How to Classify, Teach, and Learn Ophthalmic Eponyms

Steven Yale 1, Halil Tekiner 2, Eileen S. Yale 3

1. Internal Medicine, University of Central Florida College of Medicine, Orlando, USA 2. Department of the History of Medicine and Ethics, Erciyes University School of Medicine, Melikgazi, TUR 3. General Internal Medicine, University of Florida College of Medicine, Gainesville, USA

Corresponding author: Steven Yale, steven.yale.md@gmail.com

Abstract

Introduction

There are limited educational studies on effective ways to teach and learn medical eponyms. While there is no consensus on how to best address this issue, developing novel strategies to teach medical eponyms has become critical in many branches of medicine, including ophthalmology.

Materials & Methods

An ophthalmologic eponymic database was created using eight source texts (e.g., books, encyclopedias, and dictionaries) and included the year the eponym was introduced, related name, nationality, specialty, and the eponym's description. PubMed database with a Medical Subject Headings (MeSH) keyword for "eponym" and "eye" and "ophthalmology" and a Google search for a combination of related keywords was also performed. A careful biographical search was conducted for each name in the second phase to obtain further biographical details. Inclusion criteria for eponyms in the dataset were: i) named after at least one person, ii) identified as a specific medical term in the literature, iii) related to any field of medicine. Names derived from art, history, mythology, patient, family, chemistry, botany (or other fields outside of medicine) were excluded. The three authors independently screened to eliminate duplicated names and ensure eligible names met inclusion and exclusion criteria.

Results

A total of 1,257 unique ophthalmologic eponyms representing 8.8% of 14,332 medical eponyms were identified. Three-hundred fifty-one of 743 (47.2%) eponyms were named after ophthalmologists representing 36 countries. The United States of America and Germany comprised the largest fraction of nationalities (40.2%), not necessarily representing their birthplace. Signs, syndromes, and diseases composed the largest category (45.8%) of eponymous ophthalmologic names.

Discussion

The current volume of eponymous names impedes the ability of a learner to retain this information. Classifying eponyms based on form, intention, or function, provides a more refined method for placing eponyms in their respective categories. Teaching eponyms by enumerating their historical content, demonstrating the correct performance of the eponym, assessing the technique, and providing feedback, affords the learner a more fruitful and meaningful learning experience. Understanding the context of the signs, syndrome, or techniques further allows the learner to gain insights into the clinical application of eponyms in diagnostic decision-making.

Conclusion

The teaching model proposed incorporates key aspects that may facilitate retention and recall of the eponymous name. The model includes imparting historical knowledge about the person who described the sign, technique, or process; demonstrating the correct procedure as originally reported; and coaching to ensure that the appropriate skill is mastered. Before abandoning eponyms, it is first necessary to understand their efficacy, effectiveness, usefulness, and role in clinical medicine.

Categories: Internal Medicine, Medical Education, Ophthalmology
Keywords: student education, syndromes, physical signs, eponyms, ophthalmology

Introduction

Eponyms provide a rich cultural perspective to the literature and remind us about our historical medical heritage. Despite this, the routine use of eponyms remains controversial, with not all physicians embracing their widespread use [1-3]. Unfortunately, ophthalmologic eponyms have not been well studied, and there is a paucity of information available for only a few eponyms in clinical medicine [4,5]. Before abandoning
eponyms, it is incumbent that we further study them in order to determine their reliability, validity, and applicability in clinical practice. Eponyms found to be valid should be further classified, based on expert advice within the various subspecialties, to facilitate teaching and learning. This paper aims to formulate and propose a teaching model that provides a meaningful way for classifying and teaching ophthalmological eponyms. We recognize gaps in our knowledge about how to teach eponyms as there are limited studies available. Furthermore, the principles applied to the ophthalmologic literature are also applicable to other specialties of medicine.

Materials And Methods

Data were obtained from research utilizing primarily eight sources representing medical or eponymic books, dictionaries, encyclopedias, indexes, medical periodicals, and one online source. The following criteria were considered in selecting eponyms: i) the eponym should be named after at least one person, ii) the eponym should be identified as a specific medical term in the literature, and iii) the eponyms should be related to any field of medicine. Names derived from art, history, mythology, patient or family names were excluded from the list identified. Moreover, eponym names related to chemistry, biology, botany (or other fields outside of medicine) were also excluded.

In the first phase, an eponymic database was created. The eight sources were scanned by one of the authors (Halil Tekiner), identifying names, year introduced, related name, nationality and specialty, and the eponym description. The PubMed database was searched with a Medical Subject Headings (MeSH) keyword for “eponym” and “eye” and “ophthalmology” in humans published from inception to June 1, 2021. A Google search for a combination of related keywords was also performed to find any other names not appearing in text sources. A biographical search was conducted for each name in the second phase to obtain further biographical details. Obituaries were extremely helpful in this regard. For those names whose gender was not apparent, a photographic search was also conducted. The three authors independently screened to eliminate duplicated names and ensure eligible names met inclusion and exclusion criteria.

This type of research has its limitations. Despite our efforts, it is inevitable to have several names missed in this list or the derivation undetermined, especially those known only with their surname or the initial letters of their names. Therefore we cannot claim this list is precisely complete in its current form.

Results

We identified and classified 1,257 (8.8%) unique ophthalmologic eponyms representing 14,332 total eponyms in the eponymous literature. We created eight categories within this classification schema as this would limit the number of categories making it easier to manage and learn. Each eponym was assigned to a single category to avoid overlap, even though some fit into more than one. For example, Westphal pupillary reflex is both a clinical and physiologic phenomenon but was assigned to the clinical one, as it is more relevant to a practicing physician. Categories were arranged based on common themes. The category algorithm, classification, formula, theory, and law all involve problem-solving techniques. Clinical symptoms are objective or subjective findings or phenomena. Pathologic findings were grouped with clinical symptoms as they represent the histopathologic component to an objective or subjective condition. The words device, instrument, product, and supply are in reference to a larger category named tools, as a device may be an instrument or equipment, and an instrument is a device. With this exception, all the remaining eponyms received one qualifier within a category.

