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Fly High July & August 2024 Gold Course



Center for Success with Froggy



First Minute

Multi-Detector Computed Tomography

Paragraph 1: Multi-detector computed tomography (MDCT) is a revolutionary advancement in medical imaging that has greatly enhanced the diagnosis and treatment of various medical conditions.

Paragraph 2: The journey towards MDCT began with the invention of the first CT scanner by Sir Godfrey Hounsfield in 1971.

Paragraph 3: While groundbreaking at the time, this early scanner had limitations in terms of image quality and acquisition speed.

Paragraph 4: MDCT scanners typically feature anywhere from 4 to 320 rows of detectors, allowing for the simultaneous acquisition of multiple cross-sectional images with each rotation of the scanner's gantry.

Paragraph 5: Despite the numerous benefits of MDCT, the technology is not without its challenges.

Paragraph 6: To address this issue, manufacturers have developed various dose reduction techniques, such as automatic tube current modulation.

Special Training

Which part of each sentence forms the MAIN SENTENCE? Highlight it in your mind.

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One word will provide you with new information about the title. It will be what the paragraph is about. And, it's often (but not always) found in the second half of the main sentence. This is your anchor word.

What anchor word (maybe 2) would you pick from each highlighted sentence?

Multi-Detector Computed Tomography

Paragraph 1: Multi-detector computed tomography (MDCT) is a **revolutionary advancement** in medical imaging that has greatly enhanced the diagnosis and treatment of various medical conditions.

Paragraph 2: **The journey towards MDCT began with the invention** of the first CT scanner by Sir Godfrey Hounsfield in 1971.

Paragraph 3: While groundbreaking at the time, **this early scanner had limitations** in terms of image quality and acquisition speed.

Paragraph 4: **MDCT scanners typically feature** anywhere from 4 to 320 rows of detectors, allowing for the simultaneous acquisition of multiple cross-sectional images with each rotation of the scanner's gantry.

Paragraph 5: Despite the numerous benefits of MDCT, **the technology is not without its challenges**.

Paragraph 6: To address this issue, **manufacturers have developed various dose reduction techniques**, such as automatic tube current modulation.

Can you see the structure naturally divides into 3 parts: beginning, middle, and end? How would you summarize each of these parts? Write one simple sentence for each part.

Multi-Detector Computed Tomography

Beginning: MDCT is a **revolutionary** medical device *that began as an **invention***.

Middle: The invention had **limitations** *that future **MDCT features** improved*.

End: **Challenges** remained that **manufactures** tried to fix with **developments**.

Can you see how this is a very clear step-by-step strategy? But, it does require strong grammar, vocabulary, and memorization of the strategy. Know that you will improve all of these week after week, little by little.

Can you see how this directly translates to the summary question?

Complete the summary by selecting the THREE (out of six) answer choices that express the most important ideas in the passage.

Multi-detector computed tomography (MDCT) represents a significant technological advancement in medical imaging. MDCT is a groundbreaking medical tool that originated from an earlier invention. The original invention had drawbacks that subsequent advancements improved. Despite advancements, issues persisted that manufacturers attempted to resolve through new innovations.

A. Despite advancements, issues persisted that manufacturers attempted to resolve through new innovations.

~~B. The original invention had no limitations and required no further improvements.~~

C. MDCT is a groundbreaking medical tool that originated from an earlier invention.

D. The original invention had drawbacks that subsequent advancements improved.

~~E. Manufacturers addressed persistent challenges despite advancements by outsourcing production to other countries.~~

~~F. MDCT was first developed as a portable device for home use.~~

Build your vocab list from these words in your vocabulary notebook. Pick 3, 10, 30 words from what you read. Create flashcards with them on your own. You can use Quizlet for flashcards, ChatGPT or Claude for simple TOEFL stories with these words.

Here are the top 15 TOEFL academic words from our topic sentences. These words are frequently used in academic TOEFL material.

Revolutionary

Advancement

Enhanced

Diagnosis

Treatment

Medical

Conditions

Invention

Groundbreaking

Limitations

Acquisition

Simultaneous

Cross-sectional

Technology

Challenges

If all of these words seem familiar, your improvement in comprehension requires more grammatical mastery and academic structure mastery that will come from continued training and reading your non-fiction book.

