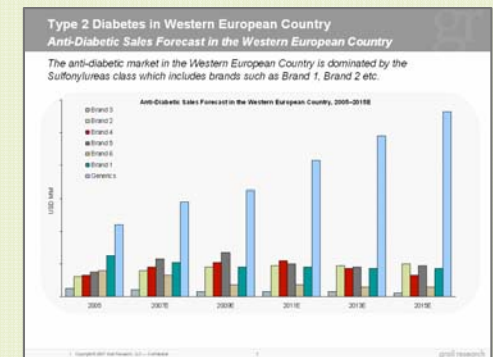
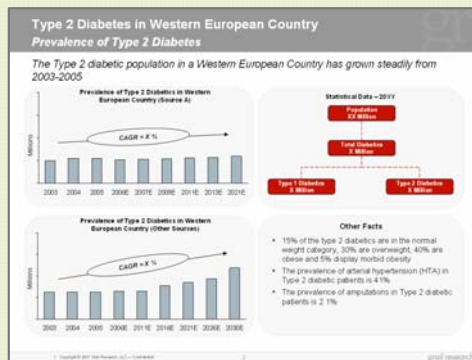


Diabetes in Western European Nation

Life Sciences

- **Objective:** Conduct a quick-cycle study for a Life Sciences Company to evaluate the economic toll that diabetic complications have on a Western European Nation's healthcare system
- **Role of Grail Research:** Leveraged industry-specific expertise and local language resources to provide a fresh, objective perspective on this issue despite a compressed timeline



