

Artfully Anatomical

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Rationale

Robert Henri, a prominent American painter and leader of the Ashcan School, a realistic artistic movement in the early 21st century once said, “Knowledge of anatomy is a tool like good brushes.¹” Simply put, art and anatomy illuminate each other and have done so for quite some time. For instance, beautiful sculptures called the Venus figurines were used in the Paleolithic Era in fertility rites. The famous and beautiful *Venus of Willendorf* is now housed in the Natural History Museum of Vienna and has a rich history indicating a strong link between art and anatomy. These voluptuous figurines created out of limestone were thought to be highly regarded as amulets during rituals celebrating and welcoming fertility. They are said to be “an embodiment of overflowing fertility.²” The breasts and hips were shaped with exaggerated enormity compared to the rest of the small body model. “So in Paleolithic people terms, the parts that mattered most had to do with successful reproduction...these parts were isolated and amplified by the artist's brain.³” It is evident the people of this time period truly believed in a strong connection between the art and their anatomy. The two disciplines have been prudently knotted together throughout history even as early as 25,000 years ago. It “is one of the earliest images of the body made by humankind.⁴”

Like scientists, artists must be intense observers of what surrounds them. For example, an artist “draws his inspiration from the natural world” as he “sees light, shadows, colors, textures, form and lines.⁵” Art is thus created after the artist combines these observations with his own personal passions, experience, ideas and creativity. Scientists are not so different. They, too, are powerful observers of the environmental phenomena happening around them. They are curious and intellectual and also use their own imagination to predict answers to the problems and questions that arise from their observations.

Background

The convergence of art and science is very important to me. As far as I am concerned, it is a very effortless blend. I teach high-level sciences at a school focused on the fine-arts. Students are required to audition for admission and choose a major (visual art, dance, musical theater, choir, etc.). They must maintain a certain grade-point-average in their academic classes as well as their major classes. These students are innovative, talented and unique and crave lessons developed by teachers who think outside the box. I do not

want my students to view science as a dry class where they are sure they will be bored and half-asleep as they try to understand the complex text they are reading from their 10-inch-thick book. Furthermore, Anatomy and Physiology is not a required science class, but rather an elective one. I want the students to take this course because they want to be there; because they have passion for both science and art.

I plan to integrate a fascinating unit into my Honors Anatomy and Physiology class that will inspire the eleventh and twelfth graders to, not only, learn the complex and clinical, yet extremely fascinating information they need to know about the human body, but to remember and, perhaps, cherish the creativity and excitement it holds for an eternity. How amazing would it be for my anatomy students to learn each body system in depth on the required molecular, structural and physical levels indeed, but also on the artistic level?! As both artists of some sort and now scientists since they are sitting in a high-level science class, my students will be reminded that science should also be very creative as can be evidenced when pondering the answers (hypotheses) to the questions that arise from their scientific inquiry. Art and science students alike must think outside the box and use their “imagination to stretch beyond the accepted theories of their time.”⁶

Laura Splan is an artist to whom I will refer to many times throughout this curriculum unit. Her work truly demonstrates my ideas of this art and anatomy integration. She intertwines the use of domestic and feminine products, ideas and techniques to create art that resembles anatomical or biomedical metaphors. Furthermore, Splan’s upcoming workshop in New York in January of 2012, called *Dissection as Studio Practice...*

...will survey the use of dissection in contemporary art practice through an illustrated lecture, discussion and collaborative art project. [It] will examine the conceptual and cultural significance of cutting, excavating, disassembling, labeling, observing and displaying bodies.⁷

There are many novel ideas that come to mind to make learning more enjoyable for the artistically-inclined science students such as reviewing art history, sculpting of organs, painting of muscles and researching the history and doings of body art. I will integrate this unit throughout the entire school year, weaving the art very tightly into the systematic approach I take to teaching anatomy which will allow my students to be logical, creative and reflective.

Understanding anatomy is crucial for an artist as evidenced by the works of Leonardo da Vinci and Michelangelo. Both participated in numerous dissections of human cadavers to better learn the makings and doings of the body. Michelangelo had a dream to publish a book about anatomy while Leonardo kept many science journals that were later published and used as models by other anatomists and artists. I think the students of my class would be very interested to learn just how involved with anatomical studies both of these Old Masters were. On the flipside, it is my goal to make understanding art a

crucial facet for our young anatomists. In reality, the initial observing and analyzing with the artist's eye is what lead to the observing and analyzing with the scientist's eye later on in life when the church was no longer feared.

A humanist approach to life and learning was seen even as early as the late 1500s when Leiden University in the Netherlands made an anatomical theatre available for student use. "Public dissections in this theatre, anatomies on a human cadaver for the benefit of a wide audience (and not just medical professionals and students), were conducted with great solemnity and decorum, almost like religious ceremonies.⁸" This theatre was compared to a tourist attraction of its day since dissections were only conducted during winter months when cadavers could be properly stored. This was the time when humanist thought was zenith. "As Man and the understanding of Man were at the centre point of the humanist world view, a theatre where the fabric of the human body could be demonstrated would be an important tool in gaining this knowledge.⁹" These anatomical theatres are art museums of science. *Nosce te ipsum*¹⁰ can be found in many places of art such as sketches or theaters or in the front of books, etc. It is of Latin origin and means 'know thyself' and was intended to remind individuals that anatomy was a way to know yourself both psychologically as well as physically and to remember the fragility of the human body.

