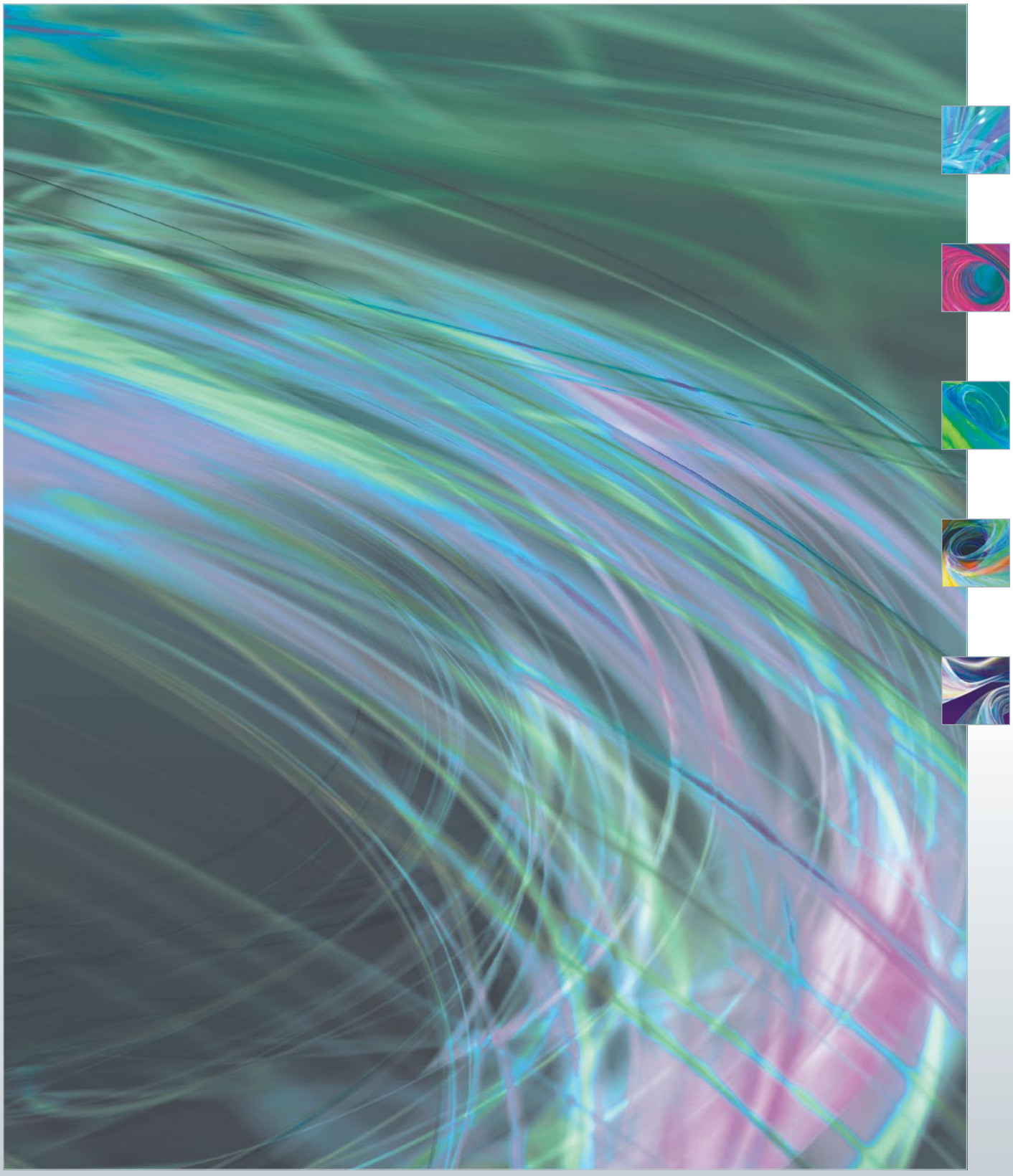
Alliance FOR AGING RESEARCH

Chronic Disease and Medical Innovation in an Aging Nation

The Silver Book®: Diabetic Retinopathy



The Silver Book®: Diabetic Retinopathy

Diabetic retinopathy (DR) is a serious, irreversible eye disease that can occur in people with diabetes, and is a leading cause of blindness around the world. Because diabetes is becoming increasingly common in industrialized and even developing countries, DR could impact as many as 191 million people around the globe by 2030.

