



Background

- **Electroretinogram (ERG)** testing on mice will be conducted to determine the effects that schizophrenia has on retinal function
- **Retina**-layer of the eye layered with two photoreceptors, rods and cones
 - Rods-react to dimly lit conditions
 - Cones-React to colored light stimuli
- **Uniform illuminance** of ERG test dome is critical to prevent any unwarranted changes in ERG recordings
- A diffuser layer will be used to improve illuminance uniformity with the fewest LEDs as possible

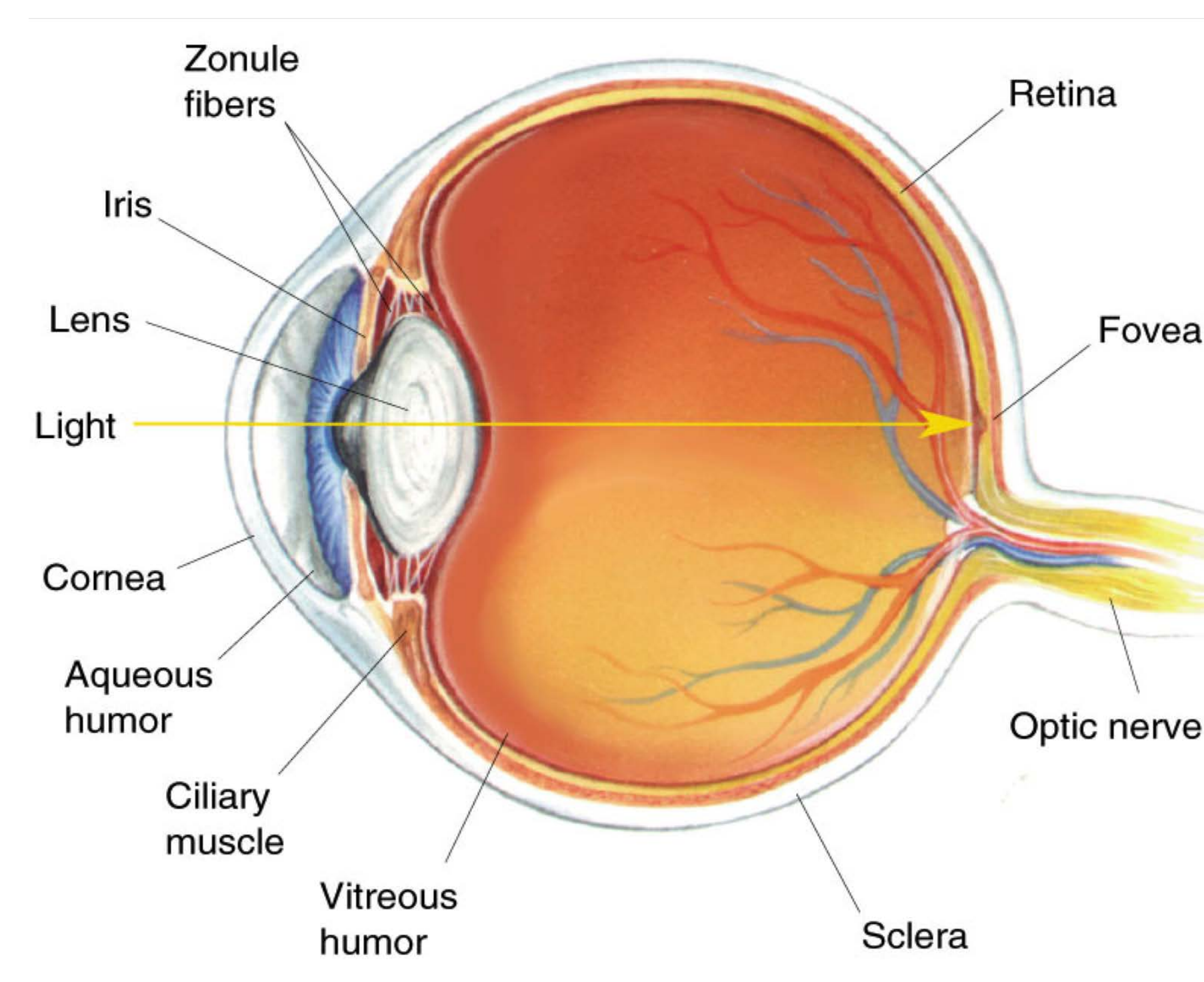


Figure 1: Cross-section of a human eye ("CMI-HEENT", 2012)

- Schizophrenia affects 1% of the American population
- Problems with current diagnosis procedures
 1. Early symptoms in teenagers can be interpreted as adolescent behavior
 2. Many of those with the disease don't believe they have it
 3. Can take up to 6 months for a diagnosis
 4. Changes in brain physiology have been diagnosed as schizophrenia
 5. Tests can cost as much \$2600
- A more effective schizophrenia test is needed