An intense concentration in this unit will be on this said vulnerability. One of the main goals in any course detailing the human body is an intense exploration of the various conditions that disrupt homeostasis, the body's ability to maintain a normal internal environment. Such circumstances include tissue rejection, allergies, injury disease and disorders. Students will be required to research different diseases, conditions and disabilities in great scientific detail and to document their findings in a *Disease Diary* throughout the course of the school year. This will be the culminating project of this curriculum unit as outlined below and in the Appendix and will count as a major assessment grade.

Major Projects

Two major projects will be discussed at the beginning of the year and will be ongoing assignments that form a background to this curriculum unit. Students will be given suitable amounts of class time to work on these projects through research, planning, designing, etc. Both projects are outlined below.

Disease Diary

Students will be expected to keep an organized journal on specific diseases with which they hold a personal affiliation or simply an interest in learning more about. They will be required to, not only, research and write about the diseases in great scientific detail (see Appendix), but to find or create art that depicts each disease in their eyes with an

explanation of why they have chosen this art and disease. Examples of diseases include, but are not limited to, emphysema, depression, cancer, AIDS, cleft palate, epilepsy, etc.

Students will work on this project throughout the course of the year and will be enabled to use the Library Media Center during class time. The Appendix includes a rubric used to assess the students' work. I will expect the Disease Diary project to be completed by the end of the third quarter of the school year and may be presented in any way the students see fit.

To exemplify this goal even further, I will expect students to use both the online photographic exhibition *Anatomical Theatre* featuring several medical museums around the United States and Europe and the spectacular photographs of Joanna Ebenstein¹¹ and Laura Splan's art collections. Students will need to find sculptures using the Anatomical Theatre to supplement the different required aspects of their chosen diseases and their art research. Using Splan's art as a model, students will be required to research the different diseases featured in her collections. The full rubric can be viewed in the Appendix.

Artfully Anatomical Organs

A very important objective that anatomy students must master is exploring how anatomy and physiology relate to each other. I will assign each group of two students a different organ which they will be required to research and sculpt or model three-dimensionally and paint using various materials. A presentation will be part of the grade for this project. Modeling the correct shape of the organ (the anatomy) is very pertinent to its functioning (the physiology) which they will indeed have to explain to their audience. This project is an infusion of art and anatomy and will be done strictly at home and will be due at the middle of the final quarter of the year. I will allow one block period for organization of duties and planning.

During the presentations of the organs, students in the audience will be expected to classify them by the organ systems to which they belong. Students will also become proficient in identifying the organs shown on a diagram or a dissectible torso. This is great preparation for the final practical exam.

Unit 1: An Introduction to Anatomy

The first nine weeks of the 36-week school year will be covering Units 1 and 2 and the first part of the third unit and will end with a quarterly exam.

The main objective of this first unit is for students to analyze anatomical structures in relation to their physiological functions. Students will need to apply correct terminology when explaining the orientation of body and investigate the interdependence of the various body systems to each other and to the body as a whole. Homeostasis has

tremendous importance when teaching any life science. Explaining the role of homeostasis and its mechanisms as these relate to the body as a whole and predict the consequences of the failure to maintain homeostasis will be a standard addressed throughout the year.

I will spend about half a block class lecturing about what anatomy is, why it is important and how it is studied both today and in the past and how on Earth can we integrate art into this class. The artworks I will include in my instructional slides are outlined in detail below.

Showing Rembrandt's symmetrical and shadowy *Anatomy Lesson* created in 1632 will capture the attention of my audience. "This is not a static, descriptive anatomy lesson, but a lesson in physiology and functional anatomy. It also displays one of the essential qualities of Rembrandt's genius: the depiction of movement¹²," which is evident in the faces of the onlookers watching different parts of the dissection. It is as if they are waiting for the chief surgeon to pull on the muscles so that they can watch the fingers and hand move or perhaps could be looking at the anatomical atlas following along with the dissection.

Historical facts about anatomy in the 1600s seem significant to note as well as some background information about Holland when this painting was commissioned. This will give the students an idea of how different the study of anatomy was then compared to now. Well-to-do citizens of this area in the 17th century loved to have their life documented in art and group photos seemed very popular. Nicolaes Tulp was a wealthy surgeon who hired Rembrandt to paint him in his "natural environment." The individuals alongside Tulp in the masterpiece were other affluent citizens that paid a hefty price to be included. Only two or three were actually involved in medicine. These details and the actual date this painting was created are very well known in the art industry because The Amsterdam Guild of Surgeons would allow only one public dissection a year. The cadaver had to be that of a hanged criminal and dissections were reserved for winter months so as to decrease the decay of the dead bodies since electricity was not used.

There has been some controversy over the medical correctness of this painting. Rembrandt painted the musculature incorrectly so it seems. This interesting fact that students will be required to know regards one of the arm muscles shown in the dissected arm of the picture. The flexor digitorum superficialis is actually painted on the wrong side of the elbow.¹³ This bit of knowledge will hopefully make them remember the true anatomy of the lower arm as well as the name of the muscle. This proves that art can literally be a source for conveying scientific knowledge. To make things more interesting, I will poll students on if they think Rembrandt made a genuine mistake while painting this arm muscles or if he did it on purpose to make it look more aesthetic.

