One theory about the causes of depression is that an imbalance or deficiency of certain neurotransmitters is to blame. Neurotransmitters are chemical messengers that allow nerve cells to communicate with each other. The diagram depicts the junction between two nerve cells. Packets of serotonin molecules are released from the end of the presynaptic cell (the axon) into the space between the two nerve cells (the synapse). These molecules may then be taken up by serotonin receptors of the postsynaptic nerve cell (the dendrite) and thus pass along their chemical message. Excess molecules are taken back up by the presynaptic cell and reprocessed.

Using the information above, suggest some reasons why a person might have serotonin activity that is lower than it should be.
Depression: Neurochemical Approaches

Three neurotransmitters are primarily implicated in causing depression. They are:

- Noradrenaline
- Serotonin
- Dopamine

Noradrenaline is used in many brain systems that are involved with emotion and mood. Decreases in noradrenaline lead to low mood, increases have the opposite effect.

Serotonin regulates the activity of noradrenaline. If serotonin levels drop, then noradrenaline levels can fluctuate more widely than they should.

Dopamine is a neurotransmitter that is important for reinforcement. Activities that increase dopamine levels make people feel good.

Using this information, try to come up with three possible reasons why a person might become depressed.

Possibility 1:

Possibility 2

Possibility 3
Depression: Neurochemical Approaches

Discoveries about the functions of different neurotransmitters in mood and emotion regulation have led to three main hypotheses about the role on brain chemistry in depression.

The Catecholamine Hypothesis

Mood disorders are caused by abnormally high or low levels of Noradrenaline (NA). If NA levels drop too low, the result is depression. If NA levels climb too high, the result is mania. Bipolar disorders are caused by regular, extreme fluctuations in NA levels.

The Permissive Amine Hypothesis

Mood disorders are caused by NA abnormalities, but the real culprit is serotonin (5-HT). 5-HT is necessary to regulate NA activity, so if 5-HT levels drop sufficiently, NA levels are allowed to fluctuate to the extent that they cause abnormalities in emotion, such as depression.

The Dopamine Hypothesis

Depression is caused by a deficiency in dopamine (DA). If the brain is either unable to produce enough dopamine, or is partially insensitive to the action of dopamine, then a person will find it difficult to get any reinforcement. Consequently, their ability to enjoy things will suffer, and they may lose interest in things.

What you need to do…

Using the research materials available, try to evaluate each of these hypotheses. Write a short commentary about each, explaining how the evidence supports or challenges it. Finally, write a short overall conclusion in which you evaluate the neurochemical theory of mood disorders.

You may find the following questions useful in guiding your research:

- Is there any direct evidence to suggest that depressed patients have abnormal levels of neurotransmitters in their brains?
- How do antidepressant drugs work? Which is the most effective?
- Why do depressed patients run a higher than average risk of abusing alcohol or other drugs, such as cocaine and heroin?