

## National centers of excellence in glaucoma

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**Accepted: October 17, 2015**

### Abstract

Glaucoma refers to a group of related eye disorders that have in common an optic neuropathy associated with visual function loss. It is the second leading cause of blindness in developed countries and Romania and the first cause of irreversible blindness worldwide.

In Europe, 2% of the population over 40 and 7% of the population over 80 have glaucoma. In Romania, there are no official statistics concerning glaucoma disease, but it was estimated that over 160000 Romanians suffer from this disease and only 50% of them are undergoing treatment.

The silent evolution of the disease, the deficient sanitary education, the lack of well structured national programs for screening and follow-up and the lack of adherence to treatment and check-ups, are the causes of late diagnosis and irreversible visual function loss.

The article emphasizes the need for national centers specialized in managing patients with glaucoma, from prevention, screening, early diagnosis to treatment and monitoring.

**Key words:** glaucoma, national centers, experts, standard screening, national data base.

### Introduction

Glaucoma is the second leading cause of blindness in developed countries and Romania and the first cause of irreversible blindness worldwide. It refers to a group of related eye disorders that have in common an optic neuropathy associated with visual function loss. Glaucoma can damage vision gradually so it may not be noticed until the disease is at an advanced stage. Unlike other diseases, glaucoma is

treatable and visual function can be preserved [1] [2].

Diagnosis of this disease is easily established, even in early stages by measuring intraocular pressure (IOP), gonioscopy, visual field examination and optic nerve examination [3].

The disease affects 3.54% of the population with ages between 40 and 80 years in the world. In 2013, it was estimated that 64.3 millions of people in the world suffer from this disease.

Almost 10% of affected individuals are now blind [4].

Predictions say that by the year 2020, the population affected will rise to 76 million and by 2040, it will be 111.8 million [4].

In Europe, 2% of the population over 40 and 7% of the population over 80 have glaucoma. In Romania, there are no official statistics concerning glaucoma disease, but it was estimated that over 140000 Romanians suffer from this disease and only 50% of them are undergoing treatment [5] [6].

In Romania, the silent evolution of the disease, the deficient sanitary education, the lack of well structured national programs for screening and follow-up, the lack of adherence to treatment and check-ups, are the causes of late diagnosis and irreversible visual function loss.

### **National centers of excellence in glaucoma**

The fight against glaucoma is a common effort of the Romanian Ophthalmology Society (SRO), the Romanian Glaucoma Society (SRG), all ophthalmologists, general practitioners and companies producing antiglaucoma drugs. The common goal of those mentioned is maintaining the quality of life (QoL) of patients suffering from glaucoma.

National centers of excellence in glaucoma are independent, impartial entities formed by well trained health care professionals.

Such centers are needed to create and maintain a scientific and professional environment regarding medical practice and scientific data about glaucoma disease and to optimize the quality of the medical act. Similar centers already exist in Europe and have major social and medical implications. Medical personal can work as volunteers and companies producing antiglaucoma drugs of medical supplies can help equip the center.

## **Objectives**

### **1. Creating a national data base**

It must contain the number of patients diagnosed with glaucoma per year, the number of new patients diagnosed, the number of patients suffering from the disease which are currently supervised by a doctor.

Having this information well organized can make it easy to establish predictions concerning glaucoma, to conduct medical research and to enroll patients into medical trials.

### **2. Creating a national standard screening for patients**

An existing screening program for patients would ensure an earlier diagnosis, thus reducing the number of patients with irreversible visual function loss by starting treatment.

### **3. Creating a screening chart for glaucoma**

This chart must contain statistical data: number of patients suffering from the disease, the type and the evolution stage of the disease, information about diagnosis and risk factors, frequently used therapies.