Signs, syndromes, and diseases represented the largest category at 576 (45.8%), followed by those including devices, instruments, medical products and supplies at 260 (20.7%), clinical/pathological aspects of disease at 185 (14.7%), techniques at 127 (10.1%), and other subcategories (Table I).
### TABLE 1: Classification of ophthalmologic eponyms

| Classification                                      | Frequency of unique eponyms |
|-----------------------------------------------------|----------------------------|
| Algorithm, classification, formula, theory, law     | 6                          |
| Anatomic or physiologic                             | 57                         |
| Clinical symptoms or pathologic findings            | 185                        |
| Device, instrument, product, supply (tool)          | 260                        |
| Infectious agents                                   | 11                         |
| Sign, syndrome, or disease                          | 376                        |
| Technique                                           | 127                        |
| Test or treatment                                   | 25                         |

Named after 743 professionals (including 351 ophthalmologists) from 36 countries, the vast majority (97.9%) of these are names honored men, reflecting the preponderance of men in this specialty before the mid-twentieth century. Interestingly, the nationality of these individuals, not necessarily the country from which the eponym was written, were American (20.9%), German (19.3%), and Austrian (10.2%); followed by French (9.8%), Swiss (7.6%), and English (7.1%) among many others.

### Discussion

Eponyms used in the context of clinical medicine are honorific terms bestowed to an individual(s) who identified or discovered a disease, sign, symptom, syndrome, test, or finding. They may also represent a designation of an anatomical structure, devices, procedures or techniques, views or phenomena, treatments, classifications or indexes, prediction rules, laws or principles, or algorithms. Eponymic signs and findings are rarely pathognomonic by themselves. When used in combination with other symptoms, signs, and physical findings, it assists in diagnosis. Their use should be strictly reserved to honor individuals whose contribution(s) embody the rich tradition of the art of medicine for centuries.

There are drawbacks to the use of medical eponyms, which have led to reservations regarding their use. Limitations with eponyms include inaccessibility of the original publication or presentation because it was written in a different language or presented at a conference or in a monograph, historical misinformation, lack of attribution of all authors, naming (e.g., misspelled, a middle name used, multiple renditions of surname, and the same name which may have different meanings), and transcription challenges from non-Latin scripts such as Arabic, Greek, and Russian or sometimes from umlaut letters (ä, ö, ü) in the extended Latin alphabet. Other issues regarding eponyms are the routine use by authors of the possessive form of the name and inclusion within the literature of eponymic names derived from individuals who committed atrocities against humanity or bore racist or antisemitic remarks. The latter has improved as of more recent times as there has been increased awareness and confirmation of these claims. As a result, diseases were renamed and replaced with more descriptive terms (e.g., Wenger granulomatosis to granulomatous with polyangiitis or Reiter syndrome to reactive arthritis). The possessive form of the eponymous name continues to be used in the literature even though its use should be restricted to cases whereby the person had the sign, disease, or syndrome for which they described. The most highly recognized example of where the possessive form is an acceptable designation is Trousseau’s sign named for Armand Trousseau (1801-1867), who developed phlebitis occurring in association with a gastric tumor [14].

It is unrealistic to think that hundreds of ophthalmologic eponymic names could be taught, processed, remembered, and recalled. This is compounded in that many eponymous names having more than one designation in the same category. Furthermore, it may not be recognized that an eponym may also be named for both a father and son, as in Sturge-Weber syndrome or von Hippel-Lindau disease. Several papers recommend standardizing terminology when naming new and existing morphological abnormalities and new diseases that can also be applied when classifying ophthalmologic eponyms [15-17]. This serves as the basis for assisting in identifying the framework for naming eponyms. The critical designations to consider are that eponyms be limited to one proper name and no more than three names with the last name(s) used, and authorship preferably limited to include those in the first three positions of the manuscript or monographs. Initials and acronyms (e.g., acute retinal necrosis (ARN), congenital hypertrophy of the retinal pigment epithelium (CHRPE), and acute posterior multifocal placoid pigment epitheliopathy (APMPPE)) should be avoided. Eponyms that are currently obsolete (e.g., Donder glaucoma, Donder ring, Doyne honeycomb choroidopathy, Filatov operation) should be excluded from ophthalmologic terminology.
Despite these limitations, which apropos constitute a small portion of the eponymous corpus, we believe that eponyms should be retained and further studied unless there is compelling evidence to the contrary. We concur with the words of Sir Gordon Gordon-Taylor (1878-1960), a pioneering British surgeon and past President of the Royal Society of Medicine, “This may sound antiquated, but it goes against me to sacrifice names which for centuries have proved to be good and useful. The honorable names of our science are thereby fixed in the memory of posterity, and through them, there is awakened in the student a certain historical interest which stimulates him to further investigation” [18].

The field of ophthalmology is replete with eponyms that have been assigned to nearly every conceivable structure within the eye or as part of a systemic process that secondarily involves the eye. Interest in eponyms is likely to grow in recent years, with many journals publishing articles on ophthalmologic eponyms such as Eales disease and Sjögren syndrome or eponyms named to honor female ophthalmologists [19-22].