Gathered data from country-specific sources

Interviewed industry-experts to fill any data gaps

Analyzed all collected data and presented final output

1 day

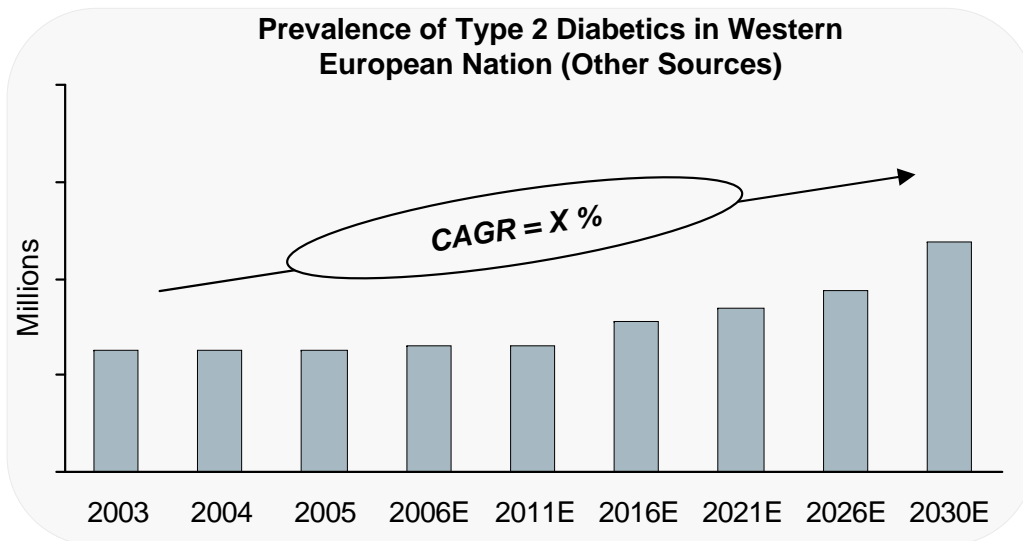
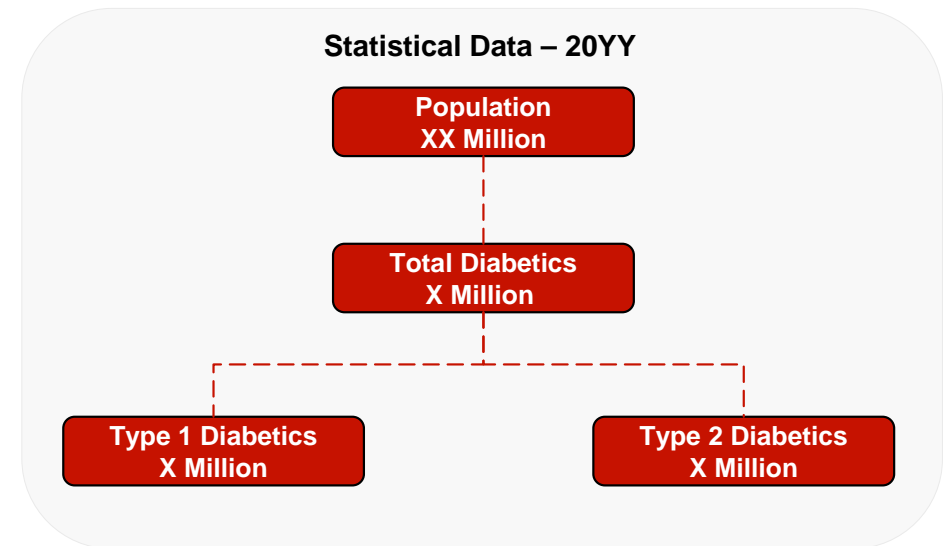
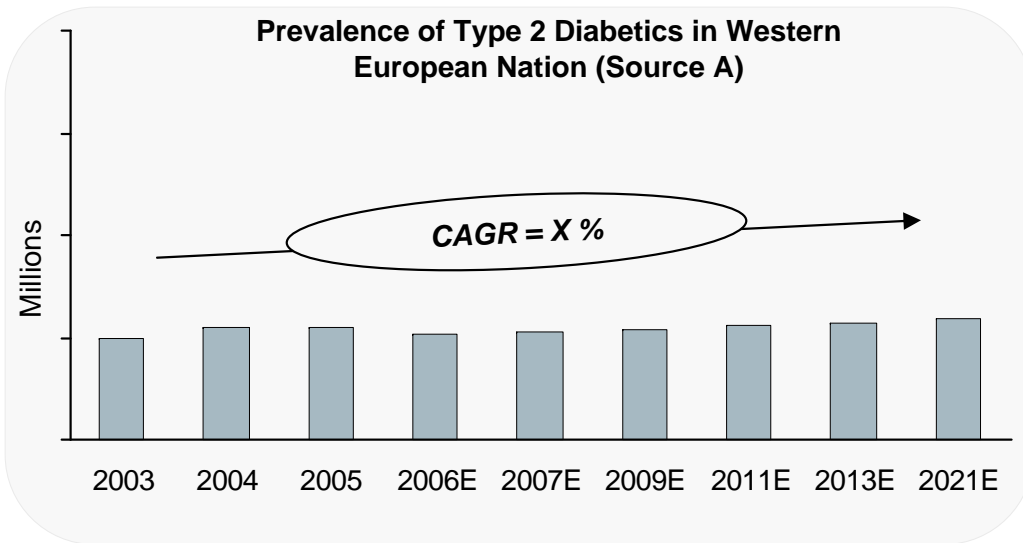
2 days

1 day

Diabetes in Western European Nation

Prevalence of Type 2 Diabetes

The Type 2 diabetic population in a Western European Nation has grown steadily from 2003-2005



- Other Facts**
- XX% of the type 2 diabetics are in the normal weight category, XX% are overweight, XX% are obese and X% display morbid obesity
 - The prevalence of arterial hypertension (HTA) in Type 2 diabetic patients is XX%
 - The prevalence of amputations in Type 2 diabetic patients is X%

Diabetes in Western European Nation

Cost of Type 2 Diabetes (Study – 20YY)

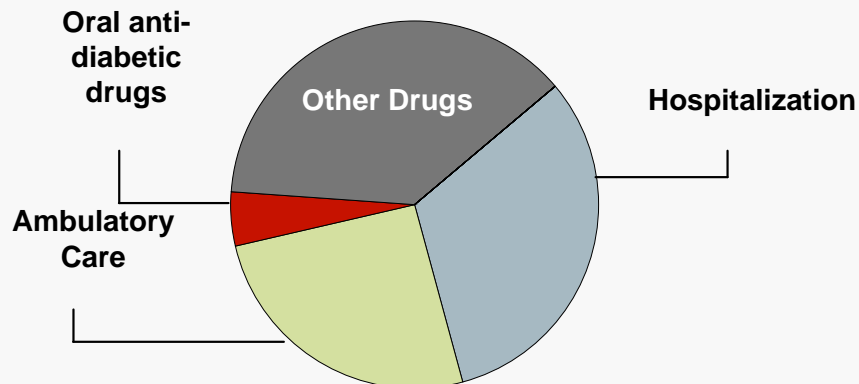
In the Western European Nation, drugs accounted for the greatest healthcare costs (XX%), followed by hospital care (XX%), and ambulatory care (XX%)