#### ***Glaucoma screening chart***

First name:

Last name:

Date of birth:

A. Medical history

B. Stages in diagnosis:

- Visual acuity;

- Autorefractometry;

- Measuring the intraocular pressure (IOP): Goldmann (gold-standard in measuring IOP), non-contact tonometry, DCT, ORA, Ocuton S, Tono-Pen, etc;

- Pachymetry;

- Gonioscopy;

- Van Herick's method;

- UBM/OCT-SA – for special cases (it can establish the mechanism for angle closure);

- Visual field: static perimetry: baseline, follow-up at 3 months; for progression: 4 visual field exams/year, for 2 years; if the patient is diagnosed with intraocular hypertension (IOHT), the visual field exam is performed once a year;

- Ocular echography;

- Eye fundus (EF) examination:

o Direct examination: ophthalmoscope, EF lens (60, 78 or 90 D)

o Indirect examination: ophthalmoscope;

▪ Vertical cup-to-disc ratio

▪ Neuroretinal ring

▪ Nasal deviation of the vessels

▪ Peripapillary atrophy

- Optic disk hemorrhages
- Stereo photography of the EF;
- HRT (baseline, follow-up at 3 months, then 4 times/year for two years);
- OCT (baseline, follow-up at 3 months, then 4 times/year for two years);
- GDx-ECC.

#### C. Risk factors analysis

- Family history
- Medication
- Corticotherapy (topical/systemic)
- Ocular trauma (contusion)
- Refractive surgery
- Cardiovascular diseases/ chronic respiratory diseases
- Vascular diseases
- Ocular perfusion pressure
- Central cornea thickness
- Myopia
- Pseudo exfoliations

#### D. Additional examination and tests

- Hemoleucogram
- CRP
- Glycemia
- Lipid profile
- Cardiologic examination
- Pulmonary X-ray
- Carotid Doppler echo

#### E. Glaucoma classification

- Primary congenital glaucoma
- Late-onset childhood open-angle glaucoma (early juvenile glaucoma)
  - Primary juvenile glaucoma
  - Secondary childhood glaucoma
  - Intraocular hypertension
  - Primary open-angle glaucoma suspect
  - Primary open-angle glaucoma (POAG)
  - Secondary open-angle glaucoma
    - Exfoliative (pseudoexfoliative) glaucoma
    - Pigmentary glaucoma
    - Uveitic glaucoma
    - Lens-induced open-angle glaucoma
    - Glaucoma associated with intraocular hemorrhage
      - Neovascular glaucoma
      - Glaucoma due to intraocular tumor
      - Open-angle glaucoma due to ocular trauma

○ Glaucoma due to corticosteroid treatment

○ Secondary open-angle glaucoma due to ocular surgery and laser

○ Glaucoma associated with retinal detachment

○ Glaucoma caused by increased episcleral venous pressure

- Primary angle-closure

○ Primary angle-closure suspect (“occludable” angle)

○ Acute angle-closure with papillary block mechanism

○ Acute angle-closure with plateau iris configuration

○ Intermittent angle-closure

○ Chronic angle-closure glaucoma

○ Status post-acute angle-closure

- Secondary angle-closure

○ Secondary angle-closure with papillary block

○ Secondary angle-closure with anterior “pulling” mechanism without papillary block

▪ Neovascular glaucoma

▪ Iridocorneal endothelial syndrome

▪ Posterior polymorphous dystrophy

▪ Epithelial and fibrous ingrowth after anterior segment surgery or penetrating trauma

▪ Inflammatory membrane

▪ Peripheral anterior synechiae after ALT

▪ Aniridia

○ Secondary angle-closure with posterior “pushing” mechanism without papillary block

▪ Aqueous misdirection

▪ Iris and ciliary body cysts, intraocular tumors

▪ Silicon oil or other tamponading fluids or gas implanted in the vitreous cavity

▪ Uveal effusion

▪ Retinopathy or prematurity

▪ Congenital anomalies that can be associated with secondary glaucoma

+ ocular/ systemic associated diseases

#### F. Treatment

##### I. Drug therapy

##### a. Local therapy:

○ First line of treatment:

▪ Prostaglandin analogs

▪ Beta-receptor antagonists

▪ Carbonic anhydrase inhibitors

- Alpha-2 selective adrenergic agonists
- Fixed combinations/ multiple drug therapy