Clarifications regarding eponyms and their clinical applications can only come about through further studies that examine their validity, reliability, and reproducibility. Physicians make cognitive errors in clinical decision-making that involve biases and heuristic shortcuts. This may be further perpetuated based on anchoring and premature closure, which leads physicians astray from identifying the correct diagnosis. Other errors are linguistic, based on a physician’s lack of knowledge regarding the meaning of a structure, process, disease, symptom, syndrome, or sign. These failures include physician’s inability to distinguish Bell (Charles Bell, 1774-1842) palsy as idiopathic facial nerve paralysis from other known causes of peripheral facial nerve paralysis, or that William John Adie (1886–1955) described the findings of areflexia found predominantly in women with a known tonic pupil and thus constitutes a syndrome (Adie syndrome), a constellation of signs, symptoms, and findings, ‘All the evidence seems to me to support the notion that the tonic convergence reaction in pupils apparently inactive to light is a thing apart. The peculiar extra-ocular phenomena (symptomless areflexia) that are frequently associated with it also suggests that we are confronted by a unique condition’ [22]. Therefore, it is incumbent that educators teach these principles to learners to avoid perpetuating the same errors. The question is, what the best method for teaching eponyms is?

Disease, syndromes, and signs will continue to become better defined as they are studied, leading to, in some cases, a more refined and specific disease classification. Eponymically named signs and syndromes by themselves lack sufficient specificity alone for diagnostic purposes. In most cases, they represent only the anatomic (e.g., Leber venous plexus), physiologic (Donder law), or pathologic (e.g., Fuch adenoma) expression of the disease or algorithm (e.g., Helvacioglu reproducibility index), classification (e.g., Mann), theory (e.g., Elschnig), or formula (e.g., Reuss). These eponymic signs, syndromes, findings, devices, and techniques, when used in some cases in combination with other more sophisticated diagnostic tests, assist in better understanding, sorting out, and sorting through, the various disease processes.

Classifying ophthalmologic eponyms based on a mechanistic approach assists the reader to understand better their representation (e.g., anatomic, pathologic, physiologic) and purpose (e.g., test, technique, algorithm, classification, instrument, or device, or operative technique), as shown in Table 2.