Vision loss from DR can be avoided with proper management and treatment, and risk is more common in people who have poorly controlled diabetes. The International Council of Ophthalmology (ICO) Diabetic Eye Care Guidelines outline best practices for screening and detection of DR, as well as assessment and management of DR patients.

Despite these clinical standards and the availability of effective treatments, as many as 50% of people with diabetes are not getting regular eye exams, or are diagnosed too late for treatment to be effective. Patients are often unaware of the seriousness of DR and the need for early detection and treatment, many countries lack the capacity to screen patients with diabetes, and treatment may be accessible to only a few. Countries and communities need to adopt policies that promote effective education, screening, detection, and management of DR.

Non-proliferative diabetic retinopathy (NPDR) is the early stage of DR, and **proliferative diabetic retinopathy (PDR)** is the late stage of the disease. PDR is sight-threatening and is characterized by the growth of abnormal blood vessels in the retina. These blood vessels can bleed and cause scarring and retinal detachment. **Diabetic macular edema (DME)** is an accumulation of fluid from leaking blood vessels in the macula — the part of the retina that controls detailed vision — and can occur at any stage of DR, but is more likely as the disease progresses and can lead to total blindness.

The Silver Book®: Chronic Disease and Medical Innovation in an Aging Nation is an almanac of thousands of facts, statistics, graphs, and data from hundreds of agencies, organizations, and experts. These statistics spotlight the mounting burden of chronic diseases that disproportionately impact older Americans, and the promise of innovation in mitigating that burden.

Launched in 2006, *The Silver Book®* has become a trusted resource for health policy practitioners and thought leaders and has featured volumes and factsheets on osteoporosis, thrombosis & AFib, heart disease, persistent pain, cancer, healthcare-associated infections, infectious diseases & prevention through vaccination, vision loss, diabetes, and neurological diseases. All data is available online at **www.silverbook.org**, where users can access more than 2,900 facts, statistics, graphs, and data from more than 800 references. All data is cited and when possible, linked to the original source online.

www.silverbook.org/DR

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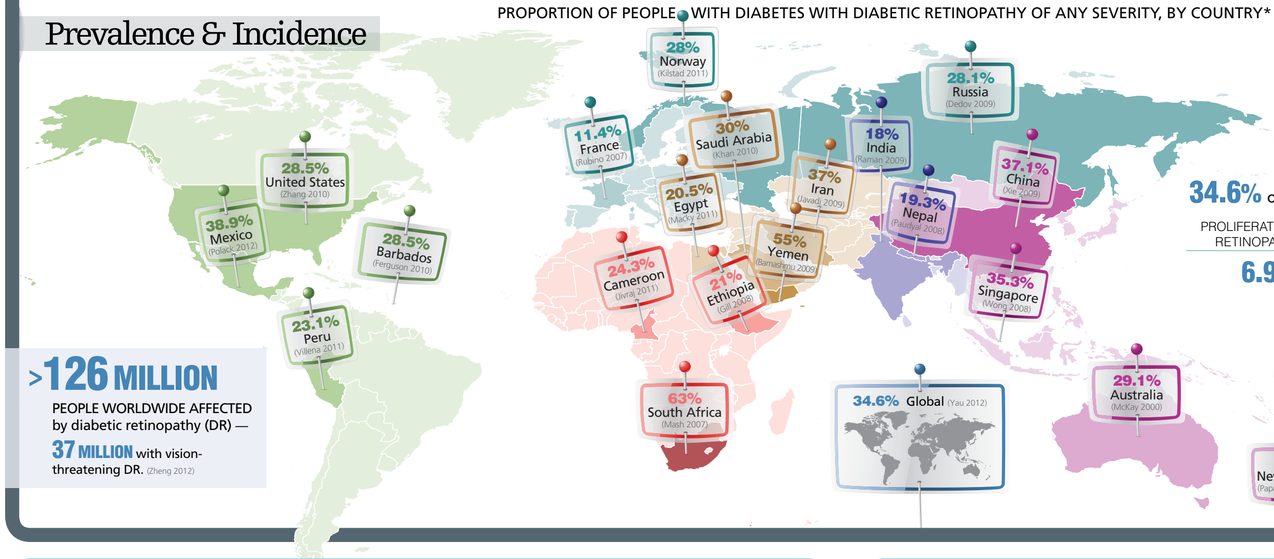
Prevalence & Incidence