While viewing the bust of Julius Caesar, I will ask students what they see in this sculpture? What do they know about it already? What time period is it from? Who created it? This will validate how anatomy was extremely significant to artists as early as the Ancient Greeks.. "...the Greeks accurately measured the human form and defined a perfect figure for a man and a woman." Classical beauty is what we today refer to when speaking about this anatomical likeness as seen in art. The person depicted in the art was further individualized not only through the resemblance in the art, but through appropriate objects which spoke about who they were and what they did. For example, a professor might be holding a scroll or a king might be wearing a crown or wreath. "These objects became known as icons and over time became a language associated with art."¹⁴ It is important to also note that only certain kinds of anatomy were acknowledged in art (beauty, power, perfection) while others (disability, disease, deformity) were scrupulously left out during this time. "While it tells us they wanted to reproduce anatomy, it also tells us about what kinds of anatomy they valued or thought worthy of depiction."¹⁵

The following class period, I hope to demonstrate to the students how anatomy can be and should be represented through art in a different perspective. I will show them a slide of Marc Quinn's controversial statue *Alison Lapper Pregnant* that was unveiled in London's Trafalgar Square in 2005. Alison Lapper is a current British artist who was born in 1965 with phocomelia.¹⁶ This very rare condition causes the bones of the arms and legs to be shortened or even absent.

Quinn says his inspiration came from the fact that there was "no positive representation of disability in the history of public art." Lapper says that she hopes the sculpture will "make a difference ... it's inspirational. It puts disability and femininity and motherhood on the map. It's time to challenge people's perceptions of these things. I'm hopeful it can make a difference."¹⁷

I want the students to ponder the differences in this statue with many other historical statues. I will ask them what they think it says about our ability to accept these differences today and how has that changed throughout history. This lesson of art accentuating and glorifying both Alison Lapper's disability and pregnancy is showing students how we in the past have structured our study of anatomy (not just art) to be more aesthetic rather than scientific. I will read students the following excerpt and provoke a discussion using the embedded questions.

The disabled body or differently-abled body has been largely absent from theoretical discourse on the body. Why? Is it because...it is not seen as chic, sexy or fashionable? Is the disabled body too transgressive and deviant? Does it overstep the boundaries of what is considered allowably transgressive or deviant? Are there theoretical limits? Does it produce in the viewer's gaze the fear of the uncanny, in the Freudian sense, with the attendant repulsion for the unfamiliar

unheimlich or too different other? Does the disabled body not destabilize and disturb notions of the classical body and disrupt the idea of an organized body...¹⁸

The Perfect Body

Next, we will discuss body image. Who decides what the perfect ideal is? How has this ideal changed throughout history? I will show students Phillip Johnson's musical video *Women in Art*¹⁹ revealing 500 years of changing female portraiture and ask them what they think this says about art historically.

Students will be introduced to Leonardo's world-renowned *Vitruvian Man* (1487) which is now a symbol of modern medicine. Inspired and accompanied by the notes and work of Vitruvius, a Roman architect, writer and engineer (circa 80 BC – 15 BC), it is said to portray the perfect proportions of the human male anatomy. It is evidence of a Renaissance quest to figure out who we are and from where we come. This was later supported by the *Modulor* work of the great Modernist Le Corbusier, an architect. He used measuring instruments attached to his own body. Corbusier truly feels he worked out the perfect answer to *who has the ideal body?* Students will use the rest of the period working in groups to use their body parts (thumb, foot, arm) to make scientific measurements of objects around them and compare with measurements with members in their lab groups. They will also use The Vitruvian Man to learn and practice their anatomical terminology and directional terms such as superior, inferior, posterior, anterior, etc.

We live in a society that idolizes a full and completely artificial conception of bodily perfection. This view of the normal body tyrannizes most, if not all women in our culture, so that far too many women in our culture grow up believing that their bodies are inadequate in some way. The issue here is that I want professionals to think about the whole parallel between dieting and rehabilitation.²⁰

For homework, I will assign an introspective task that requires students to look at artwork from different artists and answer questions. What do these pieces of art say about the human body, the artist themselves and why? What do you think about the ideal body as it changes through time? What has happened in history to make us change how or what we think beautiful or ideal is? We will spend about half the next class period discussing student responses.

The artwork in the above assignment includes, but is not limited to:

- Various pastels from the *Ballet Series* by Degas Pastel
- Vor dem Spiegel* by Degas Pastel
- Woman Sponging Her Back* and others from the bath collection by Degas Pastel

- Vive Moi* by Niki de Saint Phalle
- Giacometti's sketches and sculptures
- Picasso portraits
- At Eternity's Gate* by Vincent van Gogh

After reviewing their thoughts the next class, we will discuss Sarah Grogan's book about Body Image and showing the illustrations she uses in her discussion.²¹ Subjects range from early models such as the *Study of Two Nude Figures* (1503), *Bathsheba* (1654), the *Blonde Bather* (1881) to the later Marilyn Monroe, Twiggy, Kate Moss and even Arnold Schwarzenegger and Marlon Brando. We will discuss Grogan's research on body image over the years, the socio-cultural influences, modification practices (such as cosmetic surgery and tattooing) and interventions used to promote positive body image.