| Name | Eponym | Classification |
|------|--------|----------------|
| Adie, William John (1886–1935) | Adie pupil | clinical symptoms |
| Adie, William John (1886–1935) | Adie syndrome | syndrome |
| Adie, William John (1886–1935) | Adie-Critchley syndrome | syndrome |
| Amsler, Marc (1891-1968) | Amsler chart | tool |
| Amsler, Marc (1891-1968) | Amsler chart marker | tool |
| Amsler, Marc (1891-1968) | Amsler corneal graft operation | technique |
| Amsler, Marc (1891-1968) | Amsler grid | tool |
| Amsler, Marc (1891-1968) | Amsler needle | tool |
| Amsler, Marc (1891-1968) | Amsler scleral marker | tool |
| Amsler, Marc (1891-1968) | Amsler test | test |
| Amsler, Marc (1891-1968) | Amsler/Werry sign | sign |
| Arlt, Carl Ferdinand Ritter von (1812–1887) | Arlt eyelid repair | technique |
| Arlt, Carl Ferdinand Ritter von (1812–1887) | Arlt fenestrated lens scoop | tool |
| Name                                      | Term                                        | Description                        |
|-------------------------------------------|---------------------------------------------|------------------------------------|
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt lens loupé                            | tool                               |
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt line                                   | pathologic findings                |
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt operation                             | technique                          |
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt pars planum excision                  | technique                          |
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt recess                                | anatomic                           |
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt sinus                                 | tool                               |
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt syndrome                              | syndrome                           |
| Arlt, Carl Ferdinand Ritter von (1812-1887) | Arlt triangle                              | pathologic findings                |
| Axenfeld, Karl Theodor Paul Polykarpus (1867-1930) | Axenfeld calcareous degeneration          | pathologic findings                |
| Axenfeld, Karl Theodor Paul Polykarpus (1867-1930) | Axenfeld syndrome                       | syndrome                           |
| Behçet, Hulusi (1889–1948)                | Behçet disease                             | clinical symptoms                  |
| Behçet, Hulusi (1889–1948)                | Behçet syndrome                            | syndrome                           |
| Behr, Carl Julius Peter (1874-1943)       | Behr abduction phenomenon                  | clinical symptoms                  |
| Behr, Carl Julius Peter (1874-1943)       | Behr disease                               | disease                            |
| Behr, Carl Julius Peter (1874-1943)       | Behr sign                                  | sign                               |
| Behr, Carl Julius Peter (1874-1943)       | Behr syndrome                              | syndrome                           |
| Bell, Sir Charles (1774-1842)             | Bell law                                   | law                                |
| Bell, Sir Charles (1774-1842)             | Bell nerve                                 | anatomic                           |
| Bell, Sir Charles (1774-1842)             | Bell palsy                                 | clinical symptoms                  |
| Bell, Sir Charles (1774-1842)             | Bell papilla                               | clinical symptoms                  |
| Bell, Sir Charles (1774-1842)             | Bell phenomenon                           | clinical symptoms                  |
| Best, Franz (1870-1920)                   | Best carmine stain                        | test                               |
| Best, Franz (1870-1920)                   | Best disease                               | disease                            |
| Best, Franz (1870-1920)                   | Best macular degeneration                 | pathologic findings                |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky disease                      | disease                            |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky head tilt test               | test                               |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky method                       | technique                          |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky phenomena                    | clinical symptoms                  |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky sign                         | sign                               |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky spatio                       | clinical symptoms                  |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky stigm                         | test                               |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky syndrome                     | syndrome                           |
| Bielschowsky, Alfred (1871-1940)          | Bielschowsky-Dollinger syndrome           | syndrome                           |
| Bjerrum, Jannik Petersen (1851-1936)      | Bjerrum scotoma                           | pathologic findings                |
| Bjerrum, Jannik Petersen (1851-1936)      | Bjerrum scotometer                        | tool                               |
| Bjerrum, Jannik Petersen (1851-1936)      | Bjerrum screen                            | tool                               |
| Bjerrum, Jannik Petersen (1851-1936)      | Bjerrum sign                              | sign                               |
| Bowen, Sir William (1816-1882)            | Bowen's eye knife                         | tool                               |
Bowman, Sir William (1816-1892) Bowman iris needle tool
Bowman iris scissors tool
Bowman, Sir William (1816-1892) Bowman lacrimal dilator tool
Bowman, Sir William (1816-1892) Bowman lacrimal probe tool
Bowman, Sir William (1816-1892) Bowman lamellae of cornea anatomic
Bowman, Sir William (1816-1892) Bowman membrane anatomic
Bowman, Sir William (1816-1892) Bowman probe tool
Bowman, Sir William (1816-1892) Bowman strabismus scissors tool
Bruch, Karl Wilhelm Ludwig (1819-1884) Bruch glands pathologic findings
Bruch, Karl Wilhelm Ludwig (1819-1884) Bruch membrane anatomic
Cloquet, Jules Germain (1790-1883) Cloquet canal anatomic
Cloquet, Jules Germain (1790-1883) Cloquet canal remnants anatomic
Cloquet, Jules Germain (1790-1883) Cloquet space anatomic
Cogan, David Glendenning (1908-1993) Cogan microcystic dystrophy pathologic findings
Cogan, David Glendenning (1908-1993) Cogan sign sign
Cogan, David Glendenning (1908-1993) Cogan syndrome syndrome
Cogan, David Glendenning (1908-1993) Cogan-Reese disease disease
Dalymply, John (1803-1832) Dalymply disease disease
Dalymply, John (1803-1832) Dalymply sign sign
Doyne, Robert Walker (1837-1914) Doyne choristoma pathologic findings
Doyne, Robert Walker (1837-1914) Doyne guttae iridis pathologic findings
Doyne, Robert Walker (1837-1914) Doyne hexagonal choristopathy pathologic findings
Doyne, Robert Walker (1837-1914) Doyne operation technique
Duane, Alexander (1859-1930) Duane parallax test test
Duane, Alexander (1859-1930) Duane retraction syndrome syndrome
Duane, Alexander (1859-1930) Duane syndrome syndrome
Duane, Alexander (1859-1930) Duane test test
Erbie, Henry (1832-1915) Erbie disease disease
Eidinger, Ludwig (1855-1919) Eidinger-Westphal nucleus anatomic
Elischnig, Anton (1863-1906) Elischnig blepharorhaphy technique
Elischnig, Anton (1863-1906) Elischnig bododes pathologic findings
Elischnig, Anton (1863-1906) Elischnig carrihaphity technique
Elischnig, Anton (1863-1906) Elischnig cataract knife tool
Elischnig, Anton (1863-1906) Elischnig conjunctivitis pathologic findings
Elischnig, Anton (1863-1906) Elischnig corneal knife tool
Elischnig, Anton (1863-1906) Elischnig cyclolysis spatula tool
Elischnig, Anton (1863-1906) Elischnig dissecting knife tool
| Name                     | Description                      | Type         |
|-------------------------|----------------------------------|--------------|
| Elschnig, Anton (1863-1939) | Elschnig extrusion needle tool |              |
| Elschnig, Anton (1863-1939) | Elschnig eye spoon tool         |              |
| Elschnig, Anton (1863-1939) | Elschnig fixation forceps tool  |              |
| Elschnig, Anton (1863-1939) | Elschnig intoduction technique  |              |
| Elschnig, Anton (1863-1939) | Elschnig lid retractor tool     |              |
| Elschnig, Anton (1863-1939) | Elschnig pearls pathologic finding |          |
| Elschnig, Anton (1863-1939) | Elschnig procedure technique   |              |
| Elschnig, Anton (1863-1939) | Elschnig pterygium knife tool   |              |
| Elschnig, Anton (1863-1939) | Elschnig retractor tool         |              |
| Elschnig, Anton (1863-1939) | Elschnig spots pathologic finding |        |
| Elschnig, Anton (1863-1939) | Elschnig syndrome syndrome      |              |
| Elschnig, Anton (1863-1939) | Elschnig theory theory          |              |
| Fleischer, Bruno Otto (1874-1965) | Fleischer corneal ring pathologic finding |              |
| Fleischer, Bruno Otto (1874-1965) | Fleischer dystrophy pathologic finding |            |
| Fleischer, Bruno Otto (1874-1965) | Fleischer lines pathologic finding |             |
| Fleischer, Bruno Otto (1874-1965) | Fleischer ring pathologic finding |              |
| Fleischer, Bruno Otto (1874-1965) | Fleischer vortex pathologic finding |            |
| Fleischer, Bruno Otto (1874-1965) | Fleischer-Strumpell ring pathologic finding |          |
| François, Émile Jules Marie Joseph (1907-1984) | François cloudy central dystrophy pathologic finding |        |
| François, Émile Jules Marie Joseph (1907-1984) | François dysplastic dystrophy syndrome |        |
| François, Émile Jules Marie Joseph (1907-1984) | François dystrophy (I) pathologic finding |          |
| François, Émile Jules Marie Joseph (1907-1984) | François dystrophy (II) pathologic finding |         |
| François, Émile Jules Marie Joseph (1907-1984) | François speckled dystrophy pathologic finding |          |
| François, Émile Jules Marie Joseph (1907-1984) | François-Evans syndrome syndrome |            |
| Fuchs, Ernst (1851-1930) | Fuchs adenoma pathologic finding |            |
| Fuchs, Ernst (1851-1930) | Fuchs atrophy pathologic finding |          |
| Fuchs, Ernst (1851-1930) | Fuchs black spots pathologic finding |        |
| Fuchs, Ernst (1851-1930) | Fuchs capsule forceps tool |              |
| Fuchs, Ernst (1851-1930) | Fuchs capsaicinomy forceps tool |             |
| Fuchs, Ernst (1851-1930) | Fuchs cataract pathologic finding |          |
| Fuchs, Ernst (1851-1930) | Fuchs crypt anatomic |              |
| Fuchs, Ernst (1851-1930) | Fuchs disease disease |              |
| Fuchs, Ernst (1851-1930) | Fuchs epithelial dystrophy pathologic finding |        |
| Fuchs, Ernst (1851-1930) | Fuchs grid tool |              |

