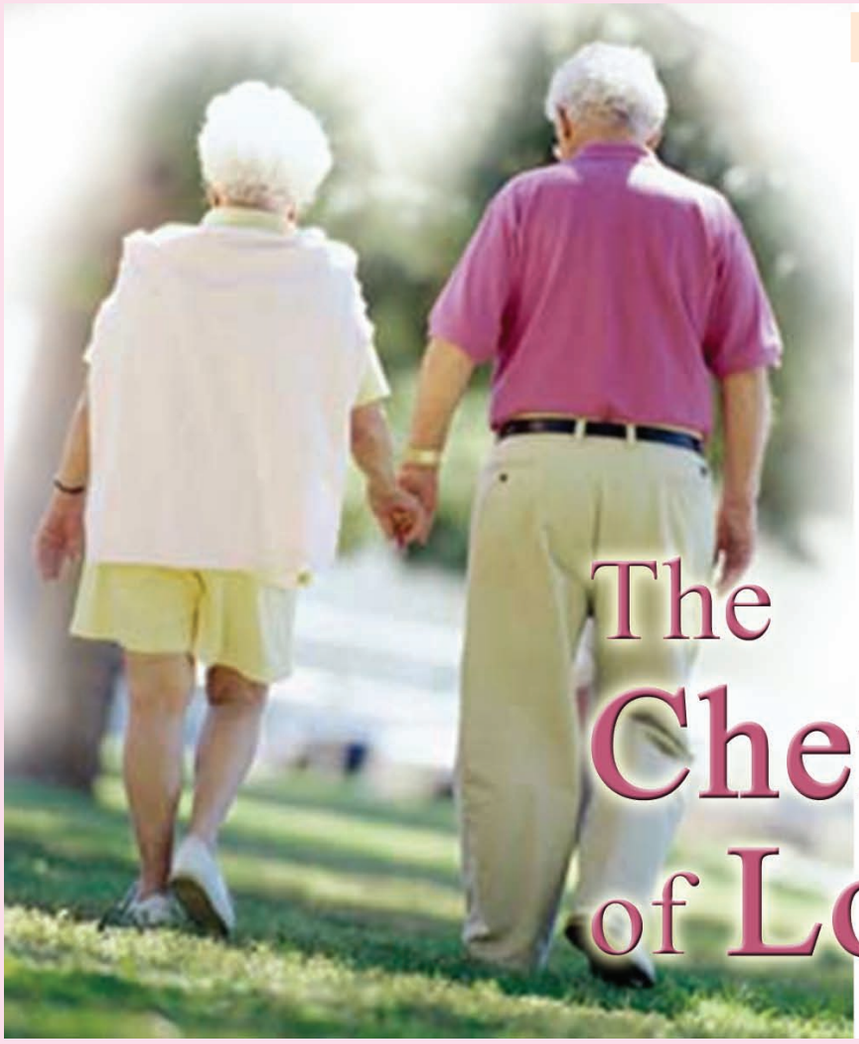
SHOA ABBAS NAQVI



Love is confusing indeed. But it becomes easier to comprehend when you delve deeper into the chemical changes set in motion inside the body when love strikes.

The Chemistry of Love

IT was their best time of the day. The walk through the Club Park. He held her hands gently and with a heavy heart started humming the lines of the latest song "We were both young when I first saw you, I close my eyes and the flashback starts." It was *Love Story* by Taylor Swift and described almost vividly the romance between Romeo and Juliet. She just smiled, like always.

Yes! Almost instantly, he knew the feeling that gripped him. He had often wondered about it when he was young. He had been dazed and perplexed since the first time their eyes had met. And after all these years of togetherness, now he knew for sure, that it was indeed Love. Love that was exquisite but yet so complex to understand in the beginning. Love that had bound them together, in sickness and in health, till death do them apart.

Love is confusing indeed. For how can you explain the sudden attraction and feeling of compassion for someone who is but a stranger to you? How can you decipher the complex cascade of emotions that flow through your heart when you come across that someone special? Love is a beautiful feeling, but as complicated as beautiful. They say, "It's all about the hormones". May be it is. Let's see how.

Throughout evolution, we have come across amazing theories on how man has evolved to become the *Homo sapien*. Charles Darwin gave us the Theory of Natural Selection, and even though Darwinism may be questioned by some in recent times, that the fittest survive the best cannot be denied. And the credit that the human race still thrives, inspite of the stupendous rise in hardships and competition, could as well be given to an extent to what we call "Love". The magical feeling that drives humans to spend a lifetime together in perfect bliss and harmony, and biologically to mate and procreate more of their kind.