The study was conducted in 20YY to measure the total healthcare costs of Type 2 diabetes in Europe. It evaluated over 7000 Type 2 diabetic patients across 8 European nations

Information on Western European Nation Study

- Prevalence of Type 2 diabetes: XMM patients (X% of population)
- Percentage of patients hospitalized in the six-month study period: X%
- Average length of stay per hospitalization: X days
- *Demographic data:*
 - Average age in years: XX
 - Male / Female (%): XX / XX
 - Mean BMI (kg/m²): XX
 - Mean time since diagnosis in years: XX ± XX

Per Patient Costs



Annual Direct Medical Cost Per Patient: EUR XX

National Costs For Resources

- General practitioner visit: EUR XX
- Diabetologist visit: EUR XX
- Other visit: EUR XX-XX
- Paramedical visit: EUR XX-XX
 - Physiotherapist: EUR XX
 - Nurse: EUR XX-XX
 - Footcare: EUR XX
- ICU: EUR XX
- Ward: EUR XX
- Emergency: EUR XX-XX

The total annual direct health care costs of Type 2 diabetes in the Western European Nation were EUR XX Bn in 20YY

Diabetes in Western European Nation

Cost of Diabetes (Department of Economics Study)

As per estimates, diabetic patients consume 5-6% of the healthcare expenditures in the developed countries

Following are the findings of the study conducted by Department of Economics – University A

Other Data Points from the Study

Costs of Diabetic Patients, 20YY

	Cost of Diabetes Mellitus (Type1 + Type2) (EUR MM)	Estimated Cost of Type 2 Diabetes (EUR MM)
Cost of Insulin & Oral Hypoglycemic Agents	XX	XX
Other Drugs	XX	XX
Consumable Goods	XX	XX
Visit to Specialists & Dialysis	XX	XX
Primary Care Visits	XX	XX
Hospital Costs	XX	XX
Total cost (A)	XX	XX
Diabetes Mellitus Patients (B)	XX	XX
Per Patient Cost (EUR) (A/B)	XX	XX

Key Findings:

- In YYYY, the total costs associated with diabetes were nearly EUR XXMM, with an average cost of EUR XX per patient annually
- Hospitalization costs represented a major portion of all costs (XX%), followed by doctor and hospital outpatient visits (XX%), anti-diabetes drugs (XX%), laboratory tests (XX%), and dialysis (X%)
- The **direct health care costs** of diabetes were EUR XXMM, or EUR XX per patient annually (XX% of the total cost of a diabetic patient)
- The **indirect health care costs** were EUR XXMM (XX% of the total cost)

Diabetes in Western European Nation

Complications (Across 7 major markets)

Type 2 Diabetes is coupled with a range of microvascular and macrovascular complications

- A physician survey for Type 2 Diabetes revealed that in 20YY, an average of XX% of diagnosed Type 2 diabetes patients across the seven major markets have complications
- Type 2 diabetes is associated with the following **long-term complications**:
 - **Microvascular complications**: Includes nephropathy, retinopathy and neuropathy
 - » Survey results generated by extensive clinical checks indicate an average of XX% of Type 2 Diabetic patients have microvascular complications
 - **Macrovascular complications**: Includes atherosclerosis, coronary artery disease, stroke and peripheral vascular disease
 - » Checks with clinicians suggest that an average of XX% of Type 2 Diabetic patients have macrovascular complications

Microvascular Complications across seven major markets

- **Nephropathy:**
Characterized by weakening of kidneys' ability to properly filter circulating blood
- Among the diagnosed Type 2 diabetic patients: XX% have microalbuminuria, XX% have proteinuria, and X% have end-stage renal disease