2021 Yale et al. Cureus 13(10): e18849. DOI 10.7759/cureus.18849
| Name                        | Term                                      | Description               |
|-----------------------------|-------------------------------------------|---------------------------|
| Fuchs, Ernst (1851–1930)    | Fuchs heterochromic cyclitis              | pathologic findings       |
| Fuchs, Ernst (1851–1930)    | Fuchs keratome                           | tool                      |
| Fuchs, Ernst (1851–1930)    | Fuchs lid                                | pathologic findings       |
| Fuchs, Ernst (1851–1930)    | Fuchs phenomenon                         | clinical symptoms         |
| Fuchs, Ernst (1851–1930)    | Fuchs signs                              | sign                      |
| Fuchs, Ernst (1851–1930)    | Fuchs spot                               | pathologic findings       |
| Fuchs, Ernst (1851–1930)    | Fuchs stoma                              | anatomic                  |
| Fuchs, Ernst (1851–1930)    | Fuchs superficial marginal keratitis     | pathologic findings       |
| Fuchs, Ernst (1851–1930)    | Fuchs synechoma (F)                      | syndrome                  |
| Fuchs, Ernst (1851–1930)    | Fuchs two-way eye syringe                | tool                      |
| Fuchs, Ernst (1851–1930)    | Fuchs uveitis                            | pathologic findings       |
| Fuchs, Ernst (1851–1930)    | Fuchs keratome                           | syndrome                  |
| Goldmann, Hans (1899–1991)**| Goldmann applanation tonometer            | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann contact lens prism               | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann expressor                       | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann goniolens                       | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann macular contact lens            | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann multilens lens implant          | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann perimeter                       | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann serrated knife                  | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann three-lens contact lens         | tool                      |
| Goldmann, Hans (1899–1991)**| Goldmann-Fries disease                   | disease                   |
| Gräfe (Graefe), F.W. Ernst Albrecht von (1828–1870)| Graefe cautery (electrocautery)      | tool                      |
| Gräfe (Graefe), F.W. Ernst Albrecht von (1828–1870)| Graefe cystotome                       | tool                      |
| Gräfe (Graefe), F.W. Ernst Albrecht von (1828–1870)| Graefe disease                         | disease                   |
| Gräfe (Graefe), F.W. Ernst Albrecht von (1828–1870)| Graefe knife needle                     | tool                      |
| Gräfe (Graefe), F.W. Ernst Albrecht von (1828–1870)| Graefe sign                            | sign                      |
| Graves, Robert James (1796–1853)| Graves ophthalmopathy                | clinical symptoms         |
| Graves, Robert James (1796–1853)| Graves orthophathy                     | clinical symptoms         |
| Gunn, Robert Marcus (1850–1939)| Gunn dots                              | anatomic                  |
| Gunn, Robert Marcus (1850–1939)| Gunn pupil                             | clinical symptoms         |
| Gunn, Robert Marcus (1850–1939)| Gunn sign                              | sign                      |
| Haab, Otto (1850–1931)      | Haab degeneration                       | pathologic findings       |
| Haab, Otto (1850–1931)      | Haab eye knife                          | tool                      |
| Haab, Otto (1850–1931)      | Haab line                               | pathologic findings       |
| Haab, Otto (1850–1931)      | Haab magnet                             | tool                      |
| Haab, Otto (1850–1931)      | Haab reflex                             | physiologic               |
| Haab, Otto (1850–1931)      | Haab subcutaneous reaction knife        | tool                      |
| Haab, Otto (1850–1931)      | Haab senile macular degeneration        | pathologic findings       |
| Name                        | Term                                    | Description          |
|-----------------------------|-----------------------------------------|----------------------|
| Haab, Otto (1820-1931)      | Haab-Dimmer dystrophy                   | pathologic findings  |
| Hanada, Einosuke (1892-1946)| Hanada disease                          | disease              |
| Hanada, Einosuke (1892-1946)| Hanada syndrome                         | syndrome             |
| Herbst, Friedrich Gustav Jakob (1809-1885) | Herbst-Herbst bodies                  | pathologic findings  |
| Herbst, Friedrich Gustav Jakob (1809-1885) | Herbst fiber layer                     | anatomic             |
| Herbst, Friedrich Gustav Jakob (1809-1885) | Herbst glands                          | anatomic             |
| Herbst, Friedrich Gustav Jakob (1809-1885) | Herbst nervous layer                   | anatomic             |
| Hering, Karl Ewald Konstantin (1834-1910) | Hering afterimage                      | physiologic          |
| Hering, Karl Ewald Konstantin (1834-1910) | Hering test                            | test                 |
| Hering, Karl Ewald Konstantin (1834-1910) | Hering theory of color vision          | theory               |
| Hering, Karl Ewald Konstantin (1834-1910) | Hering-Bargachowsky test               | test                 |
| Hess, Carl von (1863-1923)  | Hess capsule ink forceps                | tool                 |
| Hess, Carl von (1863-1923)  | Hess chart                              | test                 |
| Hess, Carl von (1863-1923)  | Hess expressor                          | tool                 |
| Hess, Carl von (1863-1923)  | Hess eyelid operation                   | technique            |
| Hess, Carl von (1863-1923)  | Hess lens scoop                         | tool                 |
| Hess, Carl von (1863-1923)  | Hess lens spatula                       | tool                 |
| Hess, Carl von (1863-1923)  | Hess pteris operation                   | technique            |
| Hess, Carl von (1863-1923)  | Hess screen                             | test                 |
| Hess, Carl von (1863-1923)  | Hess test                               | test                 |
