



PART 1

Read the text below and answer questions 1–13.

NEUROPLASTICITY: THE BRAIN'S ABILITY TO REWIRE ITSELF

Neuroplasticity refers to the nervous system's capacity to alter its structure and function in response to experience, injury, and learning. For much of the 20th century, many neuroscientists assumed that meaningful change was largely restricted to childhood "critical periods", when developing circuits are especially malleable. Adult brains were often described as relatively fixed. That view has been revised: plasticity is now recognised as a lifelong property, although it varies across brain regions, across individuals, and across the kinds of change being measured.

At the cellular level, plasticity is commonly discussed in terms of synapses, the junctions through which neurons communicate. Repeated patterns of activity can modify synaptic strength through processes such as long-term potentiation, while inactivity can weaken connections, echoing the practical warning that unused circuits may degrade. Plasticity also involves structural remodelling: dendritic spines can be added or eliminated, and synaptic pruning removes inefficient connections to refine networks. In limited contexts, neurogenesis contributes new neurons, most notably in regions associated with memory, although the extent and functional impact in adults remains an active research question.

Learning provides one of the clearest demonstrations of experience-dependent change. Skilled performance is not simply "stored" like a file; it is built into the organisation of networks that become faster, more coordinated, and more selective with training. Musicians, for example, often show altered motor and auditory representations after years of disciplined rehearsal, while bilingual speakers can develop differences in language-related circuitry shaped by everyday use. Such adaptations reflect both the intensity and the timing of training. Early exposure can make acquisition more efficient, but adult learners still retain a capacity to build complex skills through sustained practice, feedback, and strategically designed environments.

Injury and illness reveal plasticity under constraint. After a stroke or traumatic lesion, the nervous system may recruit alternative pathways to restore at least part of a lost function. This can include cortical reorganisation, in which neighbouring regions assume roles previously carried by damaged tissue, as well as hemispheric compensation, where the opposite hemisphere contributes more strongly to performance. These changes can support recovery, but they may also mask limitations: a patient might perform a task by using slower or less efficient routes. Moreover, change is not always beneficial.



Maladaptive plasticity can stabilise harmful patterns, reinforcing chronic pain circuits or strengthening compulsive responses associated with addictive behaviours.

Modern methods have made it possible to observe plasticity in living humans with far greater detail than earlier generations could imagine. Functional imaging can reveal shifts in activity during learning or after rehabilitation, and stimulation techniques such as transcranial magnetic stimulation can transiently alter neural excitability to test causal relationships. Yet such measures demand caution. Imaging signals are indirect proxies of neural activity, and a stronger signal does not always imply improvement; sometimes it reflects greater effort, inefficient processing, or compensation rather than genuine recovery. For these reasons, careful experimental design and converging evidence are essential before interpreting brain changes as functional gains.

Clinical rehabilitation increasingly attempts to harness plasticity rather than merely accommodate disability. After stroke, therapies often emphasise repetitive, task-specific practice to drive reorganisation that is relevant to daily function. Constraint-induced movement therapy, for instance, encourages use of an affected limb by limiting the unaffected one, thereby reducing learned non-use and increasing training intensity where it matters. Technology has expanded the toolkit: robotic training and virtual reality can deliver high volumes of structured movement and feedback. However, protocols differ widely, and the presence of a device does not guarantee an outcome; effective therapy still depends on goals, patient engagement, and the quality of training rather than novelty alone.

Plasticity is also shaped by lifestyle and context, which helps explain why identical clinical protocols can yield different outcomes. Sleep supports memory consolidation and stabilises learning-related changes. Exercise influences growth factors linked to neural health and may improve readiness for training. In contrast, chronic stress can impair learning and recovery by disrupting attention, sleep, and physiological regulation. Social factors matter as well: motivation, support, and daily routines can determine whether therapy “doses” are actually achieved. In real-world settings, the brain changes within a whole person, not within a laboratory abstraction.

Despite excitement, neuroplasticity has limits. Some sensitive windows exist, and certain injuries cause permanent loss that cannot be fully reversed. Overpromising is a recurring problem, particularly in commercial “brain training” claims that imply rapid transformation without targeted work. The strongest evidence still supports specific, meaningful practice and enriched environments that sustain attention, feedback, and repetition over time. In this sense, plasticity is best understood as an adaptive capacity under constraints: it enables learning and partial restoration, yet it can also entrench harmful patterns when



conditions push the brain toward inefficient solutions. Responsible application requires realistic goals, careful measurement, and a focus on the conditions that make change more likely.

Questions 1–4

Complete the sentences below. Choose **ONE WORD ONLY** from the text for each answer.

- 1 Neuroplasticity is now recognised as a property.
- 2 With repeated activity, synaptic can increase.
- 3 Following injury, the brain may recruit alternative
- 4 Persistent stress may interfere with learning and

Questions 5–9

Choose **TRUE** if the statement agrees with the information given in the text, choose **FALSE** if the statement contradicts the information, or choose **NOT GIVEN** if there is no information on this.

- 5 The passage presents neuroplasticity as allowing the nervous system to change both its physical organisation and how it operates.
- 6 The passage suggests that neuroplasticity was once thought to be largely confined to childhood.
- 7 The passage suggests that adults are unable to acquire complex skills without early exposure.
- 8 The passage states that maladaptive plasticity can contribute to chronic pain and addictive behaviours.
- 9 The passage states that shifts in brain activation during learning always indicate genuine recovery.

Questions 10–13

Complete the notes below. Choose **ONE WORD ONLY** from the text for each answer.

Applying neuroplasticity in practice

- Changes linked to skill learning reflect both the intensity and the **10** of training.



- Because imaging signals are indirect, results should be interpreted with **11**
- After stroke, therapy often uses repetitive, task-specific **12**
- The strongest evidence supports targeted practice and enriched **13** rather than quick fixes.

Answer Key

1. lifelong
2. strength
3. pathways
4. recovery
5. TRUE
6. TRUE
7. FALSE
8. TRUE
9. FALSE
10. timing
11. caution
12. practice
13. environments