It all begins with our senses and our perceptions, and ends with a well-directed result oriented action. Some predict that it's all about the chemistry. So let us now endeavour to peek into the fascinating world that governs the feeling that has been the theme of innumerable movies, literature, poetry and even historic sagas – LOVE.

Humans can literally smell out potential partners!!

A few years ago, a very interesting research pointed out how people tend to select mates not just on the basis of physical attraction, intelligence or status but also rely on more subtle human senses like smell. It claimed that people literally have the ability to sniff out suitable partners from among a vast population. And surprisingly, they go after those who are most MHC incompatible to them!

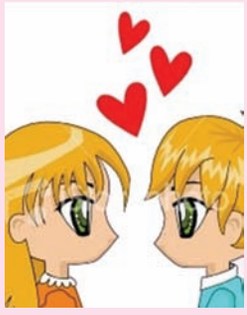
Major Histocompatibility Complex or MHC, simply put, are a group of genes clustered on the human chromosome 6. Known as the Human Leukocyte Antigens (HLA) in humans, they are responsible for a variety of functions ranging from intercellular recognition to discrimination between self and non-self components of the body. They play a vital role in the immune responses, as the proteins coded by these set of genes help in recognition and presentation of foreign antigens, to be destroyed by certain cells in the body.

These antigens are responsible for protecting the body against various infections and the more varied they are, the chances are that the human will be more protected. This could be one of the major reasons for the preference of mates with a higher degree of dissimilarity, since it increases the MHC diversity manifold. So once you have successfully sniffed out your partner, chances are that you will eventually fall in love with him or her. And it's now that the chemistry begins!

When you find yourself sleepless at night gazing at stars while all others are fast asleep, undoubtedly it is Cortisol at play.

Of course, there may be moments when you cannot explain those feelings of intense jealousy and possessiveness. Now you know it is testosterone.

Eye to eye contact increases levels of Oxytocin!!



As we already know, there is no dearth of hormones rushing through our bodies, trying to accomplish different tasks at a time. There are certain hormones that elicit sad emotions, others that cause elation. Some are released during excitement and fear, others gush forth when we are in pain. Thus the human body is flooded with a cocktail of hormones, some of which are responsible for the various intense emotions one feels when one is in love.

Oxytocin is the most potent of them all and has been shown to help maintain healthy psychological boundaries and interpersonal relationships among individuals. Moreover, this hormone (also known as Pitocin), released from the posterior pituitary gland also aids lactation in mothers and uterine contraction during birth. Research has shown that women with higher levels of Oxytocin have better chances of bonding with others as compared to those with lower levels of the hormone.

The magnocellular neurosecretory cells of the supraoptic and paraventricular nuclei of the hypothalamus are responsible for the production of this hormone and it is stored in Herring bodies at the axon terminals in the posterior pituitary. It will be interesting to add that eye-to-eye contact between humans leads to increase in Oxytocin levels. So, one can't blame you if you want to gaze into those lovely eyes forever!!

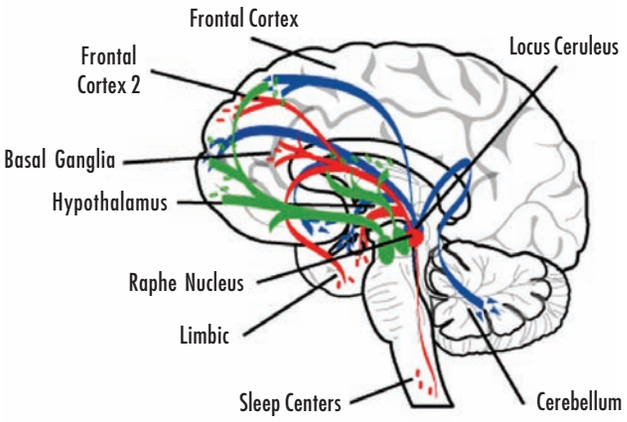
Cortisol, a hormone seen to rise due to stress has been reported to rise during courtship among human beings. It is undoubtedly this hormone that is responsible for the anxiety and tension people feel when in love. A corticosteroid hormone (gluco-corticoid) produced by the adrenal cortex (zona fasciculata), Cortisol has been implicated in increased blood pressure and blood sugar.

Other than Oxytocin and Cortisol, another hormone that reaches the peak when we are in love is Adrenaline. Also known as Epinephrine or the famous 'Fight or Flight hormone', it is released by the adrenal glands. Not just a hormone but also a neurotransmitter that participates in the sympathetic nervous system, this catecholamine is produced from the aromatic amino acids Phenylalanine and Tyrosine.