- **Retinopathy:**
Characterized by a broad range of ophthalmologic problems caused by hyperglycemia
- Among the diagnosed Type 2 diabetic patients: XX% have retinopathy

- **Neuropathy:**
Characterized by development of temporary or permanent damage to nerve tissue due to hyperglycemia and decreased blood flow
- Among the diagnosed Type 2 diabetic patients: XX% have neuropathy

Macrovascular Complications across seven major markets

- Macrovascular complications include cardiovascular disease, stroke, myocardial infarction (MI), and coronary artery disease (CAD)
- Among the total diagnosed Type 2 diabetic patients: XX%, XX%, and XX% have suffered stroke, MI, and CAD respectively

Diabetes in Western European Nation

Costs Associated with Complications

Microvascular complications, such as Nephropathy, Retinopathy, and Neuropathy account for a majority of complications in Type 2 Diabetic patients

Nephropathy

- In 20YY, direct costs associated with renal complications in the Western European Nation were:
 - Annual haemodialysis cost: EUR XX
 - Annual peritoneal dialysis cost: EUR XX
 - Annual renal transplantation cost: EUR XX
- In 20YY, the average cost of treatment with dialysis in the Western European Nation was between EUR XX and XX for each session

Neuropathy

- In 20YY, following were the direct costs associated with Neuropathy and Foot Ulcers in Western European Nation:
 - Annual neuropathy cost: EUR XX
 - Lower extremity amputation cost: EUR XX
 - Prosthesis: EUR XX
 - Gangrene treatment: EUR XX

Retinopathy

- In 20YY, following were the direct costs associated with ophthalmologic complications in Western European Nation:
 - Laser treatment cost: EUR XX
 - Cataract operation cost: EUR XX
 - Annual cost following cataract operation: EUR XX