PROPORTION OF PEOPLE WITH DIABETES WITH DIABETIC RETINOPATHY OF ANY SEVERITY, BY COUNTRY*



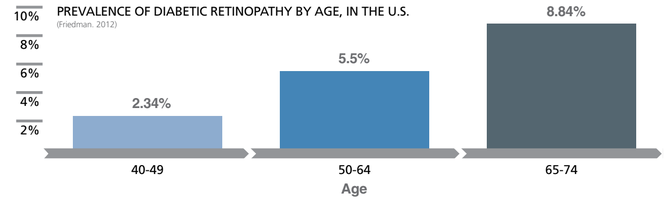
Key

	No data available	0-20%	21-40%	41-60%	61-80%
Africa					
Americas					
South-East Asia					
Europe					
Eastern Mediterranean					
Western Pacific					

*map figures are for both Type 1 & 2

34.6% of people living with DIABETES GLOBALLY have some degree of DR.

PROLIFERATIVE DIABETIC RETINOPATHY (PDR)	DIABETIC MACULAR EDEMA (DME)	VISION-THREATENING DR
6.96%	**6.81%**	**10.2%** (Zheng 2012)



>126 MILLION

PEOPLE WORLDWIDE AFFECTED by diabetic retinopathy (DR) — **37 MILLION** with vision-threatening DR. (Zheng 2012)

The **RISK** OF DR **INCREASES** the longer a person has diabetes. Of those who have diabetes for 20+ YEARS . . .

MORE THAN **75%** will have some form of DR. (WHO 2005)

The Value of Innovation

Appropriate treatment can **REDUCE THE RISK** of blindness or moderate vision loss from DR by (WHO 2005)

TIGHT BLOOD PRESSURE CONTROL in type 2 diabetes patients **reduced progression of DR** by **34%** and **risk of deterioration** by **47%** after 9 years. (UKPDS 1998)

Adequately trained **general practitioners** can **screen** for DR with **90% sensitivity** using **tele-ophthalmology**. (Andonegui 2010)

INTENSIVE GLYCEMIC CONTROL in people with diabetes reduced their:

Adjusted mean risk of DR by	76%
Risk of progression by	54%
Rates of laser surgery by	56%
Risk of DME by	23%

(WHO 2005)

Use of REMOTE INTERPRETATION of retinal imaging in diabetics **sent via tele-ophthalmology**, **improved the frequency of screening** from **32%** to **71%** in only 12 months. (Garg 2012)

LASER TREATMENT of PDR can **reduce** the 5-year **risk** of **BLINDNESS** by **90%**, and the risk of **VISUAL LOSS** from DME by **50%**. (Lang 2007)

Use of a MOBILE EXAMINATION for DR screening in Finland **decreased visual impairment** by **86%** in the covered area. (Hautala 2013)

Nearly **50%** of DME patients who received an ANTI-VEGF DRUG, experienced substantial **visual improvement after a year of injections**. (Bressler 2010)

An anti-VEGF therapy for DME **improved vision by more than 15 letters** in approximately **36-51%** of participants in a trial. (Brown 2013)

LASER TREATMENT plus a VEGF INHIBITOR achieved an **incremental cost-effectiveness ratio** of: **$12,410 per quality adjusted life year** in patients with DME. (Pershing 2014)

By treating DR, the **U.S. SAVES** an estimated **$1.6 BILLION** annually. (Lighthouse Int'l)

The Human Burden

DR is **ONE of the LEADING CAUSES** of **vision loss**. (Zheng 2012)

In 2010, **~2.6%** of WORLD BLINDNESS was due to DR (Bourne 2013)

A quality of life survey of **legally blind DR patients** found that **41%** would be willing to trade their remaining years for **perfect vision**. (Brown 1999)

Patients with **severe DR** have:

- poorer QUALITY OF LIFE
- reduced PHYSICAL, EMOTIONAL & SOCIAL WELLBEING
- increased use of HEALTHCARE RESOURCES