Adrenaline causes the pupils of our eyes to dilate, results in a substantial increase in heartbeats and even the rate of respiration is enhanced. No wonder we all feel flustered when we come across that someone special. Some of us even get cold feet! When the Japanese scientists Jokichi Takamine and Keizo Uenaka discovered Adrenaline in 1900, little would have they known about the vital role that it would play in love!!

Dopamine stimulates the production of oxytocin, sometimes known as "the cuddle chemical." Oxytocin is best known for its role in mothering, stimulating contractions during labor and aiding with breast-feeding. According to *BirthPsychology.com* scientists now think that both genders release this nurturing hormone when touching and cuddling.

Another euphoria-inducing chemical in your brain, norepinephrine, stimulates the production of adrenaline and makes your blood pressure soar when near the person you are attracted to. That's



The human body is flooded with a cocktail of hormones, some of which are responsible for the various intense emotions one feels when one is in love.

why you might experience a pounding heart or sweaty palms when you see someone you've got the hots for.

Researchers are using functional magnetic resonance imaging (fMRI) to watch people's brains when they look at a photograph of their object of affection. According to Helen Fisher, a well-known love researcher and an anthropologist at Rutgers University, the scans showed increased blood flow in areas of the brain with high concentrations of receptors for dopamine – associated with states of euphoria, craving and addiction. High levels of dopamine are also associated with norepinephrine, which heightens attention, short-term memory, hyperactivity, sleeplessness and goal-oriented behavior. In other words, couples in this stage of love focus intently on the relationship and often on little else.

Another possible explanation for the intense focus and idealizing view that occurs in the attraction stage comes from researchers at University College London. They discovered that people in love have **lower levels of serotonin** and also that neural circuits associated with the way we assess others are suppressed. These lower serotonin levels are the same as those found in people with obsessive-compulsive disorders, possibly explaining why those in love "obsess" about their partner.

Research has also provided an amazing insight on how the levels of the primary male hormone, Testosterone, are affected in individuals in love. It has been found that men in love have lower levels of this hormone than men who are not. In contrast, higher levels of testosterone have been found in women in love. Scientists behind this research elucidate that this may be Nature's trick to bring males and females together by diluting their basic differences. In general, Testosterone is higher in males than in females, and is responsible for feelings of aggression and lust. A steroid hormone of the androgen group, Testosterone is produced by the testes in males and the ovaries in females. Moreover, it has been seen that females are much more sensitive to Testosterone, even if it is present at very low levels.

What happens when we see our loved one? Voila! We all surely feel glad, and maybe that's an understatement! Well, chemically we get a shot of a hormone called Dopamine. It is produced in the brain and also released by the hypothalamus. It affects our body in pretty much the same way as any addictive drug would and hence, we wish to see our beloved over and over again. Every glance in the loved one's direction leads to a gush of Dopamine. It's like the drug to us, like our personal brand of Heroin. However, as time progresses, the Dopamine levels tend to fall and hence, the feeling declines.

When in love, we all feel on top of the world. This is particularly because of Endorphins. These hormones cause the feeling of happiness to persist. They cause the body to revel in love exactly the same way as when our body has been drugged. Endorphins are endogenous opioid polypeptide compounds produced in vertebrates by the hypothalamus and the pituitary gland. Excitement, pain, strenuous exercise and orgasm lead to their release in the body. Endorphins act like natural pain relievers in the body and produce feelings of well being and power, much like in love!

Some scientists believe that after a certain period, from 18 months to four years, one's body gets used to these love stimulants. According to Helen Fisher, author of *Anatomy of Love*, in this phase of the relationship, your brain produces endorphins, brain opiates more like morphine than speed. They calm the mind, kill pain, and reduce anxiety. So what some people call "separation anxiety" might actually be a form of drug withdrawal.

The idea that the "honeymoon period" of a relationship is fueled by different brain chemistry than what is present during the later years might explain why some people can't seem to hold long-term relationships: they prefer the revving-up effects of brain amphetamines to the pain-killing effects of endorphins.

So the next time you fall in love, and your eyes meet with your beloved, remember it is Oxytocin gushing into your blood stream causing you to instantly "connect" with each other. Then of course, your heart would be skipping beats and you must be tongue-tied, thanks to adrenaline. And when you find yourself sleepless at night gazing at stars while all others are fast asleep, undoubtedly it is Cortisol at play. Of course, there may be moments when you cannot explain those feelings of intense jealousy and possessiveness. Now you know it is testosterone.

Ms Shoa Abbas Naqvi, is a Research Scholar in the Department of Biochemistry (F/o Life Sciences), Aligarh Muslim University. Aligarh; Address: 65-Alig Apartments, Shamshad Market, Aligarh-202001, U.P.; Email: shoaabbas@yahoo.co.in