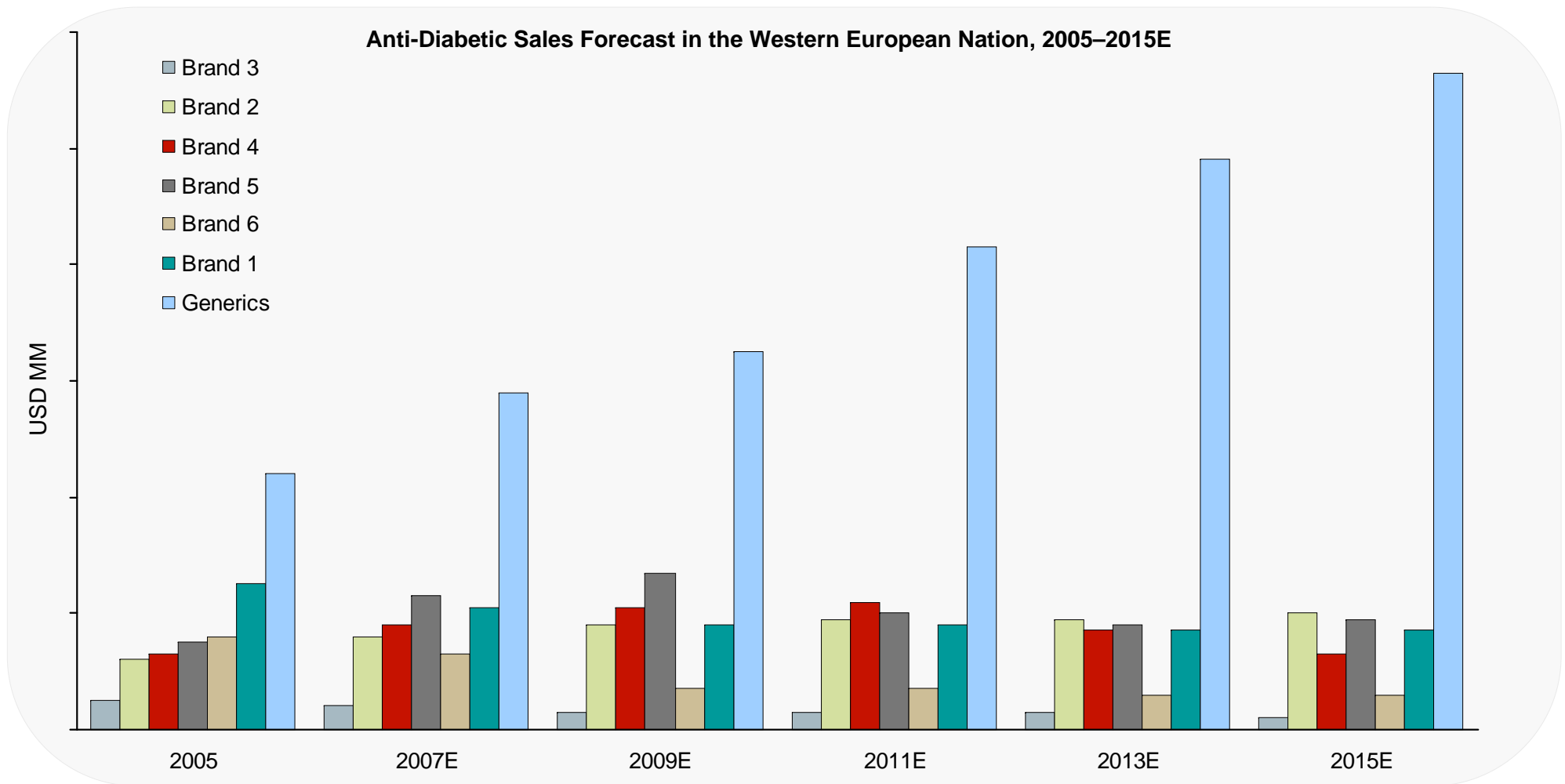
Other Complications

- In 20YY, direct costs associated with other diabetic complications in the Western European Nation were:
 - Annual myocardial infarction cost: EUR XX
 - Annual coronary heart failure cost: EUR XX
 - Annual stroke cost: EUR XX
 - Annual angina cost: EUR XX
 - Cost of hypoglycemic events requiring medical assistance or resulting in coma/seizure: EUR XX
 - Cost of ketoacidosis/lactic acid events: EUR XX

Diabetes in Western European Nation

Anti-Diabetic Sales Forecast in the Western European Nation

The anti-diabetic market in the Western European Nation is dominated by the Sulfonylureas class which includes brands such as Brand 1, Brand 2 etc.



Diabetes in Western European Nation

Price Comparison of Major Anti-Diabetics

Price Comparison of Major Anti-diabetics

Drug	Molecule/Class	Specification	Retail Price
Brand 1	GLIMEPIRIDE	X mg / XXX Capsules	EUR XX
		X mg / XXX Capsules	EUR XX
Brand 2	GLICLAZIDE	XX Capsules	EUR X
Brand 3	GLIBENCLAMIDE	X mg / XXX Capsules	EUR X
Brand 5	PIOGLITAZONE	XX mg / XX Capsules	EUR XX
		XX mg / XX Capsules	EUR XX
		XX mg / XX Capsules	EUR XX
		XX mg / XX Capsules	EUR XX
Brand 4	ROSIGLITAZONE	X mg / XX Capsules	EUR XX
		X mg / XX Capsules	EUR XX
		X mg / XX Capsules	EUR XX

Diabetes in Western European Nation

Pre-diabetes

About XX – XX% of people with pre-diabetes will develop type 2 diabetes in next X years

Pre-diabetes

- Pre-diabetes is an early stage of diabetes, where the level of glucose in the blood becomes higher than normal, but not high enough to be diagnosed with diabetes
 - Pre-diabetic patients are at increased risk of developing type 2 diabetes and cardiovascular diseases
- In Europe, over XX million people (~8% of total population) are estimated to have pre-diabetes and a vast majority of these people are ignorant of their condition
- In the Western European Nation, IGT (Impaired Glucose tolerance) prevalence is X% of population and IFG (Impaired Fasting Glucose) prevalence is X% of population

Diagnosis Tests for Pre-diabetes

Fasting Plasma Glucose (FPG)

- FPG test measures the amount of glucose remaining in the blood when the person has not had food or drinks for at least 8 hours
- Diagnostic criteria for pre-diabetes and diabetes based on FPG level:
 - ≥ 126 mg/dL: Diabetes
 - ≥ 100 mg/dL and < 126 mg/dL: Pre-diabetes
 - < 100 mg/dL: Normal
- If FPG level ≥ 100 mg/dl, patient is referred to have IFG