Unit 2: Histology

Histology is the study of tissues of the human body. Students must be able to correctly name and identify the four major tissue types of the human body (connective, epithelial, nerve and muscle), their chief subcategories and major characteristics of each. They will also need to explain how the four major tissue types differ structurally and functionally.

Alvin G. Telser is a retired professor at Feinberg School of Medicine at Northwestern University in Chicago, Illinois and is renowned for using art in his histology lessons to medical students. "...a lover of art, Dr. Telser knew that a work of art is recognized by certain characteristics. [He] wanted to show the students that the same method of identifying art could be applied to the study of tissue..."²²

I will take a similar approach to incorporating art in this very comprehensive, microscopic section. Showing art alongside my histology slides will help students grasp this complex subject-matter. Students will view and draw what they see of specific tissues under the microscope and analyze their characteristics just as they would a piece of art. This lesson will take two block periods to ensure students have enough time to work through different stations designated to the learning and viewing of different tissue types under the microscope as well as analyzing their characteristics and comparing them to the art.

The follow-up activity the following class period will be a short warm-up using a few magnified photographs of microscopic images shown on an LCD projector from a slide show program. The images will be paired with a piece of abstract art that resembles the look of the tissue. Students will have to answer the following questions. Which image is art? What is the function of the tissue shown? How does the structure of this tissue allow it to function as it should?

- Epithelial tissue will be paired with Sam Francis' *Blue Balls* (1960)
- Adipose (connective) tissue will be paired with more of Sam Francis' untitled work (<http://meulensteinartcenter.org/html/Sam-Francis.html>)
- Areolar (connective) tissue will be paired with Jackson Pollock's *Lavender Mist* (1950)
- Porous osseus (connective) tissue will be paired with Fred William's *You Yangpond* (1963)
- Neural tissue will be paired with Katherine Sherwood's *Cajal's Revenge* (2007) and *One in 100 Billion* (2008)
- Muscle tissue (skeletal, cardiac and smooth) will be paired with Pat Lipsky's *Spiked Red* (1969)

The “loose brushstrokes, drips and splatters, and dynamic colors” of the abstract art pieces highlighted above vividly emulate the microscopy of the human body.²³ A histologist just like a maker or viewer of abstract art uses a specialized language that is very visual as one needs to examine both the form and lines of the matter in question.

Scar tissue

Students are also required to examine conditions that change normal body functions such as injury and the sequential process of tissue repair or wound healing. Scar or granulation tissue is a specialized type of fibrous connective tissue that is very different from healthy body tissue. Students will be introduced also to the four types of burns and the differences between each. First degree burns are the least severe whereas fourth degree burns are the most often resulting in death, dehydration or amputation of the affected body part. After the anatomy information is presented, the art integration begins.

While the physical tragedy of overcoming and surviving grave burns is beyond mind's eye, the severe emotional and psychological terror that goes along with it can be even more depressing and debilitating. Burn survivors intensely struggle with self-esteem and social issues.

Students will be introduced to Doug Auld and his State of Grace Project Series.²⁴

“In order to lift the stigma from those whom fire and scars and grafted skin have reshaped into aesthetic outcasts” and to encourage people “to accept them as fellow human beings, rather than as grotesques to be gawked at or turned away from,²⁵” Auld began painting burn victims in 2002 with the help of the Burn Center at Saint Barnabus Medical Center in Livingston, New Jersey.

The young people that have volunteered for this series have all endured physical pain and personal tragedy. They have developed a strong sense of *self* at an early age in order to survive public alienation due to their appearance. Many of them

lost family members in the fires that they survived. My motivation to paint them is rooted in the desire to explore the parameters of beauty in our society. These paintings document their visual facts while interpreting the less tangible aspects of inner beauty and personal character.²⁶

After perusing Doug Auld's series, students will be given the rest of the class period to discuss their thoughts.

Unit 3: Protection, Support and Movement

The second nine weeks of the 36-week school year will be covering the second half of the third unit and the whole fourth unit and will end with a quarterly exam. The aim of this section is to analyze the interdependence of the integumentary and musculoskeletal systems as these relate to the protection, support and movement of the body. This is a fantastic section to incorporate art.

Before beginning my first lecture on the skin and its structures and functions, I will integrate Laura Splan's *Trousseau* collection of feminine garments and accessories and ask the students of what does the artist's medium remind you? Students will be flabbergasted to know the art was made using a chemical facial peel that Splan used all over her own skin. "Since the transparent, plastic-like beauty product picked up the impressions of Splan's skin, the intricacies of her bodily texture were preserved in the gossamer, almost ghostly garment."²⁷

Body Art

Can the skin be used as a canvas to illustrate art? Should it? Is this art? Why or why not? If art is shown on the skin, are we more skeptical of it as art? Why or why not? What are the historical ways skin has been understood or used?

After taking adequate class to outline the integumentary system with the anatomical information the students need to know, I will teach an enticing lesson on body art. There are different types of body art (piercing, tattooing, scarring, shaping, painting, etc.) and the use of the human body as a solid medium for artistic expression has quite a long history. Two individuals will be introduced to students in this section.