| Hgppel, Eugen Adolf Arthur von (1857-1939) | Hgppel keratoplasty                   | technique            |
| Hgppel, Eugen Adolf Arthur von (1857-1939) | Hgppel trephine                        | tool                 |
| Hgppel, Eugen Adolf Arthur von (1857-1939) | Linzbau-von Hgppel syndrome            | syndrome             |
| Hgppel, Eugen Adolf Arthur von (1857-1939) | von Hgppel disease                     | disease              |
| Hgppel, Eugen Adolf Arthur von (1857-1939) | von Hgppel ulcer                       | pathologic findings  |
| Horner, Johann Friedrich (1803-1888) | Horner hollow chisel                   | tool                 |
| Horner, Johann Friedrich (1803-1888) | Horner pupil                           | clinical symptoms    |
| Horner, Johann Friedrich (1803-1888) | Horner sign                            | sign                 |
| Horner, Johann Friedrich (1803-1888) | Horner syndrome                        | syndrome             |
| Horner, Johann Friedrich (1803-1888) | Horner-Tonnts dots                    | pathologic findings  |
| Horner, Johann Friedrich (1803-1888) | Horner-Tonnts spots                   | clinical symptoms    |
| Hutchinson, Sir Jonathan (1829-1915)  | Hutchinson facies                      | clinical symptoms    |
| Hutchinson, Sir Jonathan (1829-1915)  | Hutchinson patch                      | pathologic findings  |
| Hutchinson, Sir Jonathan (1829-1915)  | Hutchinson pupil                      | clinical symptoms    |
| Hutchinson, Sir Jonathan (1829-1915)  | Hutchinson sign                       | sign                 |
| Hutchinson, Sir Jonathan (1829-1915)  | Hutchinson syndrome                   | syndrome             |
| Hutchinson, Sir Jonathan (1829-1915)  | Hutchinson trait                      | clinical symptoms    |
| Hutchinson, Sir Jonathan (1829-1915)  | Hutchinson tumor                      | pathologic findings  |
| Knapp, Herman Jakob (1832-1911)**  | Knapp cataact knife                    | tool                 |
| Name                                      | Description                                      | Type               |
|-------------------------------------------|--------------------------------------------------|--------------------|
| Knapp, Herman Jakob (1832-1911)**         | Knapp eye speculum                                | tool               |
| Knapp, Herman Jakob (1832-1911)**         | Knapp iris hook                                  | tool               |
| Knapp, Herman Jakob (1832-1911)**         | Knapp iris trocar                                | tool               |
| Knapp, Herman Jakob (1832-1911)**         | Knapp iris scissors                               | tool               |
| Knapp, Herman Jakob (1832-1911)**         | Knapp lens scoop                                 | tool               |
| Knapp, Herman Jakob (1832-1911)**         | Knapp lid operation                              | technique          |
| Knapp, Herman Jakob (1832-1911)**         | Knapp pterygium operation                        | technique          |
| Knapp, Herman Jakob (1832-1911)**         | Knapp streaks                                    | pathology findings |
| Knapp, Herman Jakob (1832-1911)**         | Knapp strab                                       | pathology findings |
| Knapp, Herman Jakob (1832-1911)**         | Knapp test                                       | test               |
| Koyanagi, Yosoo (1860-1904)               | Vogt-Koyanagi syndrome                           | syndrome           |
| Krasne, Karl Friedrich Theodor (1797-1880)| Krasne gland                                     | anatomic           |
| Laurence, John Zachariah (1829-1870)      | Laurence-Moon syndrome                           | syndrome           |
| La Fort, Leon Clément (1829-1880)         | Le Fort fracture                                 | pathology findings |
| Labor, Theodor (1840-1917)                | Leber cell                                       | pathology findings |
| Labor, Theodor (1840-1917)                | Leber congenital amaurosis                       | pathology findings |
| Labor, Theodor (1840-1917)                | Leber disease                                    | disease            |
| Labor, Theodor (1840-1917)                | Leber hereditary optic atrophy                   | pathology findings |
| Labor, Theodor (1840-1917)                | Leber idiothetic stellate neuroretinosis         | pathology findings |
| Labor, Theodor (1840-1917)                | Leber inflammatory amaurosis                     | pathology findings |
| Labor, Theodor (1840-1917)                | Leber pleius                                     | anatomic           |
| Labor, Theodor (1840-1917)                | Leber retinitis                                  | pathology findings |
| Labor, Theodor (1840-1917)                | Leber syndrome                                  | syndrome           |
| Labor, Theodor (1840-1917)                | Leber versus pleius                             | anatomic           |
| Lindau, Arnd Wilhelm (1882-1958)          | Lindau disease                                   | disease            |
| Maddox, Ernest Edmund (1860-1933)         | Maddox prism                                     | tool               |
| Maddox, Ernest Edmund (1860-1933)         | Maddox rod                                       | tool               |
| Maddox, Ernest Edmund (1860-1933)         | Maddox red occluder                              | tool               |
| Maddox, Ernest Edmund (1860-1933)         | Maddox red test                                  | test               |
| Martin, Antoine Bernard Jean (1808-1942)  | Martin syndrome                                  | syndrome           |
| Martin, Antoine Bernard Jean (1808-1942)  | Martin-Beckung syndrome                          | syndrome           |
| Maucluz-Recklesi, Johannes (1800-1835)    | Maucluz syndrome                                 | syndrome           |
| Möbius (Moebius), Paul Julius (1835-1907) | Möbius sign                                      | sign               |
| Möbius (Moebius), Paul Julius (1835-1907) | Möbius syndrome                                  | syndrome           |
| Moell, Jacob Antonius (1832-1914)          | Moell glands                                     | anatomic           |
| Moon, Robert Charles (1846-1914)          | Laurence-Moon syndrome                           | syndrome           |
Mooren, Albert (1828-1899)

