ENGLISH SUMMARY

Concern continues about exposure to radio-frequency (RF) fields from sources used for mobile telecommunications, radars, radio and television broadcast, medical and industrial applications. Much of the concern arises because new technologies are introduced without provision of public information about their nature and their possible health consequences.

The purpose of this study is to investigate the effect of electromagnetic field on chromosomal aberrations and mitotic index and on the electrophoretic pattern of proteins in liver and brain tissues. In addition, to evaluate the anticlastogenic effect of garlic (Tomex) in the irradiated rats group.

In the present study eighty five female rats weighting 80-100 gm were used. The rats were divided into four groups twenty rats each, in addition to the control group with five rats.

The first groups were exposed to microwave radiation with 9875 MHz for 30, 45 and 60 days then 5 rats were left for 30 days away from the exposure source as a recovery group.

The second groups were treated like the first groups in addition to the daily administration of 0.1 ml Tomex during the exposure.

The third groups were exposed to mobile phone radiation with 900 MHz for 14, 30 and 45 days, while 5 rats were kept away from the radiation source for 30 days as recovery group.

Also the fourth groups were exposed to the same circumstances as the third groups with the daily administration of Tomex.

First: The effect of the electromagnetic field on chromosomal aberrations of bone marrow cells of rats which were exposed at different time intervals.

Structural aberration:

The highest percentage of chromosomal abnormalities observed in the irradiated rats was deletions and gaps while the chromatid breaks, centric fusion, centromeric attenuation, and ring were the lowest value of aberrations, appeared.

There was a decline in the rate of mitotic index in rats exposed to microwave and mobile phone radiation. Tomex exerted antimutagenic potential against the effect of the radiation, it reduced the total chromosomal aberrations and elevated the mitotic index.

- The exposure of rats to microwave or mobile phone radiation lead to a significant increase in the chromosomal aberrations and this increase was time dependant. After 30 days of post exposure the aberrations were reduced in the recovery group.
- Chromosomal aberrations were decreased in groups exposed to microwave or mobile phone radiation with the daily administration of Tomex in comparison to the exposed groups only.
- Chromosomal aberrations in recovery groups, which were kept away from the radiation source for 30 days after exposure and were daily administrated with Tomex, were significantly decreased, specially the (mobile phone & Tomex) group.

Second: The effect of electromagnetic field on the proteinogram of liver and brain tissues.

1- Microwave radiation groups:

- The number of protein bands in liver of rats exposed to microwave radiation was increased in all irradiated groups at all intervals comparing to the control. While in the recovery group, the number of the bands was decreased in comparison with the irradiated groups but still higher than the control.

- In liver of rats exposed to microwave radiation during the administration of Tomex, protein fractions of 86, 26 kDa appeared in the control and the recovery groups but disappeared at all the exposed groups. In contrast the fraction of 25 kDa appeared in all exposed groups but disappeared in the control and the recovery groups. In comparison with the groups exposed to microwave radiation only, there was a decline in the number of protein bands in all exposed groups under the effect of Tomex.
- The analysis of proteins in brain or rats exposed to microwave radiation showed a noticeable increase in the number of bands after 30 days of exposure while the number was decreased in the recovery group. The protein fraction of 26 kDa appeared after 30 days of exposure and remained stable to the recovery group.
- By the effect of Tomex, the fractions of 155, 67, and 50 kDa were expressed in microwave & Tomex groups at all time intervals but down regulated in the control and the recovery group. On the contrary protein fraction of 30 kDa that expressed in both control and recovery groups was down regulated in the brain of the exposed animals.

2- Mobile phone groups:

- Proteins bands of liver in rats exposed to mobile phone radiation were increased in all exposure time comparing to the control. The protein fraction of MW 86 kDa resists the mobile phone radiation, since it was recorded in control, recovery and irradiated animals. In addition, the protein fractions of 70, 36, 33, 25 and 20 kDa appeared as new bands in all exposed groups, but disappeared in the recovery group.
- The data showed that in liver of rats exposed to mobile phone radiation during the administration of Tomex, the 104, 55 kDa proteins

appeared in all exposed groups and disappeared in the control and the recovery group. Also the polypeptide bands with molecular weight 34, 32 and 23 kDa were recorded in the control, recovery and all treated groups as essential proteins.

- The present study showed a noticeable increased number of protein bands in brain of rats after exposure to mobile phone radiation at all time intervals, while the recovery group was decreased comparing to the control. Both of the two proteins 37 and 25 kDa appeared in the control and the recovery group but down-regulated in all exposed groups. On the contrary, protein fraction of 77.5 kDa was expressed only in the brain of exposed rats.

- Proteins of 111 kDa and from 50 to 55 kDa were clearly observed in brain of rats exposed to mobile phone radiation during administration of Tomex, but did not expressed in control and recovery groups. Other protein fractions were expressed in the exposed animals but also persisted in the recovery group as 58, 46 and 34 kDa.

The results showed that the rate of appearance and disappearance of some bands was clear in rats exposed to electromagnetic field, and caused inhibition of some fractions, which reflect the genetic damage due to exposure to radiation.

In conclusion, the use of electric equipments must be in a limited scope also precautions in using mobile phones should be done by using hands-free sets and the antenna of the phone should not be in contact with the user. Also it is increasingly clear that garlic is most likely a powerful anticancer agent and inclusion of garlic in the diet should be considered to be mandatory to maintain good health.