

A chrome app for improving
reading comprehension of health information
online for individuals with low health literacy

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Health Literacy

“The degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions” ¹

1. CDC, 2016

Effects of poor health literacy

Unnecessary hospitalization ²

Less preventive care ³

Low self-efficacy ⁴

2. Mitchell et al., 2012

3. Scott et al., 2002

4. Lee et al., 2016

Self efficacy

assessment of one's ability to accomplish a task

Influences the decision to use a coping strategy

Influences how long one will persist when a task is especially difficult ⁵

Barriers to improvement

Time constraints

20.3 min = Primary care visit ⁶

21 min = Specialist visit ⁶

45.4 days = Wait time to see a physician in
Boston ⁷

6. Shaw et al., 2014

7. Merrit Hawkins, 2014

Barriers to improvement

Shame

67.2% hid their difficulty with reading from their spouse ⁸

40% reported feeling ashamed ⁸

Barriers to improvement

Identifying those with poor health literacy ⁹

"Do you feel this patient has a literacy problem?"



Results on REALM-R test



Current Solutions

Universal Precautions Toolkit ¹⁰

- Assume **all patients** may have limited health literacy
- Use strategies like the **teach back** method

Plain language guidelines ¹¹

- Choose **short, easy-to-understand** words

10. Brega et al., 2015

11. Plain Language Action and Information Network, 2011

However

Primary care practices struggle to implement Toolkit measures ¹²

- Red tape, **time constraints**, **lack of support**

“Plain English” is subjective ¹³

- **Cultural differences** and language barriers

12. Mabachi et al., 2016

13. Nanna & Egbert, 2009

Current Solutions

Patient education programs

- Diabetes education improved disease management ¹⁴
- Time commitment
- Not feasible on a large scale

Patients need solutions that can be **used at home**

Current Solutions

Online Communities

- Can be accessed at home
- May be especially helpful for patients with rare diseases
- Study on PatientsLikeMe found ALS patients got advice on best options for respiratory therapy, as well as how to adapt their chosen option for better mobility ¹⁵

However

Must **split attention** away from online reading to visit online community

Finding relevant forums is **challenging**

Lower literacy readers may **give up** looking for information earlier than high literacy readers ¹⁶

Ideal Solution ?

- Available for **home use**
- Flexible and **can adapt** to patients' information seeking needs
- **Scalable**
- Does not require navigation to other sources, but is **not obtrusive**

Proposed Solution

Creates an
interactive layer
over webpage
content



Facilitates an
online learning
environment

“Got it”

Benefits of a browser plug-in

- No special app
- No extra navigation required
- Users simply search for information online as normal

Overview

Fuchs' dystrophy causes the clear layer (cornea) on the front of your eye to swell. The disorder can lead to glare, cloudy vision and eye discomfort.

Fuchs' dystrophy usually affects both eyes and can cause your vision to gradually worsen over years. But most people with Fuchs' dystrophy don't develop symptoms until they reach their 50s or 60s.

Some medications and self-care steps may help relieve your Fuchs' dystrophy signs and symptoms. But when the disorder is advanced and you've lost vision, the only way to restore vision is with cornea transplant surgery.

Cornea becomes "cloudy"

Thickened stroma

Fuchs dystrophy

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Overview

Fuchs' dystrophy causes the clear layer (cornea) on the front of your eye to swell. This causes cloudy vision and eye discomfort.

Fuchs' dystrophy usually affects both eyes and can cause your vision to gradually worsen over years. But most people with Fuchs' dystrophy don't develop symptoms until they reach their 50s or 60s. ?

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Fuchs' dystrophy care at Mayo Clinic

Symptoms

As the disease progresses, Fuchs' dystrophy symptoms, which usually affect both eyes, might include:

- Glare, which can decrease your vision in dim and bright light.
- Blurred vision, which occurs in the morning after awakening and gradually improves during the day. As the disease progresses, blurred vision either can take longer to improve or doesn't improve.

Cornea becomes "cloudy"

Thickened stroma

Fuchs dystrophy

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It is not known if Xiidra is safe and effective in children under 17 years of age. ?

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Shire

Question Placement

Does integrating questions into content improve learning?

- Little research on this in education literature
- Some evidence it **improves reading comprehension**, perhaps by **reducing cognitive load** ¹⁷

Medical Term Definition

Fuchs' dystrophy

[Request an Appointment](#)

[Symptoms & causes](#)[Diagnosis & treatment](#)[Doctors & departments](#)[Care at Mayo Clinic](#)

Overview

Fuchs' dystrophy causes clouding of the front of your eye that can lead to glare, cloudy vision and blurred vision.

Fuchs' dystrophy usually causes your vision to gradually worsen over years. But most people with Fuchs' dystrophy don't develop symptoms until they reach their 50s or 60s.

Some medications and self-care steps may help relieve your Fuchs' dystrophy signs and symptoms. But when the disorder is advanced and you've lost vision, the only way to restore vision is with cornea transplant surgery.

www.mayoclinic.org says

the transparent part of the coat of the eyeball that covers the iris and pupil and admits light to the interior

OK

Fuchs dystrophy

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By Markus MacGill | Last updated Mon 17 July 2017

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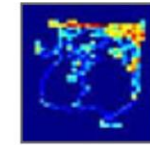
Autism Spectrum Disorder

Overview

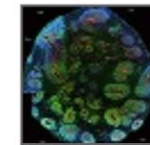
Autism spectrum disorder (ASD) is a developmental disorder that affects communication and behavior. Although autism can be diagnosed at any age, it is said to be a “developmental disorder” because symptoms generally appear in the first two years of life.

According to the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*, a guide created by the American Psychiatric Association used to diagnose mental disorders, people with ASD have:

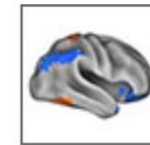
Science News About Autism



[Surprising Role of Cerebellum in Reward and Social Behavior](#)



[How Psychiatric Risk Genes Work](#)



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Focus Assistance

Beneficial for anyone reading challenging material

May be especially important for low literacy users

- Low literacy readers **lost their focus** when reading dense material, while high literacy readers did not ¹⁸

Feasibility Study

Participant: Five college students volunteered

Study Procedure:

1. Administered Form A of the Short Test of Functional Health Literacy in Adults (STOFHLA)
2. 5-question pre-test about Fuchs' Dystrophy.
3. Watch instructional video
4. Interact with webpage to complete tasks
5. Questionnaires: Demographic and feedback, as well as a post-test to judge comprehension of the health material.

Results

	Participant Demographics					
	Age	PreTest Score	PostTest Score	Internet Experience	Plugin Experience	Attention
Average	24.3	27%	87%	7/7	4	3.67
SD	5.8	0.12	0.23	0	1	0.58

Results

Auto-generated questions:

Positive:

- “They help solidified my knowledge”
- Easy to use

Problems:

- Some questions did not make grammatical sense
- Some questions were too easy

Results

Medical word definitions:

Positive:

- Rated easiest feature to use

Problem:

- Definitions were too “high level”

Future work

Sophisticated natural language processing algorithm to **auto-generate reasonable questions**

Text summarization algorithms to **simplify “high level” definitions** from dictionary API

Use **target population** in a pilot study to investigate the effectiveness

Review

Patients and caregivers face barriers to improving health literacy within the healthcare environment

Many existing interventions are helpful but may not scale up

Take away

- Solutions to improve health literacy must operate **outside the healthcare system** to be effective in large populations
- “Got It” gives patients tools they can use to improve their health knowledge **without requiring them to change** how they search for health information online