Mooren ulcer
pathologic findings

Morgagni, Giovanni Battista (1682-1771)

Morgagni cataract
pathologic findings

Müller, Heinrich (1920-1964)

Müller fibres
anatomic

Pannau, Ernst (1944-1966)

Pannau syndrome
syndrome

Purkinje, Jan Evangelista (1877-1869)

Purkinje arteriole
physiologic

Purkinje, Jan Evangelista (1877-1869)

Purkinje arteries
pathologic findings

Purkinje, Jan Evangelista (1877-1869)

Purkinje images (Purkinje-Ganso images)
physiologic

Purkinje, Jan Evangelista (1877-1869)

Purkinje phenomenon (shift, shift)
physiologic

Purtscher, Ottmar (1853-1927)

Purtscher retinopathy (syndrome)
syndrome

Recklinghausen, Friedrich Daniel von (1933-1915)

Recklinghausen disease
disease

Robertson, Douglas Mary Cooper Lamb Argyll (1937-1909)

Argyll-Robertson pupil sign
sign

Robertson, Douglas Mary Cooper Lamb Argyll (1937-1909)

Argyll-Robertson syndrome
syndrome

Sachs, Bernard (1858-1944)

Sachs lamp
test

Sachs, Bernard (1858-1944)

Tay-Sachs disease
disease

Salzmann, Maximilian (1862-1954)

Salzmann dystrophy
pathologic findings

Salzmann, Maximilian (1862-1954)

Salzmann membrane
anatomic

Sattler, Hubert (1944-1929)

Sattler cornea
anatomic

Sattler, Hubert (1944-1929)

Sattler elastic layer
anatomic

Sattler, Hubert (1944-1929)

Sattler glands
anatomic

Sattler, Hubert (1944-1929)

Sattler wall
pathologic findings

Schirmer, Otto W.A. (1864-1917)

Schirmer sign
sign

Schirmer, Otto W.A. (1864-1917)

Schirmer test
test

Sjögren, Henrik Samuel Conrad (1899-1986)

Sjögren syndrome (disease)
syndrome

Snellen, Herman (1834-1908)

Snellen chart
test

Snellen, Herman (1834-1908)

Snellen conventional refract implant
technique

Snellen, Herman (1834-1908)

Snellen entropion forceps
tools

Snellen, Herman (1834-1908)

Snellen entropion forceps
tools

Snellen, Herman (1834-1908)

Snellen eye implant
technique

Snellen, Herman (1834-1908)

Snellen fractional
clinical symptoms

Snellen, Herman (1834-1908)

Snellen gauze
test

Snellen, Herman (1834-1908)

Snellen letters
test

Snellen, Herman (1834-1908)

Snellen operation
technique

Snellen, Herman (1834-1908)

Snellen reflex
physiologic

Snellen, Herman (1834-1908)

Snellen reform eye
tool

Snellen, Herman (1834-1908)

Snellen reform implant
tool
Westphal, Karl Friedrich Otto (1833-1890)

- Westphal-Westphal disease (pseudosclerosis)
- Westphal-Westphal disease
- Westphal nucleus
- Westphal pupillary reflex
- Westphal-Ritz sign
- Wittmann-Hugo (1835-1918)
- Flexner-Wintersteiner rosettes
- Wintersteiner, Hugo (1865-1918)
- Flexner-Wintersteiner rosettes

Zinn, Johann Gottfried (1727-1759)

- Zinn artery
- Zinn corona
- Zinn corona
- Zinn meningi
- Zinn membrane
- Zinn ring
- Zinn vascular circle
- Zinn zone (zonule)

### TABLE 2: Common representative ophthalmologic eponym names

| Eponyms                        | Anatomic/Locatomical | Disease/Development | Pathologic Findings |
|-------------------------------|----------------------|---------------------|---------------------|
| Westphal-Westphal disease     | anatomic             | disease             |                     |
| Westphal-Westphal disease     | anatomic             |                     |                     |
| Westphal-Westphal disease     | anatomic             |                     |                     |
| Westphal-Westphal disease     | anatomic             |                     |                     |
| Wittmann-Hugo (1835-1918)     | Flexner-Wintersteiner rosettes |                     |                     |
| Wintersteiner, Hugo (1865-1918) | Flexner-Wintersteiner rosettes |                     |                     |
| Zinn artery                   | anatomic             |                     |                     |
| Zinn corona                   | anatomic             |                     |                     |
| Zinn corona                   | anatomic             |                     |                     |
| Zinn meningi                  | anatomic             |                     |                     |
| Zinn membrane                 | anatomic             |                     |                     |
| Zinn ring                     | anatomic             |                     |                     |
| Zinn vascular circle          | anatomic             |                     |                     |
| Zinn zone (zonule)            | anatomic             |                     |                     |

Eponyms that are studied and deemed most relevant to a particular aspect of ophthalmology (e.g., operative, instruments, clinical, and pathologic) should be identified by a panel of experts, emphasized, and taught.

We propose a learning model that involves teaching historical aspects of the person(s) who described the sign, the signs as originally described, and its application, if available, in medical practice. Teaching history impacts purpose to the eponym and, in some cases, a more in-depth understanding of the process or steps involved in identifying the particular finding. Teaching the finding as described by the author avoids misattribution or communication errors. Lastly, the application of the finding in clinical practice should be covered, incorporating known and evolving techniques and technologies to understand the disease or disease process better.

To the best of our knowledge, only one recent study evaluated a method for teaching eponyms. Viveen et al. assessed knowledge involving ten common eponymous questions before and after a two-day course among 20 orthopedic trauma surgeons in an Arbeitsgemeinschaft für Osteosynthesefragen (Swiss working group for bone fusion issues) advanced trauma course on complex elbow fractures [23]. The eponym questions covered the areas of surgical techniques, fracture types, injury, and pathologic findings. The training involved didactic and cadaveric sessions. In order to prevent bias, no emphasis was placed on the eponyms, and participants were unaware of the nature of the study. The study found that correct answers about the eponym improved in only one question with inter-rater reliability (Kappa score) of 0.31 and 0.37 before and after the course, respectively [23]. Findings from this limited study suggest that this is an ineffective method for teaching eponyms.