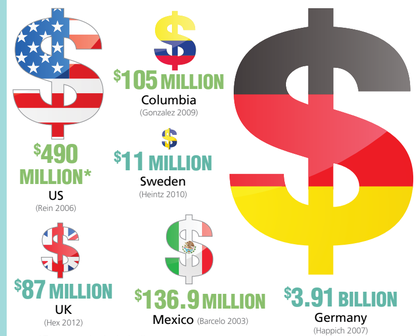
(Fenwick 2012)

Percent of Blindness in 2010 Due to DR by Region (Bourne 2013)

4.30%	Asia Pacific, high income
4%	Asia, central
1.10%	Asia, east
2.80%	Asia, south
1.40%	Asia, southeast
4.30%	Australasia
2.30%	Caribbean
3.70%	Europe, central
4%	Europe, eastern
4.20%	Europe, western
2.50%	Latin America, Andean
2.50%	Latin America, central
5.50%	Latin America, southern
2.90%	Latin American, tropical
3.50%	North Africa/Middle East
3.90%	North America, high income
1.40%	Oceania
3%	Sub-Saharan Africa, central
2.40%	Sub-Saharan Africa, east
3.40%	Sub-Saharan Africa, southern
3.10%	Sub-Saharan Africa, west

The Economic Burden

Annual Direct and Indirect Costs of Diabetic Retinopathy



*Does not include indirect costs

The Future Burden

PEOPLE AFFECTED WORLDWIDE:

BY 2030 **>191 MILLION** with diabetic retinopathy— **56 MILLION** with vision-threatening DR (Zheng 2012)

The rise of DR will **disproportionately impact** the poorest populations, since **80%** of people with diabetes **LIVE IN LOW-MIDDLE INCOME COUNTRIES**. (IDF 2013)

Challenges & Opportunities

Despite clinical standards for detection and the availability of effective treatments, as many as 30% of high-risk diabetes patients never have a retinal exam, and less than 40% of those at high-risk for vision loss receive treatment (WHO 2005)*. Countries and communities must adopt culturally, politically, and socioeconomically appropriate policies that promote effective education, screening, detection, and management of DR that are feasible and cost-effective.*

Raising Awareness About Impact

Patients with diabetes are often unaware of the seriousness of DR and the critical need for regular retinal exams, prevention, and timely treatment. Educational campaigns should:

- Discuss DR as a serious disease itself, not just as a complication of diabetes.
- Be patient-centered and emphasize the potential for vision loss and blindness.
- Involve primary care providers (PCPs) and allied health professionals in encouraging annual retinal exams to detect the often asymptomatic early stages of DR.
- Promote diabetes management and regular monitoring of eye health.
- Adapt messaging to be accessible for all cultures and groups within a society.

Building Capacity

Many countries still have only one ophthalmologist per 250,000 to 1 million people, located mostly in urban areas — often leaving rural areas underserved (Resnikoff 2012). New and existing programs must:

- Provide special and continuing education for PCPs on importance of diabetes management and screening.
- Build capacity of physicians who manage patients with diabetes at primary, secondary and tertiary levels.
- Offer training and incentives to increase the number of ophthalmologists available to treat DR.
- Improve infrastructure and equipment in secondary and tertiary level eye care treatment centers.
- Institute screening for DR using approaches adapted to the local setting, preferably using digital imaging.
- Make screening affordable and use low-cost interventions that target improved compliance.
- Ensure clear referral pathways to diagnosis and treatment for those who fail screening.
- Provide a clear path to reimbursement for healthcare professional time and services.
- Explore mobile health care services to supplement traditional medical offices, as a way to connect with available treatments.

Measuring Success

Quality DR care extends beyond self-reports of yearly retinal exams. Successful programs should:

- Promote compliance and self-management strategies for effective control of diabetes.
- Reduce the incidence of sight threatening DR through improved control of risk factors.
- Use sustainable, cost-effective approaches to the detection and treatment of DR.
- Increase the proportion of known people with diabetes who undergo annual retinal examination.
- Ensure that all identified with sight threatening DR undergo timely examination and treatment by a competent ophthalmologist.
- Promote collaboration between physicians and eye care providers at every level in the health system.
- Encourage collaboration amongst projects and countries using common indicators.

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