**Title**: Waking Up Anna

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**Abstract**: This case discusses Anna's sleeping disorder, a condition that was disrupting her normal life. The case begins by watching a video where Anna and her doctors describe her story. When most of the standard treatment approaches for treating her condition had failed, researchers examined her cerebrospinal fluid and found a substance in it that was acting like a sleeping pill! Understanding the molecular basis for where and how this substance was acting helped doctors develop a treatment for Anna. The case explores the structure function relationships of receptor molecules in the brain targeted by the treatment. It also examines how the binding of other small molecule drugs can impact the function of this receptor target.

**Learning Objectives**: The case was developed at the interface of biology and chemistry for introductory biology courses for undergraduate students

* to become familiar with scientific literature,
* learn to use data from various bioinformatics resources, and
* have a chance to explore chemical interactions that stabilize the structure and/or enable the functions of complex biological molecules.

Note: Depending on the details included in the discussions, it may also be used to teach slightly advanced physiology, cell biology, and neuroscience students. By the end of the case, students should develop some basic understanding of biomolecular structure-function relationships.

**Molecules explored**: The primary molecule explored in this case is the GABA-A receptor, that forms part of an ion channel. Different forms of the receptor, either alone or in complex with various small molecular ligands and/or drugs are explored to understand structure-function relationships in regulating opening and closure of the ion channels.

**Implementation**: The case can be implemented using either a flipped approach and/or through in-class discussions.

**Subject Headings**: Biology (Introductory), Chemistry (Introductory), Biochemistry, Genetics, and Molecular Biology

**Keywords**: GABA-A receptor; Flumazenil; GABA; agonist; antagonist; membrane channel; Chloride ions; hypersomnia, sleep

**Topical Area**: Scientific method; Molecular structure representation; Visualization

**Educational Level**: Undergraduate lower division

**Formats**: word document and Website

**Type/Method**: Flipped, Interrupted

**Language**: English

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