○ Second line of treatment:

- Non selective adrenergic agonists
- Parasympathomimetics (cholinergic drugs)

b. Systemic therapy:

- Carbonic anhydrase inhibitors: acetazolamide, metazolamide, dichlorofenamide
- Osmotics: glycerol, mannitol, isosorbide

## II. Laser surgery

- a. Laser iridotomy
- b. Laser trabeculoplasty
- c. Laser iridoplasty
- d. Cyclophotocoagulation

## III. Incisional surgery

- a. Trabeculectomy
- b. Trabeculotomy
- c. Deep sclerectomy
- d. Viscocanaloplasty
- e. Canaloplasty
- f. Long-tube drainage devices
- g. Cataract and glaucoma surgery (lens extraction).

## 4. Implementing latest generation methods in diagnosis

Diagnosing glaucoma in early stages is very important for preserving visual function and visual field. The latest methods of diagnosis, with high specificity and sensibility, help achieving this goal, thus improving QoL for patients diagnosed.

Some examples of such methods are:

- HRT: scanning laser ophthalmoscopy: analyses the retinal nerve fibers layer and the optic nerve;
- OCT: ocular computer tomography;
- GDx: scanning laser polarimetry;
- SWAP: blue-yellow computer perimetry;
- FDT: double frequency perimetry.

## 5. Improving therapy

Using the latest therapies (antiglaucoma drugs, laser surgery or incisional surgery) provides better outcomes, fewer complications and better adherence to treatment for patients.

## 6. Diagnosing and therapy management for difficult cases in other centers in the country

Being a specialized center for glaucoma, it can provide help in diagnosis, treatment and follow-up for other centers in the country that have difficulties in managing patients with glaucoma. Cases that surpass the professional knowledge of others can be referred to the center.

## 7. Improving management of the disease

Glaucoma is a progressive disease that, left untreated, leads to blindness. The correct management of the disease can prevent that from happening.

Improving screening, diagnosis and treatment and finding better ways for patients to seek medical advice and improve adherence to the prescribed treatment will lead to reducing the number of blindness cases due to glaucoma.

## 8. Standardizing diagnosis and treatment methods

An important goal of the National Centers of Excellence in Glaucoma is standardization of diagnosis and treatment methods in Romania as specified in the European Society of Glaucoma Guide ([www.eugs.org](http://www.eugs.org)).

## 9. Conducting medical research projects

In medicine, continue research is necessary for improving diagnosis, treatment and management of a disease. Up-to-date research can improve QoL for patients, reduce complications of disease or therapy and provide new directions in treatment.

Referring strictly to glaucoma, new research is focused on therapy: neuroprotection, vascular protection, genetic implications in development and evolution of the disease, gene therapy, control of apoptosis and neuropathologic changes of the visual paths and optic cortex produced by glaucoma.

## 10. Conducting randomized clinical trials

Clinical trials are necessary for establishing the efficacy, safety and side-effects of certain therapies and methods of diagnosis. Having access to the glaucoma patients' data base created, an objective of the centers is to conduct randomized national trials concerning diagnosis, treatment, management and follow-up of patients suffering from glaucoma.

### **11. Providing health education for the population**

For patients suffering from glaucoma, early diagnosis is essential. People should be aware of the need for an ophthalmological consult after the age of 40. Also, people with risk factors for ocular disease, especially glaucoma require an ophthalmologic consult at least once a year. Risk factors for glaucoma are considered:

- Family history
- Medication
- Corticotherapy (topical/systemic)
- Ocular trauma (contusion)
- Refractive surgery
- Cardiovascular diseases/ chronic respiratory diseases
- Vascular diseases
- Ocular perfusion pressure
- Central cornea thickness
- Myopia
- Pseudo exfoliations

Knowing the risk factors and keeping the required doctor check-ups are essential factors in preventing the further evolution of the disease. Also, once diagnosed, adherence to treatment and follow-ups will delay visual function loss and prevent blindness.