Geoff Ostling is a retired history teacher who lives in Sydney, Australia and is the subject of the documentary, *Skin* which premiered at the 2008 Sydney Film Festival and was shown on ABC. Ostling's tattoos span from his neck to his ankles and illustrate 62 flowers all drawn from nature and other scenes created by his tattooist eX de Medici. He aims to have his skin preserved when he dies so it may be put on display at the National Gallery of Australia.

Rick (Rico) Genest also known as Zombie Boy has also “dedicated his body to his art.” Once a homeless circus performer, this brain tumor survivor has risen through ranks of stardom and now appears in Lady Gaga music videos, commercials and as a runway fashion model. His desire to celebrate life, be free and artistic are very inspirational indeed if you can get past his scary features. His Montreal tattooist, Frank Lewis, illustrated on Genest’s body the entire skeleton free-style and a decomposing corpse over the course of many years. The two men designed the art together.²⁸

Body Art explores the many different ways, both temporary and permanent, in which people modify, change, decorate and adorn their bodies. It covers the what, why, how and where of body art. Themes covered include: universality, diversity and antiquity of styles; concepts of beauty; identity and transformation; meaning and significance of symbols; and pain, endurance and rites of passage.²⁹

After listening to my short talk about Ostling and Genest, students will work independently on the body art assignment, a response to what they are learning. They will also be assigned a project to design a piece of body art (any of the five types) that represents their identity or describes something significant about them. They will need to explain in paragraph form below why they have chosen or created this piece of body art and what it symbolizes.

I will allow students one block class period in the Library Media Center to research the five different types of body art according to the Australian Museum and to start creating their masterpiece. The due date is actually three class periods later in order to allow students’ time to be introspective about the requirements of the assignment. The Appendix contains a worksheet students are required to complete and hand in along with their body art creation for an assessment grade.

Muscles and Bones

Portraying the body through anatomist Andreas Vesalius’ 1543 art-informing-science *De Humani Corporis Fabrica* will help my students identify the major muscles of the human body. “Anatomy can legitimately be divided into the pre- and post-Vesalian periods. He created a new level of sophistication, precision, and style in anatomical illustration that would challenge” earlier schools of thought that were devoid of many visuals.³⁰

To depict and tutor the students on the musculoskeletal system, I intend to use Leonardo da Vinci’s array of anatomical artwork as shown through the Geneva Foundation for the Medical Education and Research.³¹ In the 1490s, the esteemed Leonardo da Vinci wrote about demonstrating muscles, tendons and ligaments “...to be certain of the point of origin of any muscle, you must pull the sinew from which the muscle springs in such a way as to see that muscle move, and where it is attached to the ligaments of the bones.” This will be very helpful to my anatomy students as they are

required to know the origin of the major muscles for their written and practical examinations.

Muscle Mania

Each student will be given a specific muscle to research and present. I will allow two block class periods to work on the research and design of their presentations. Students will be also expected to correctly paint the contours and angles of their assigned muscle as this is extremely relevant to the muscle's functioning. They will need to display this magnum opus as they teach the class about the science of their assigned muscle. The Appendix contains a rubric used to assess the students' work.

After students have had sufficient class and home time to learn and review the muscles and bones of the human body, I will project images of Vesalius' and da Vinci's art and allow students to work in groups identifying all muscles and bones they see. This will be graded as an assessment and will serve as a wonderful exercise to further prepare them for the practical final exam at the end of the school year. I will allow them half of a block period to work on this practice test.

Unit 4: Integration and Regulation

The main academic intention of this unit is the assessment of the integration and coordination of the body's functions and their dependence on both the nervous and endocrine systems to control physiological activities.

There are two quick ways to incorporate art into the very beginning of this unit to seize the students' attention.

Currently with Laura Splan's *Reflexive* collection

Reflexive explores the narrative implications of blood through its physical qualities. Each drawing was created using blood taken from my fingertips as the primary medium. The drawings reference neuroanatomical forms sometimes directly, sometimes loosely. I was drawn to these images as a formal exploration of the elements of our body that tell us we sense pain or pleasure. We respond to these sensations in a way that we often have no control over. Bleeding itself is an involuntary response to the penetration of the skin. The images of neurons and other brain structures evoke the complex psychological and physiological responses our body has to outside forces. The forms of the brain structures act as visual metaphors for the extreme complexity and delicate fragility of the human body.³²

Historically with Michelangelo's frescoes

I will also show students a very famous images from the ceiling of the Sistine Chapel painted by Michelangelo between 1508 and 1512 and commissioned by Pope Julius II, *The Creation of Adam* and ask how can this esteemed and highly religious work of art commissioned by Pope Julius II relate to our anatomical study? I would also love to start a debate among the students whether they think Michelangelo really integrated the human brainstem in his image of God in the Sistine Chapel, hence deliberately mixing science with religion.

The brain

While studying the complexity of the brain, students will create their own piece of art. They will use swim caps to highlight the major areas of the brain responsible for our actions such as speaking, hearing, seeing, etc. They will spend two class periods working independently on a fun yet extensive laboratory exploration borrowed from the AP level Biology curriculum as adapted by Kim Foglia.³³ This will count as a test grade and will be great preparation for their practical exam at the end of the year.

