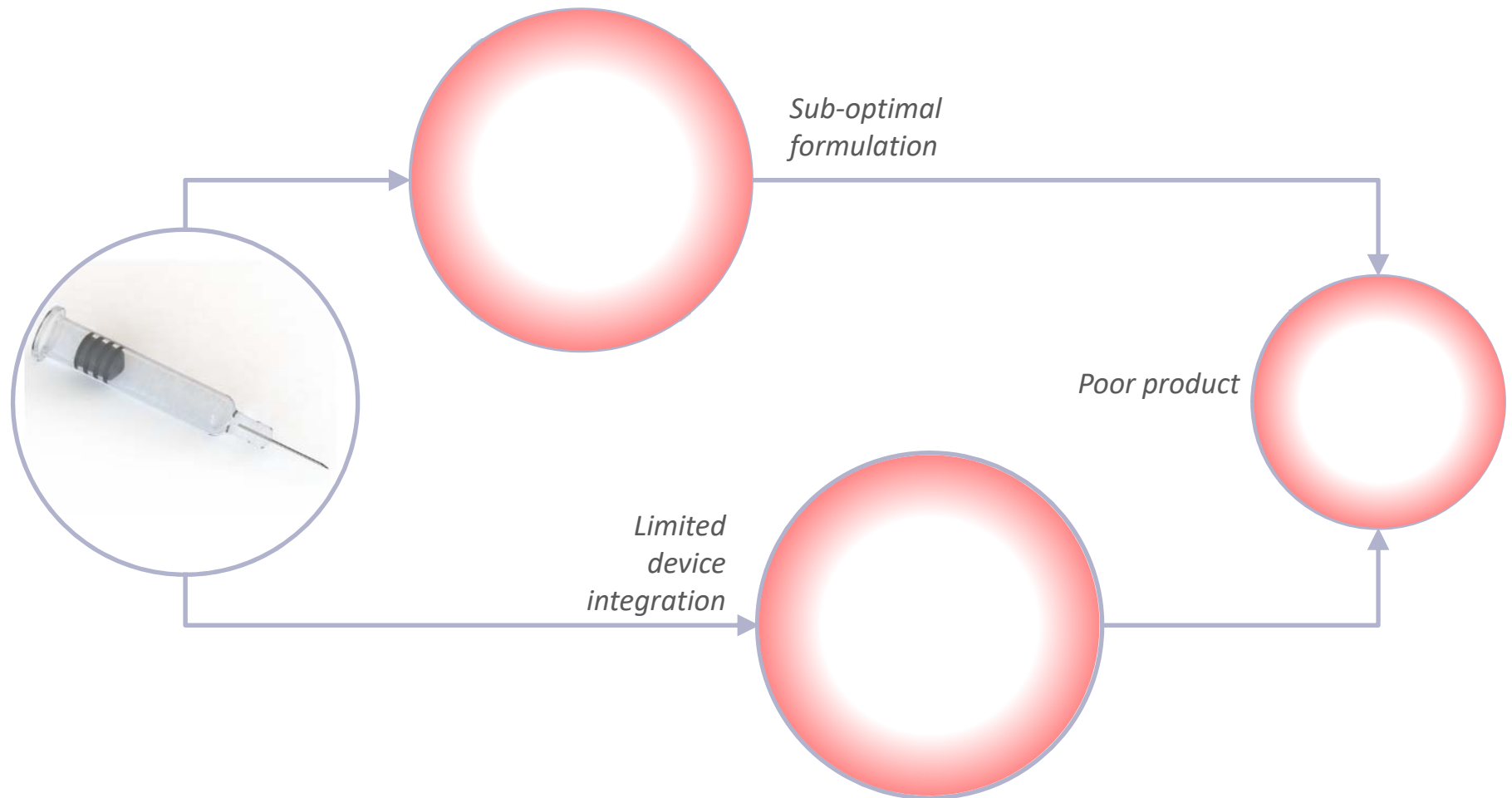
Formulation viscosity and volume limitations