### **12. Keeping people properly informed**

Just educating the doctors is not enough for preventing the evolution of this disease. People must be properly informed about the symptoms, methods of diagnosis, treatment and monitoring of glaucoma.

Glaucoma campaigns should be organized to inform people about the importance of health education, screening, ophthalmologic consults in early diagnosis of glaucoma. For late stage glaucoma, when visual function is diminished and there are multiple visual field defects, treatment is not as effective.

### **13. Maintaining quality of life of patients**

Patients do not desire just a treatment of the condition they suffer from. Maintaining a proper quality of life is also important, no matter of the stage of the disease.

Treatment can assure an adequate visual function, but side-effects can affect the daily activities of the patient, thus reducing adherence to treatment.

Doctors have to decide on a treatment that will have the lesser impact on QoL, balancing the

efficacy and safety with the least possible side-effects, while also considering the socio-economic costs of the therapy.

**14. Elaborating a methodic letter** for centers with an interest in glaucoma.

### **15. Creating a group of experts in glaucoma**

A goal of the centers is to create a group of ophthalmologists with high knowledge concerning glaucoma disease. Perfecting the training of doctors in this disease will create a group of experts in early diagnosis, monitoring and treatment of glaucoma patients.

Having such a group will provide a way to treat difficult cases of glaucoma and to better manage usual ones. These doctors will be highly trained and skilled in dealing with the disease and its complications.

For this objective to be accomplished, the centers will give out excellence scholarships to encourage performance in this field, thus creating a suitable professional and scientific environment.

Besides promoting high performance and an increased quality of the medical act, creating the group of experts will increase the responsibility doctors have towards patients, but also towards doctors from different hospitals or centers who require an advice or a second opinion regarding difficult cases.

### **16. Glaucoma awareness for other types of medical personnel**

The ophthalmologist isn't the only one involved in managing this disease. For a patient to benefit from the best treatment possible, general practitioners and optometrists must be involved. They must be aware of the importance and the severity of glaucoma.

General practitioners can help in early diagnosing the disease and can educate and support patients in getting the correct treatment. Such a hands-on approach will increase adherence to treatment and to follow-up consults for patients.

### **17. Editing a periodic issue in the Romanian Journal of Ophthalmology**

The Romanian Journal of Ophthalmology already contains articles regarding glaucoma and

glaucoma treatment. An objective of the National Centers of Excellence in Glaucoma is to better organize such articles by creating a separate journal, an issue of the Romanian Journal of Ophthalmology which will contain only glaucoma related articles.

This endeavor will provide quicker access to information and current research about this disease, thus encouraging medical personnel to brush up on the current facts.

### 18. Organizing meetings

Periodic meetings will be organized, separate or as a national manifestation, to discuss topics related to glaucoma, as current research, published articles and better treatment possibilities.

Such meetings can be supported by the companies producing antiglaucoma drugs and can be attended by all medical personnel with a particular interest in the disease.

### 19. Organizing national campaigns supporting the fight against glaucoma

Such campaigns will promote new therapy methods and prevention for glaucoma and will provide access to information for patients suffering from this disease or family members concerned for their relatives or themselves.

### 20. Creating information pamphlets

Pamphlets will be distributed throughout hospitals, general practitioners' offices and optometrists' private practices to give patients a summarized review of glaucoma, from pathogenesis, risk factors, symptoms, methods for diagnosis to treatment and monitoring of progression.

### 21. Attracting sponsors

Sponsors are needed for providing medical equipment for the centers, for the publishing of the magazine and all meetings and campaigns organized.

To summarize, the National Center of Excellence in Glaucoma will promote well trained doctors specialized in screening, early diagnosis and treatment of glaucoma to educate and inform patients on topics related to this disease, thus providing an increased QoL for patients suffering from this disease (Fig. 1).