Approach

- **Mice** will serve as the test subjects for the experiments
 - Mice have peak photometric sensitivity to **UV** and **green light**: will be using UV and green LED
 - **Flicker ERG** will be used to isolate cone function from rod function and observe if schizophrenia effects retinal function

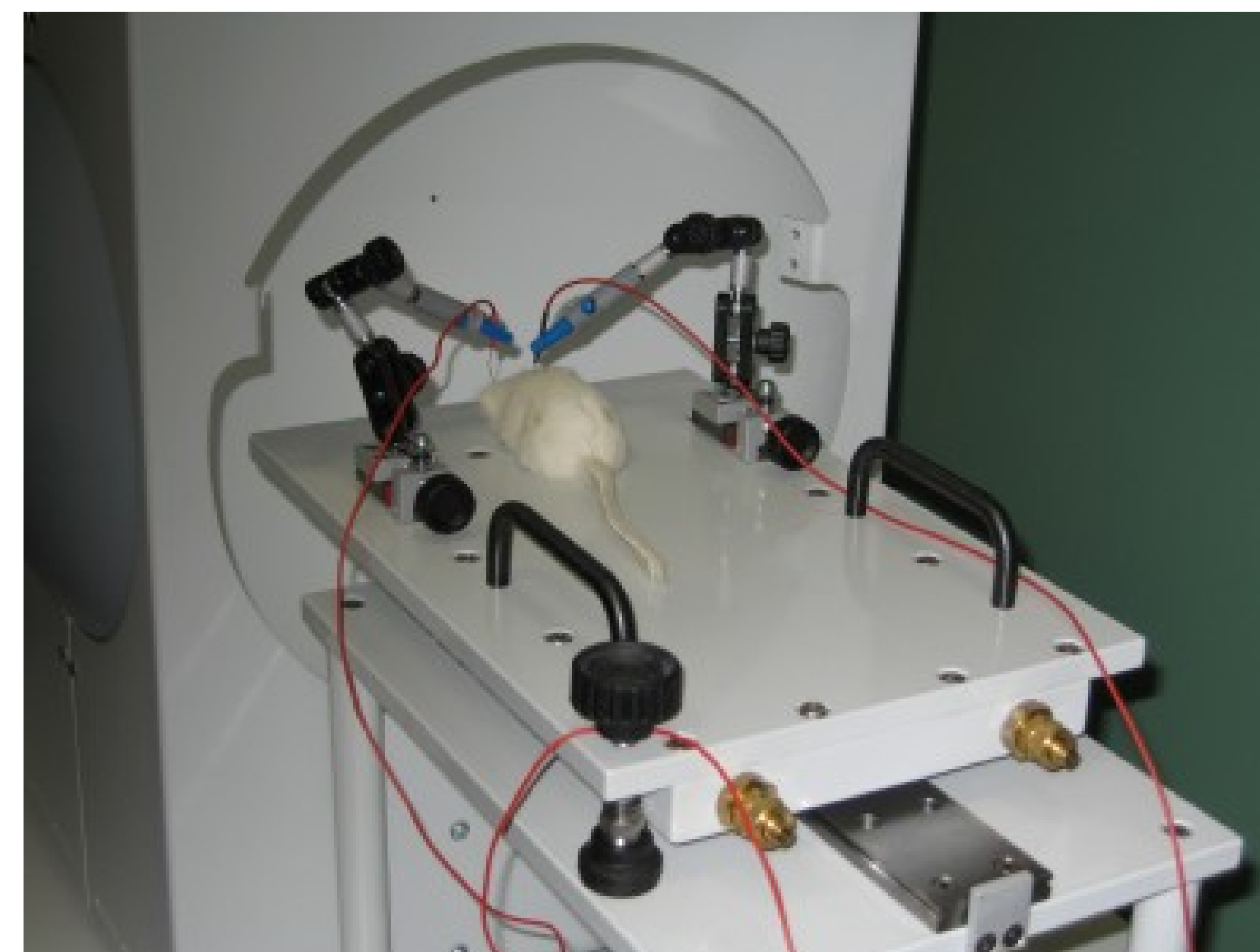


Figure 2: Example of an ERG experimental setup for a mouse (Roland Consult)