Neurological disorders

Epilepsy

Associate professor of neurology at Brigham and Women's Hospital, Shahram Khoshbin also relates art and medicine. He writes that the use and pairing of certain hues and colors can induce emotions as can be seen in Vincent Van Gogh's work which has long been suggested reflects his epilepsy. The "painter's florid use of tertiary colors, which emerge when a secondary color blends with a primary color³⁴," is indicative of epilepsy. Through Khoshbin's research at an art-therapy studio and his passion for both art and science, he made several discoveries. Patterns can be seen in the art of patients suffering from neurological disorders. Khoshbin is quoted below.

...the schizophrenics' artwork was meticulous and detailed. The depressed patients had splashed black and brown everywhere. But what stunned me was the box filled with art by the epileptics: in almost every painting they had used tertiary colors.³⁵

This diagnostic approach to analyzing the patterns in art can be very influential in convincing someone that the two disciplines are more connected than one may think. Artworks I will show include Van Gogh's *Starry Night* and *At Eternity's Gate* and his self portraits. Students will be reminded that critiquing a patient's artwork is not a completely legitimate mode of diagnosing a brain condition, however, just an interesting perspective.

Depression

Discussing serotonin and its magnitude to defeating depression while I show more of Laura Splan's Trousseau collection, specifically *Neglige* made in 2009. Splan also has a line of large pillows that she created out of sewing rugs together. They are enormous anti-depressant *pillows*: Prozac, Thorazine and Zoloft. She says "they provide a different kind of comfort than their prescription counterparts" since the process used to make the rugs and pillows "provides a sufficiently mind-numbing effect."³⁶ Questions to ask students: How is this "mind-numbing effect" related to depression? What kind of debate is Splan trying to create here? What about the ever-present and overpowering marketing of pharmaceuticals?

I will suggest to students to read the rock musical book, *Next to Normal* by Brian Yorkey. This story portrays a suburban mother of two who struggles with depression and severe bi-polar disorder. The narrative also explores suicide, drugs and ethics in modern medicine. It should be noted that Diana chooses not to medicate and have ECT at the end. Should we embrace neurodiversity? Do we overmedicate these illnesses? I will compel students to research the recent and large Mad Pride Movement where members "are rejecting pharmaceutical solutions for psychiatric conditions and fighting the stigmatization and shame of mental illness."³⁷

Stroke

Katherine Sherwood, after having a stroke and suffering some brain damage, became very interested in the "beauty of blood vessels."³⁸ Showing the students pieces of her art such as *One in 100 Billion*, *Neuron Nurse*, and *Ears* will tie nicely into this section on the brain, special senses and neurological disorders. Students can analyze her art and describe what they see in it and how it relates to what we are studying.

Unit 5: Immunology

The third nine weeks of the 36-week school year will be covering Units 5 and 6 and will end with a quarterly exam. The Disease Diary project is due at the conclusion of this quarter as well.

The Honors Anatomy and Physiology curriculum states that students should examine various conditions that affect the homeostatic state or rather change the body's normal functioning and how the body responds to these changes. Very important to the human body is its ability to defend and protect itself from invaders that will alter the way the body normally works. While learning the specifics of the immune system, students will have an interesting art component knitting itself within the anatomical lessons.

Since the body has an amazing knack to repair itself, with help needed at times, I thought it appropriate to include *A Conversation With Katherine Sherwood* into the first lesson of this unit where we will talk about the anatomy and physiology of the immune system. Sherwood, introduced earlier in Unit 4, suffered a cerebral hemorrhage which paralyzed the right side of her body. She forced herself to continue painting which she claims “was the most healing therapy she could have imagined.”³⁹ Students and I will read the article together and discuss what Sherwood means by “trying to look through the lens of disability at a few modern art historical subjects.” Can art heal? Can art help to rehabilitate? If so, how? I will give the students a chance to share their thoughts before I explain what scientific study tells us. Art is said to help the body change physiologically aiding the immune system and important and nutritious oxygenated blood flowing to the organs.

The body's physiology changes from one of stress to one of deep relaxation, from one of fear to one of creativity and inspiration. Art and music put a person in a different brain wave pattern, art and music affect a person's autonomic nervous system, their hormonal balance and their brain neurotransmitters...They change attitude, emotional state, and pain perception. They create hope and positivity and they help people cope with difficulties. They transform a person's outlook and way of being in the world.⁴⁰

This spiritual approach to the functioning of the immune system is highly regarded by some, yet rejected by others. Whether one believes in this deep healing system is very personal and should not be forced upon anyone. I will explain this to students and introduce them to Quan Yin, a Buddhist deity who is said to be the personification of compassion, kindness, love, healing amongst other amazing attributes. I will show them C. Regina Kelly's depiction of the many-handed *Quan Yin*. “Each hand is holding a different remedy. With this she can cure any illness.”⁴¹ The seven remedies found in this piece of art are the claws of a bear, corn, eyes, flames, flowers, leaves and stars.

For homework that evening, I will require students to peruse Laura Splan's website to explore the aspects of her work where they think immune system is represented. We will begin the next class and spend about 20 minutes discussing their findings. During this time, I will show them slides of Splan's art that I have found to satisfy the assignment.