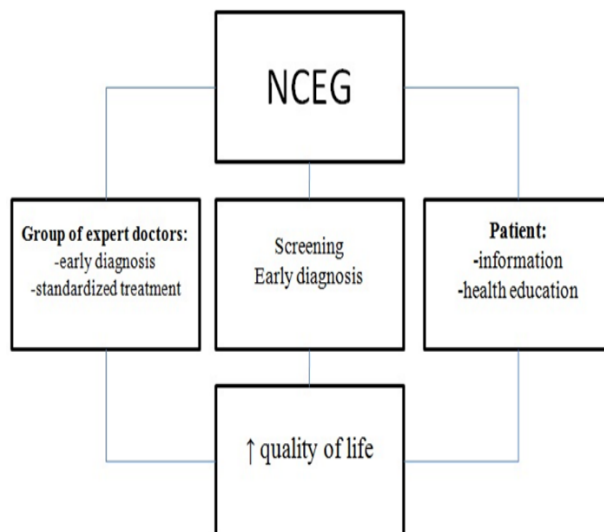
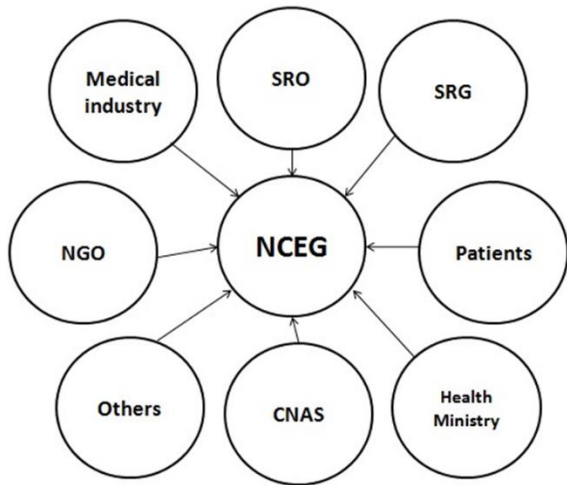


Fig. 1. the purpose of National Centers of Excellence in Glaucoma (NCEG)

### Support

For these centers to be created and well organized, support is needed from different institutions and organizations (Fig. 2):

- The Health Ministry, the Ophthalmology Committee of the Health Ministry
- The National Health Insurance Company (CNAS) and CASAOPSNAJ
- The Romanian Ophthalmology Society (SRO)
- The Romanian Glaucoma Society (SRG)
- Non-governmental organizations and other organizations with an interest in this area of medicine
- Mass-media
- Companies producing or distributing antiglaucoma drugs or ophthalmologic medical supplies; they could provide:
  - o Statistic data related to glaucoma
  - o The newest therapy methods
  - o Involvement of international foundations
  - o Fundraisings and donations
  - o Information pamphlets
  - o Antiglaucoma drug samples
  - o Funding for scientific research and trials
  - o Medical equipment for diagnosis and monitoring
  - o Support for international travels for professional improvement



**Fig. 2.** National Centers of Excellence in Glaucoma's support

## Conclusions

Glaucoma refers to a group of related eye disorders that have in common an optic neuropathy associated with visual function loss. Unlike other diseases, glaucoma is treatable and visual function can be preserved, if diagnosed in early stages.

Glaucoma is the second leading cause of blindness in developed countries and Romania and the first cause of irreversible blindness worldwide.

In Romania, the silent evolution of the disease, the deficient sanitary education, the lack of well structured national programs for screening and follow-up, the lack of adherence to

treatment and check-ups, are the causes of late diagnosis and irreversible visual function loss.

The fight against glaucoma is a common effort of the Romanian Ophthalmology Society (SRO), the Romanian Glaucoma Society (SRG), all ophthalmologists, general practitioners and companies producing antiglaucoma drugs. The common goal of those mentioned is maintaining the quality of life (QoL) of patients suffering from glaucoma.

National centers of excellence in glaucoma are independent, impartial entities formed by well trained health care professionals. Such centers are needed to better manage this disease and to offer patients the best options for diagnosis and treatment there are. They create and maintain a scientific and professional environment regarding management of glaucoma disease and optimize the quality of the medical act.

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