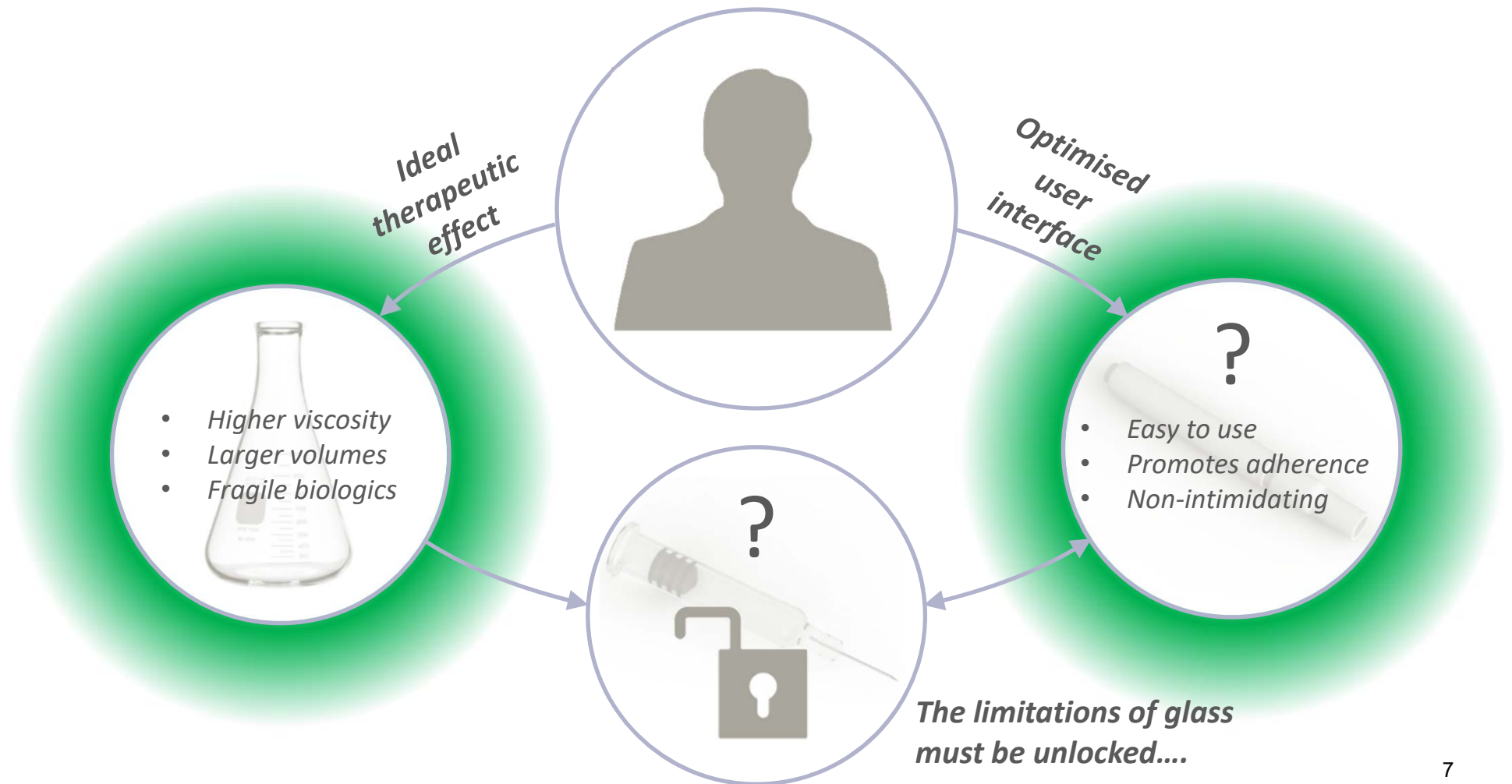
Managing the fragility of glass has direct implications on the patient



Putting the glass syringe first constrains drug and device development, placing the patient last