Splan's collection of *Doilies* are embroidered based on the molecular structure of various viruses that attack the body: SARS, HIV, herpes, influenza and hepatitis. Splan claims there are negative aspects of society that have made these viruses more ubiquitously known. “Bio-terrorism, SARS, and antibacterial soaps alike have all heightened our awareness of the microbial world. Doilies serve as a metaphor for the way we have adapted our everyday lives to these now everyday concerns.”⁴² Including these five diseases, a brief description of them and references to Splan's art in their diaries will

be a requisite in their Disease Diary which is due at the end of this current quarter. See the Appendix more detailed information.

Watching Hands is an artistic representation of keeping well. It is a group exhibition currently being featured at Atlanta's David J. Spencer CDC Museum in association with the Smithsonian Institution and partnered with Georgia Pacific. Laura Splan's *Surface Tension* series, along with the creations of five other artists from around the country "interpret the act of hand washing in innovative and unexpected ways" to call attention to "the importance of hand washing as one of the most effective ways to stay well⁴³" and battle the invisible world around us. I will show the students Splan's YouTube video.⁴⁴ about her work in this exhibit and remind them the goals of this specific section are to discuss the body's defense system, our responses to intruding microbes, ways to aid this resistance and, of course, art integration which embodies it all.

Vigilant is another series portraying immunology. These colorful, beautiful and time-consuming latch-hooked wall sculptures depict different microscopic living things that are associated with sickness such as E. coli, salmonella, anthrax, botulism, ebola and smallpox. Including these microorganisms, a brief description of how they affect the body and references to Splan's art in their diaries will be a requisite in their Disease Diary which is due at the end of this current quarter. See the Appendix more detailed information.

Finally, Splan's *Anatomy of Tears* handkerchief is a bit of a stretch, but certainly symbolizes the pain and tears involved in the body's healing process. Her creative handkerchief is embroidered using chemical facial peel and is embellished with tear ducts and glands.

I will start the next class period before getting deeper into the physiological and microscopic functioning of the immune system by showing them another artist's designs. Luke Jerram in collaboration with different glass blowers creates detailed glass sculptures of microscopic disease-causing agents such as E. coli, SARS Corona Virus, Smallpox, HIV, malaria, HPV and both the swine and avian flu viruses. They "were created to contemplate the global impact of each disease" and to explore "the tension between the artworks' beauty, what they represent and their impact on humanity."⁴⁵ Jerram uses what is called the "pseudo-coloring" found in biomedical marketing or scientific communication. Questions that he tries to answer through his art are quoted below. I will allow students time to process and try to analyze these questions as well.

If some images are coloured for scientific purposes, and others altered simply for aesthetic reasons, how can a viewer tell the difference? How many people believe viruses are brightly coloured? Are there any colour conventions and what kind of 'presence' do pseudocoloured images have that 'naturally' coloured specimens don't? How does the choice of different colours affect their reception?

In conclusion of the art assimilation element of this system, I will show a BBC World Service video of this series depicting the very “lovely⁴⁶” yet very fatal viruses in which he addresses this color-scram issue.

Unit 6: Transport

While discussing the circulatory system, I will remind students about Laura Splan’s work once again. Students must be able to describe the anatomy and physiology of blood and the other organs of the circulatory system. Blood is the main vehicle for transporting needed nutrients throughout the body. It is made up of many components, each with its own specific functions: white blood cells, red blood cells, plasma and platelets. Students will be amazed by images of Splan’s *Blood and Lace* collection. “She’s been combining horror and beauty, the biological and the familiar in her artwork for over ten years...she is using her own blood to paint over vintage doilies, which serve as stencils” for wallpaper.⁴⁷ Once again, science and art have been united in a very logical and original way.

The Missing Systems

The fourth nine weeks of the 36-week school year will be covering Units 7 and 8 and will end with a quarterly exam. The urinary, digestive, respiratory and reproductive systems will certainly be taught within these last two units of the anatomy curriculum, but will not encompass an art component. However, the creation and presentation of the Artfully Anatomical Organs project is due in the middle of this quarter as well.

Why Study Art in Anatomy?

Great question! Why not let two educators from Davidson College in North Carolina answer it?

By bringing arts and biology together...we are moving toward an interdisciplinary understanding of two seemingly disparate topics. We are moving also toward an academic approach that more effectively engages different types of learners. The truth is that our world consists of paintbrushes and micropipettes working simultaneously. Our teaching methods should reflect this reality, these daily interconnections.⁴⁸

Appendix – Disease Diary Rubric

Choose five diseases with which you have a personal affiliation or an interest in studying further. You will be required to research a collection of facts in great detail regarding each disease you have picked.

You should organize your information in a professional and creative way. Paragraphs of information and copy-and-pasted notes should NOT be part of your journals. Be sure to use proper grammar and punctuation and put the information in your own words. **DO NOT PLAGARIZE!!** Include a section at the bottom of each diary entry to cite where you found the facts and figures, etc. Your data must be accurate! Your finished product must be typed and is due at the end of the third quarter. The date will be announced later in the year. Class time will be allotted to work in the Library Media Center occasionally throughout the year, but students should work on this project throughout the year on their own time.

Diary Entry Requirements

One disease must be a type of cancer.

Each disease must be of a different organ system (although it is fine if the diseases overlap in different systems).