First 5 Questions

Multi-Detector Computed Tomography

Paragraph 1: Multi-detector computed tomography (MDCT) is a revolutionary advancement in medical imaging that has greatly enhanced the diagnosis and treatment of various medical conditions. The development of MDCT scanners in the late 1990s marked a significant milestone in the evolution of computed tomography (CT) technology. Computed tomography, also known as CT or CAT (Computed Axial Tomography) scanning, is a medical imaging technique that uses X-rays to create detailed, cross-sectional images of the body.

-harder before MDCT

-helps some but not all

Inference

1. What can be best inferred from paragraph 1 about MDCT's revolutionary impact?

A. It has enhanced the treatment more than the diagnosis of various medical conditions.

No

B. It helps doctors diagnose some medical conditions better than others. Maybe.

C. It was the key reason for the remarkable advancement in medicine in the 1990s. No

D. It is important because it does not require the use of X-rays to image the body. No

Paragraph 1: Multi-detector **computed tomography** (MDCT) is a revolutionary advancement in medical imaging that has greatly enhanced the diagnosis and treatment of various medical conditions. The development of MDCT scanners in the late 1990s marked a significant milestone in the evolution of **computed tomography (CT) technology**. **Computed tomography**, also known as CT or CAT (Computed Axial Tomography) scanning, is a medical imaging technique that uses X-rays to create detailed, cross-sectional images of the body.

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Detail

2. According to paragraph 1, **computed tomography**

A. is also known as *CT but not CAT*. No.

B. requires the *absence* of X-rays. No

C. generates visuals of *body structures*. Maybe

D. *crosses* detailed images *together*. Maybe

Paragraph 2: The journey towards MDCT began with the invention of the first CT scanner by Sir Godfrey Hounsfield in 1971. Hounsfield was a British electrical engineer. His interest in computers and X-rays led him to develop the first CT scanner, which revolutionized the field of medical imaging. Hounsfield's scanner utilized a single X-ray beam and a single detector to acquire cross-sectional images of the brain. The scanner worked by directing a narrow X-ray beam through the head from multiple angles. The X-ray detector on the opposite side measured the amount of radiation that passed through the brain tissue. By rotating the X-ray tube and detector around the patient's head, the scanner acquired multiple measurements from different angles. These measurements were then processed by a computer to reconstruct a detailed cross-sectional image of the brain.

Negative Detail

3. Which of the following is NOT mentioned as a part of Hounsfield's scanner?

- A. A measurement of the amount of X-ray that passed through the body.
- B. A detector to receive X-ray signals.
- C. The X-ray emitter and detector to sit opposite each other.
- D. The use of multiple, angled X-ray beams.

Paragraph 2: The journey towards MDCT began with the invention of the first CT scanner by Sir Godfrey Hounsfield in 1971. Hounsfield was a British electrical engineer. His interest in computers and X-rays led him to develop the first CT scanner, which revolutionized the field of medical imaging. Hounsfield's scanner utilized a single X-ray beam and a single detector to acquire cross-sectional images of the brain. The scanner worked by directing a narrow X-ray beam through the head from multiple angles. The X-ray detector on the opposite side measured the amount of radiation that passed through the brain tissue. By rotating the X-ray tube and detector around the patient's head, the scanner acquired multiple measurements from different angles. These measurements were then processed by a computer to reconstruct a detailed cross-sectional image of the brain.

Detail

4. What allowed Hounsfield's scanner to create detailed cross-sectional images of the brain?

- A. Multiple measurements of X-rays from a single angle.
- B. The unique angle of the patient's head in relation to the detector.
- C. An unfixed X-ray tube sending X-rays to a detector.
- D. The rotation of the patient's head around the detector.

Paragraph 3: While groundbreaking at the time, this early scanner had limitations in terms of image quality and acquisition speed. As CT technology progressed, manufacturers introduced scanners with multiple detectors, enabling faster image acquisition and improved spatial resolution. However, it was not until the introduction of MDCT scanners that the true potential of this technology was realized. MDCT scanners were introduced in the late 1990s by major medical imaging manufacturers. These companies developed scanners with multiple rows of detectors, ranging from 4 to 16 rows, which allowed for the simultaneous acquisition of multiple cross-sectional images during a single rotation of the scanner.