Oral Glucose Tolerance Test (OGTT)

- OGTT measures the amount of glucose in the blood when the person has not had food or drinks for at least 4 hours. The level is recorded both before and after 2 hours when the person has eaten food containing specific amount of carbohydrates
- Diagnostic criteria for pre-diabetes and diabetes based on OGTT:
 - ≥ 200 mg/dL: Diabetes
 - ≥ 140 mg/dL and < 200 mg/dL: Pre-diabetes
 - < 140 mg/dL: Normal
- If OGTT level ≥ 140 mg/dl, patient is referred to have IGT

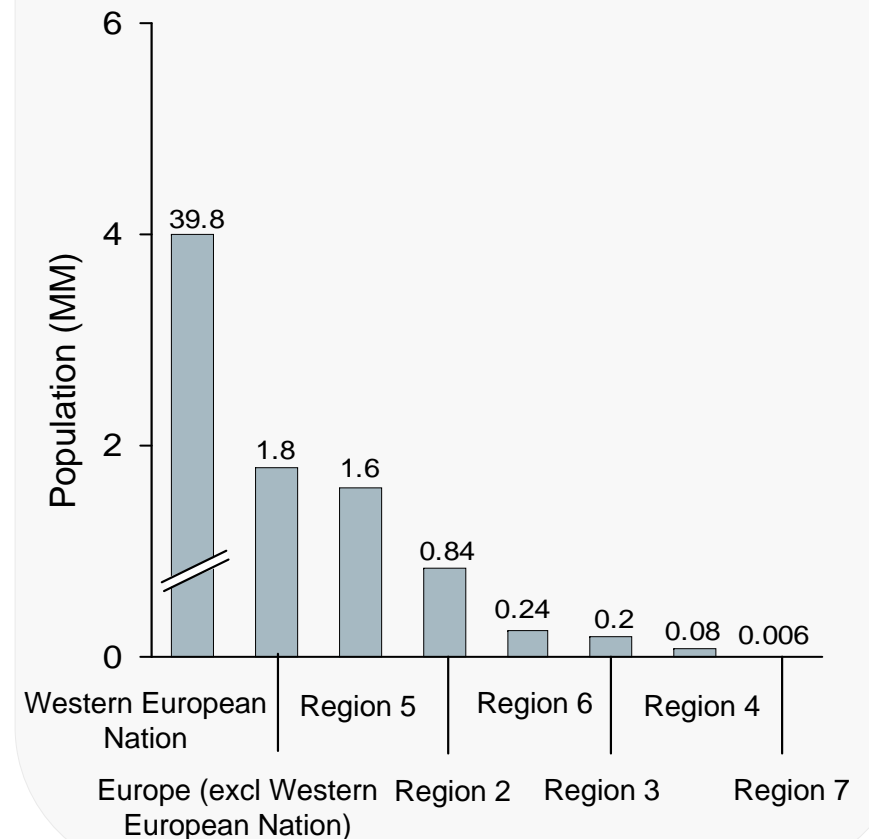
Diabetes in Western European Nation

Ethnic distribution of total population

People from Regions 3, 4, 5 and 6 have higher risk of pre-diabetes

Place of Origin	Population	% of total population
Europe (excluding the Western European Nation)	XXX	4.04%
Western European Nation	XXX	89.18%
Region 1	XXX	1.89%
Region 2	XXX	0.45%
Region 3	XXX	0.18%
Region 4	XXX	3.72%
Region 5	XXX	0.54%
Region 6	XXX	0.01%
Total	XXX	100.00%

Ethnic Distribution of Western European Nation Population, 20YY



Research Challenge

- Life Sciences company sought a current, comprehensive account of Diabetic complications impact on a Western European Nation's healthcare system
- Life Sciences entity did not possess the linguistic capabilities and the resources required to generate this perspective

How Grail Research Delivered

- Conducted research and interviews geared to identify and synthesize critical market intelligence from a number of disparate sources published in local language
- Armed Life Sciences Entity with a fresh, thorough assessment of Diabetes impact on a Western European Nation's healthcare system despite compressed timeline
- Client pursues research relationship with Grail Research