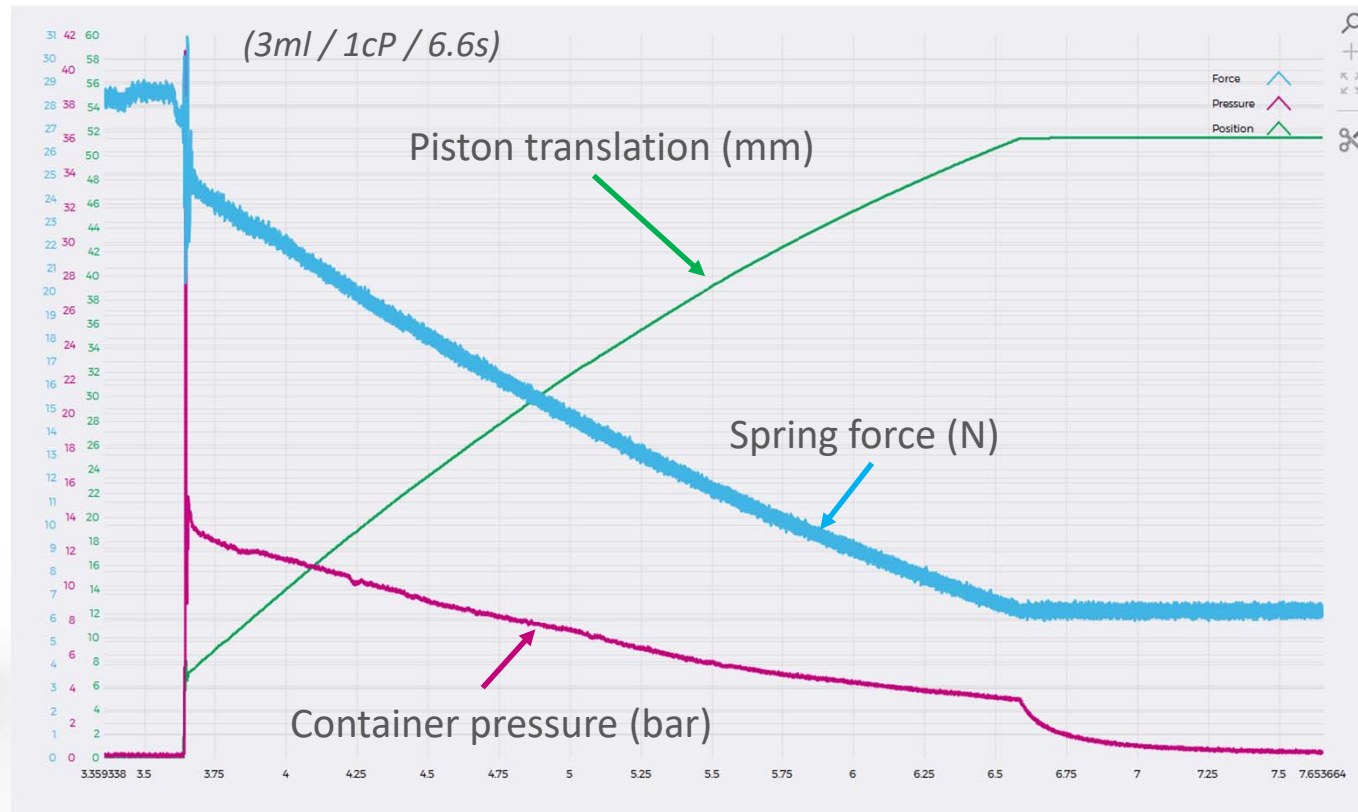


Patient needs should drive formulation and device development without constraints



If challenging drugs are to drive the design, characterisation of the formulation is essential

- Clear understanding of the delivery parameters determines the device requirements specification



Innovating around the primary drug container brings the required freedoms to manage challenging formulations

The drug...

- Higher viscosity
- Larger volumes
- Fragile biologics
- Improved pharmacokinetics



The patient...