- **Uniform illuminance** is critical to ERG experiment
 - Any change in illuminance is recorded in ERG measurements
 - Changes in ERG recordings should be due to schizophrenia and not illuminance changes
- **RTV615** silicone has been used in other UV light transmission applications and will be investigated for its potential as an adhesive layer between LED and diffuser film
- **Spectral power sensor** used to measure the effects of the diffuser film on UV and green light transmission
- **Spectral power sensor** will be rotated at several different angles to simulate rotation of a mouse's eye
 - Mouse eye can still rotate and illuminance must be maintained at different viewing angles

Goal

- Design a dome to produce uniform illuminance from green and UV LEDs, while serving as an appropriate test environment to conduct ERG experiments with mice

Impact

- **Improved schizophrenia detection techniques and increased public awareness, while being cost effective**

References

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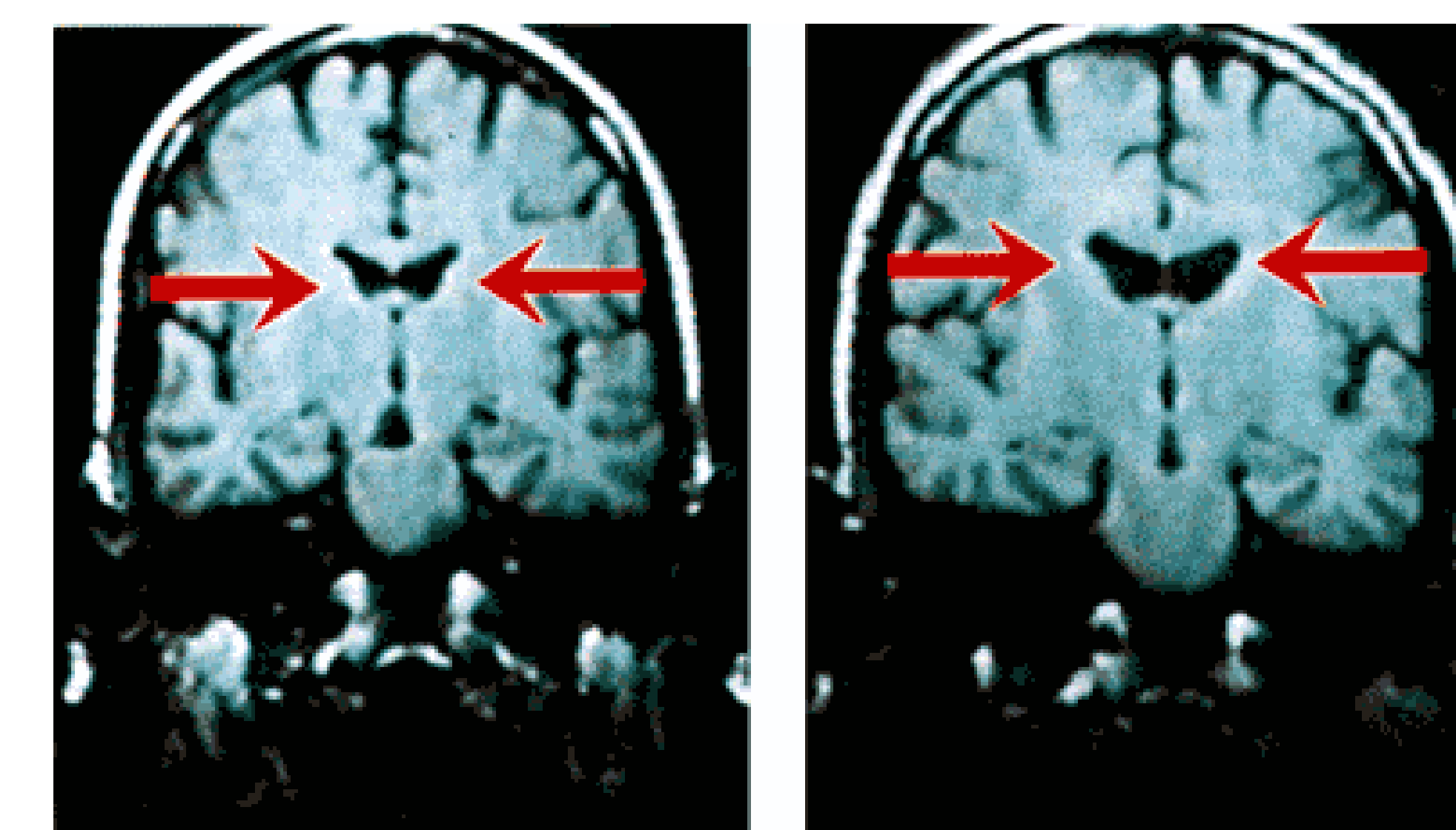


Figure 3: Left MRI scan shows a healthy brain with normal sized ventricles. Right MRI scan shows a brain with enlarged ventricles, a symptom of schizophrenia (Cengage)