We believe that eponyms are interesting to learn, and information about them should be retained and taught using an evidence-based approach. When teaching eponyms, we recommend that the components include a brief historical perspective of the person who described the sign, its original description, and its application in clinical practice. The teacher should explain and, in some cases, demonstrate the proper performance of the eponym and its application in clinical practice. The eponym should be practiced with feedback provided, and in the case of eponyms involving signs, their utility in assisting in diagnosis be emphasized [5,24].

**Conclusions**

Teaching and learning eponyms in the context of a historical perspective and, as described by the author, tells a story using a case-based learning applied model approach. This way of learning provides a meaningful way best to understand the application of eponyms in clinical practice. There is a continued impetus to remove eponyms and to substitute them using more descriptive terms. Although we do not favor this approach, we emphasize that eponyms must first be studied before devoting time to this endeavor to determine their effectiveness in clinical medicine. Those eponyms deemed to have utility in clinical practice should be retained and classified using predetermined criteria.

**Additional Information**

**Disclosures**

**Human subjects:** All authors have confirmed that this study did not involve human participants or tissue.
Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Woywodt A, Matteson E: Should eponyms be abandoned? Yes. BMJ. 2007, 335:424. 10.1136/bmj.39308.342639.AD
2. Whitworth JA: Should eponyms be abandoned? No. BMJ. 2007, 335:425. 10.1136/bmj.39308.380567.AD
3. Cogan DG: The rise and fall of eponyms. Arch Ophthalmol. 1978, 96:2202-3. 10.1001/archoph.1978.03910060504003
4. Babu AN, Kymes SM, Carpenter Fryer SM: Eponyms and the diagnosis of aortic regurgitation: what says the evidence? Ann Intern Med. 2005, 138:736-42. 10.7326/0005-4819-138-9-200505060-00010
5. Yale SH, Tekiner H, Mazza JJ, Yale ES, Yale RC: Cardiovascular eponymous signs: diagnostic skills applied during the physical examination. Springer International Publishing, Cham; 2021.
6. Bartolucci S, Forbis P: Stedman’s medical eponyms. Lippincott Williams & Wilkins, Baltimore; 2005.
7. Birrer RB, Birrer CD: Medical diagnostic signs: a reference collection of eponymic bedside signs . Charles C. Thomas, Springfield; 1982.
8. Dobson J: Anatomical eponyms. E & S Livingstone Ltd, London; 1962.
9. Gould GM: Table of eponymous diseases . An illustrated dictionary of medicine, biology and allied sciences. Kiston, Son & Co, Philadelphia; 1894. 380-92.
10. Havard C: Medical eponyms: diseases, syndromes and signs. Barry Rose Law Publishers Ltd, Chichester, West Sussex; 1998.
11. Jablonski S: Jablonski’s dictionary of syndromes & eponymic diseases. Krieger Publishing Company, Florida; 1991.
12. Thornton SP: Ophthalmic eponyms: an encyclopedia of named signs, syndromes, and diseases in ophthalmology. Aesculapius Publishing Company, Birmingham, Alabama; 1967.
13. Whonamedit? A dictionary of medical eponyms. Accessed: August 10, 2021: https://www.whonamedit.com/.
14. Rolleston H: Diseases described by medical men who suffered from them . Lancet 1921, 197:836-8. 10.1016/S0140-6736(01)25036-3
15. Persaud TVN: The rise and fall of eponyms. J Roy Coll Surg Edinb. 1959, 4:105-20.
16. Ersöz MG, Hocaoğlu M, Sayman Muslubaş IB, Arf S, Karaçorlu M: Vitrectomy due to vitreous hemorrhage and tractional retinal detachment secondary to Eales’ disease. Turk J Ophthalmol. 2021, 51:102-6. 10.4274/tjio.galenos.2020.45709
17. Hennekam RC, Bieseker LG, Allanson JE, Hall IQ, Opitz JM, Temple IK, Carey JC: Elements of morphology: general terms for congenital anomalies. Am J Med Genet A. 2013, 161A:2726-53. 10.1002/ajmg.a.36249
18. Gordon-Taylor G: In defense of eponyms. J Roy Coll Surg Edinb. 1959, 4:105-20.
19. Ersöz MG, Hocaoğlu M, Sayman Muslubaş IB, Arf S, Karaçorlu M: Vitrectomy due to vitreous hemorrhage and tractional retinal detachment secondary to Eales’ disease. Turk J Ophthalmol. 2021, 51:102-6. 10.4274/tjio.galenos.2020.45709
20. Gättinger JW Jr: On eponyms. Surv Ophthalmol. 2021, 66:411. 10.1016/j.survophthal.2021.01.004
21. Margo CE: Bell’s palsy and the peril of eponyms. Ophthalmic Plast Reconstr Surg. 2021, 10.1097/IOP.0000000000002048
22. Adie WJ: Complete and incomplete forms of the benign disorder characterized by tonic pupils and absence of tendon reflexes. Br J Ophthalmol. 1952, 16:449-61. 10.1136/bjo.16.8.449
23. Viveen J, Somford MP, Koenraad KL, van den Bekerom MPJ, Eegendaal D, Schipper IB, Doornberg JN: The rise and fall of eponyms for surgical approaches and fractures in elbow surgery: accuracy and reliability pre- and post-training. Arch Bone Jt Surg. 2019, 7:191-8.
24. Garibaldi BT, Zaman J, Arndt MD, Elder AT, Russell SW: Reinvigorating the clinical examination for the 21st century. Pol Arch Intern Med. 2019, 129:907-12. 10.20452/pamw.15073