- Effective delivery
- Safe and reliable
- Minimum pain and fear
- Easy to use

A user centric, integrated device



Easy to use

- 2 step activation
- Large inspection window

Promotes adherence

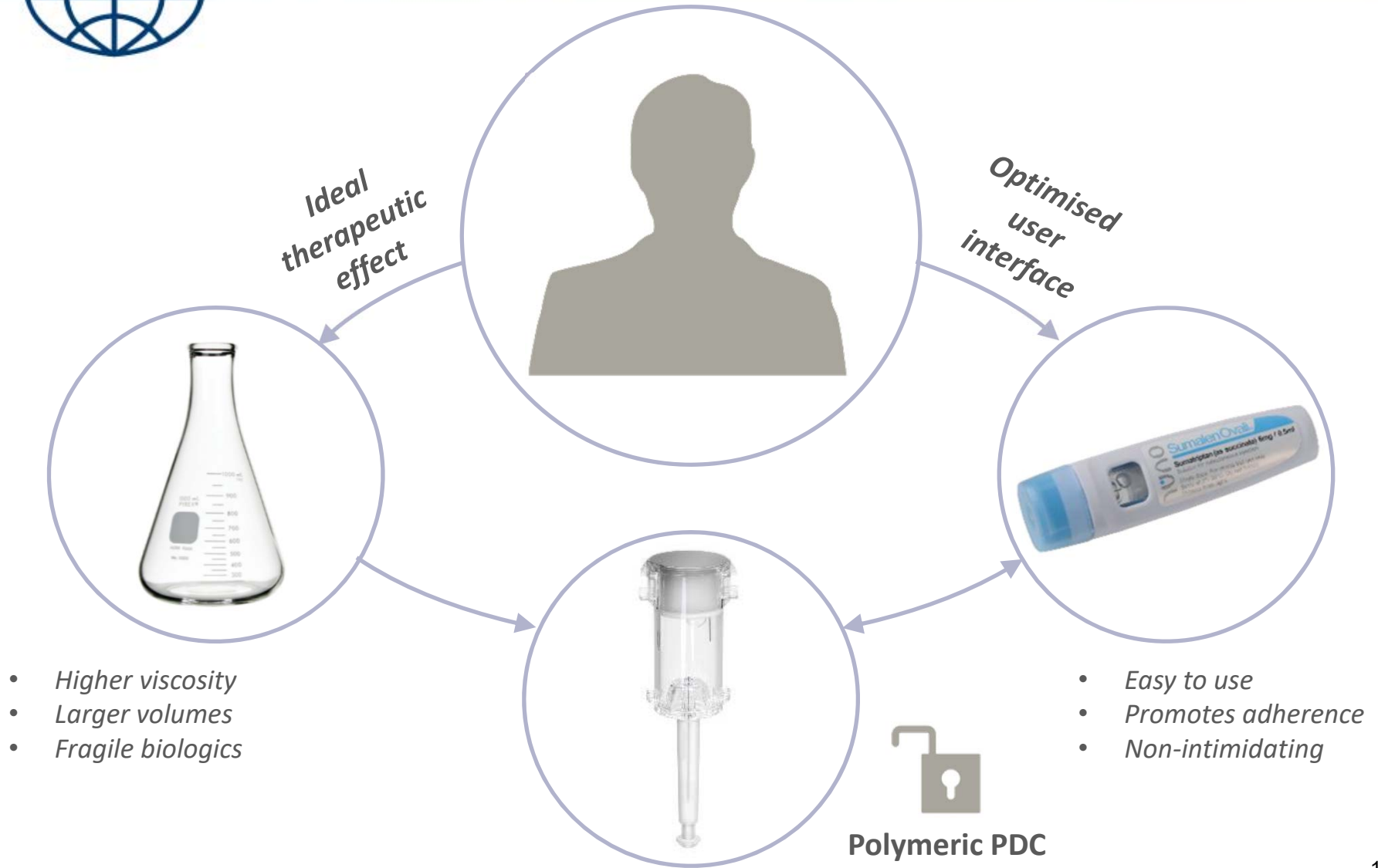
- Needle depth control
- Consistent delivery times
- Portable

Non-intimidating

- Shorter, less frightening form
- Hidden needle
- Low needle insertion force

Others

- Reduced component count
- Robust performance





Questions?