Disease Name – centered and bold

General Overview – be sure you list the human organ systems it affects and include the etiology (how the disease is acquired)

Signs and symptoms

Treatment options/cure

Prevention or ways to lower the risk factors

Prognosis/Research being done

Quote of people who have/had this disease (be sure to cite where you found the quote)

Famous people who have suffered or are currently suffering from this disease

Relevant Statistics

Art Component 1

You will need to find or create art that personally represents each disease with an explanation of why and how it represents the disease in your eyes. Include both the artwork and this explanation in your diary. At least one piece of art from your diary needs to come from the Bechtler Museum's collection.

Art Component 2

Using the online Anatomical Theatre website

(<http://www.astropop.com/anatomical/introduction.html>) or one of the featured medical museums, find something representative of each of the diseases outlined in your diary.

Art Component 3

In addition to your five chosen diseases, you must incorporate Laura Splan's artwork from both her *Doilies* and *Vigilant* collections. Research and describe in scientific detail each of the eleven diseases symbolized in her work. Include in your diary these summaries and pictures of the molecular structure of each microbe or virus side-by-side with Splan's work.

Appendix A – Course Objectives

Standard 1 – Anatomical Orientation

- 1.1 Illustrate the interconnections between anatomy and physiology.
- 1.3 Use prepared slides to distinguish among the different types of tissues.
- 1.5 Identify the major organs and describe the functions of each body system.
- 1.7 Apply correct terminology to reference anatomical position.
- 1.8 Provide examples of how the body maintains homeostasis and identify disruptions.

Standard 2 – Protection, Support and Movement

- 2.2 Explain the physiological processes involved in healing and disorders of the skin.
- 2.4 Distinguish between different types of bone and identify the major bones.
- 2.6 Identify the major muscles of the human body.
- 2.8 Explore the different types of muscle tissue noting their functions and structure

Standard 3 – Integration and Regulation

- 3.1 Identify the major areas of the brain.
- 3.9 Analyze a case study of a neurological disorder to make a diagnosis or prognosis.

Standard 4 – Transport and Immunity

- 4.3 Describe the cellular components and physical characteristics of blood.
- 4.4 Determine blood types in the ABO system.
- 4.10 Describe the immune response mechanisms at the cellular level.
- 4.11 Relate nonspecific defenses of the body to environmental factors.
- 4.12 Identify the causes of imbalances in the immune system.

Disease

A major emphasis throughout the school year will be on factors that disrupt homeostasis such as certain diseases or disorders.

Appendix B – Body Art Response Sheet

Honors Anatomy & Physiology – The Integumentary System

Body Art – is it art?!

Please type your final draft of this assignment.

Do you think body art should be considered real art? Why or why not?

According to the teacher's lecture, what do you think of Geoff Ostling and Rick Genest and their manifestations? Freaks or artists? Explain your answer(s).

Research the 5 types of body art and jot down important notes about them here including the significance of each in history.

What is Henna? For what is it used? Briefly describe the traditions of henna as body art? Are there any health risks associated with henna use?

Research and design a piece of body art (any of the different types) that represents your identity or describes something significant about you. Be creative and neat. Explain in paragraph form below why you have chosen or created this piece of body art and what it symbolizes. You may hand-draw it or design it on the computer. Attach your artwork to your final draft of this analysis sheet.

Appendix C – Annotated List of Student Websites for Body Art Assignment

A history and types of body art: <http://australianmuseum.net.au/Body-Art>⁴⁹

An interview with and pictures of Geoff Ostling:
<http://weirdnews.about.com/b/2009/05/13/interview-with-geoff-ostling-tattoo-legend-donates-body-of-work-his-body-to-museum.htm>⁵⁰

Skin Documentary: <http://www.daybreakfilms.com.au/skin/>⁵¹

A short biography about Rick Genest and a curated collection of images:
<http://rickgenest.com/index.php/home/item/86-the-curated-collection-skull-style-rick-zombie-boy-genest.html>⁵²

A very neat video commercial for Dermablend featuring Rick Genest:
<http://www.freshnessmag.com/2011/10/21/dermablend-professional-go-beyond-the-cover-video-featuring-rico-genest-aka-zombie-boy/>⁵³

Appendix D – Muscle Mania

Research the following aspects of your assigned muscle and organize it for a presentation to the class. Be prepared to both demonstrate your art component and an exercise that will strengthen your specific muscle.

- Muscle Name
- Nickname
- Number of origins
- Origin point
- Insertion point
- Describe the physical look of the muscle (size, length, location, shape, etc.)
- Why was it named the way it was?
- Action
- Antagonistic muscle
- Controlling nerve
- Three fun facts

Art Component

Correctly paint the contours and angles of your assigned muscle. Art must be created to accurately reveal the actual size and location of the muscle. Be creative with your medium of choice. Bonus points will be awarded.

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⁴⁶ “BBC World Service programme about Luke Jerram's glass virus artworks,” YouTube video, 3:31, from a performance televised by BBC at Smithfield Gallery, London in

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⁴⁷ Groeger, “Blood and Lace” (see note 27).

⁴⁸ Anna G. McDonald and David R. Wessner, “The Visual Art of HIV/AIDS: An Interdisciplinary Approach to Teaching About HIV/AIDS,” *Bioscene*, Volume 29(1): March 2003, 20.

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⁵⁰ “Interview With Geoff Ostling: *Tattoo Legend Donates Body of Work (His Body) to Museum*,” by Buck Wolf, *About.com Guide*, May 13, 2009,
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