Vocabulary

5. The word "acquisition" in the passage is closest in meaning to:

- A. Removal
- B. Gathering
- C. Display
- D. Transfer

Grammar & Comprehension Break

Focus on any sentence you understand well, such as this one from paragraph 3:

Paragraph 3: While groundbreaking at the time, this early scanner had limitations in terms of image quality and acquisition speed.

Then, break it down into grammatical units. Study these units with your Jewel Grammar Course and/or ChatGPT and/or Claude. That way you can label them and know how they're constructed.

While groundbreaking at the time,

Reduced adverb clause.

this early scanner had limitations

Main sentence.

in terms of image quality and acquisition speed.

Prepositional phrase.

Next, create two examples of your own. Make them simple, focusing mainly on the grammatical unit to build mastery. You can then use your Jewel Grammar Course... ChatGPT... Claude to proofread the sentence and teach you your errors.

2 sentences with non-reduced adverb clauses with while:

While *the sun was setting*, we enjoyed a picnic in the park.

My cat knocked over a plant **while** *I was cooking dinner*.

2 sentences with reduced adverb clauses with while:

While *cooking dinner*, I listened to my favorite podcast.

I saw a beautiful rainbow **while** *walking to work*.

2 simple main sentences:

Cars need regular maintenance.

People enjoy beautiful summer days.

2 sentences with the preposition phrase in terms of:

In terms of *flavor*, homemade cookies are superior to store-bought ones.

The new employee excels **in terms of** *customer service skills*.

6. According to paragraph 3, what can be inferred about the limitations of the Hounsfield's early scanner?

- A. The scanners slow rotation contributed to the limitations.
- B. Hounsfield's limited technological background was the cause.
- C. The use of a single detector was partly responsible.
- D. Future scanners improved image quality more than acquisition speed.

Paragraph 4: MDCT scanners typically feature anywhere from 4 to 320 rows of detectors, allowing for the simultaneous acquisition of multiple cross-sectional images with each rotation of the scanner's gantry. The gantry is the circular, rotating part of the scanner that contains the X-ray tube and detectors. It is the "donut-shaped" structure that the patient passes through during the scan. As the gantry rotates around the patient, the X-ray tube emits a fan-shaped beam of X-rays that pass through the patient's body. The multiple rows of detectors on the opposite side of the gantry capture the X-rays that have passed through the body, measuring the amount of radiation absorbed by different tissues. Each row of detectors captures a separate cross-sectional image. This multi-detector design significantly reduces scan times, enabling the imaging of larger anatomical regions.

Paragraph 5: Despite the numerous benefits of MDCT, the technology is not without its challenges. One major concern is the increased radiation exposure associated with MDCT scans compared to conventional CT. Conventional CT scanners typically use a single row of detectors and acquire images one slice at a time. In contrast, MDCT scanners use multiple rows of detectors and can acquire many slices simultaneously, resulting in a higher radiation dose to the patient. Radiation exposure is a concern because it can potentially increase the risk of developing cancer later in life. The amount of radiation exposure from a CT scan is much higher than that from a traditional X-ray, and the risk increases with the number of scans a person undergoes.

Paragraph 6: To address this issue, manufacturers have developed various dose reduction techniques, such as automatic tube current modulation. Automatic tube current modulation is a technique that adjusts the amount of radiation emitted by the X-ray tube based on the patient's size and the specific area being scanned. The goal is to use the lowest radiation dose possible while still obtaining diagnostic-quality images. In this technique, the scanner estimates the patient's size and density by performing a quick, low-dose "scout" scan. Based on this information, the scanner automatically adjusts the tube current (the number of X-rays emitted) during the actual scan. For example, when scanning thinner or less dense areas of the body, such as the lungs, the scanner reduces the tube current, thus lowering the radiation dose. By constantly modulating the tube current according to the patient's anatomy, automatic tube current modulation helps to reduce the overall radiation exposure without compromising diagnostic accuracy.