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TO STUDY THE ABNORMALITIES OF SPERMATOZOA EXPOSED BY MOBILE RADIATIONS

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ABSTRACT

Nowadays all phones have become necessary for a part of life. Use of the mobile phones is increasing day by day in advance medical sciences. Many authors have reported the side-effect of electromagnetic radiation of Mobile Phones and also it is caused initially on males fertility in human beings. The present study observed the effect of Electromagnetic Radiation (EMR) of Mobile Phone on Sperms in Albino rats. Six animals were used for Control & Experimental groups. EMR of mobile was exposed over the cage of albino rats for 5 hours per day for 2 months. Mobile phone was turned to answering mode for ½ hour per day. After 2 months rats were sacrificed and observed the % of abnormal sperms, sperm count and Morphology of sperms. It was found that % of abnormal sperms were increased in experimental group as compared to Control as well as Sperm count was also decreased in Experimental group as compared to Control group. Different abnormalities in morphology of sperms were observed i.e. Double head, banana head, amorphous head, defective head, headless, bent neck, bent tail, double tail, defective tail & looped tail etc. Therefore, it is concluded that effect of EMR of Mobile Phone is harmful on reproductive health of male.

KEYWORDS: EMR (Electromagnetic Radiation).

INTRODUCTION

The widespread use of mobile phones in recent years has raised the research activities in many countries to determine the effect of electromagnetic radiation emitted from it. Concerns are growing about the possible hazardous effects of radio- frequency electromagnetic waves (RF-EMW) emitted by these devices on human health (Markov and Kostarakis, 2007). In a recent study, keeping cell phones close to the waist has been found to decrease sperm concentration as compared with men not using cell phones at all or elsewhere (Kilgallon and Simmons, 2005).

MATERIALS AND METHODS

A total 30 healthy male Albino Rats (weight 150-250gms) were used for the study. Rats are maintained under photo period that is between 8am to 5 pm, temperature 23 °±1°C.

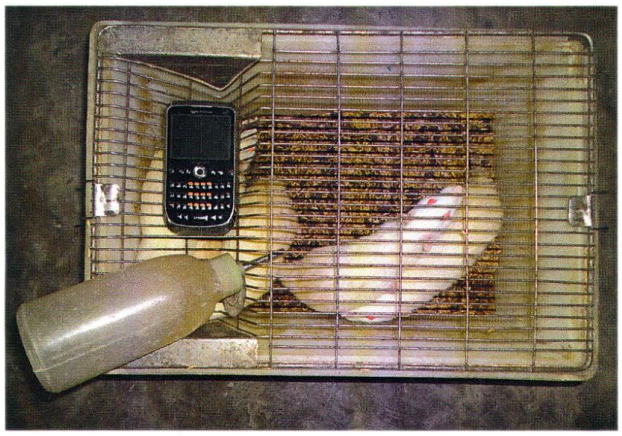
Handset Mobile of same brand and model (Micromax, q^5, SAR 1.87 w/kg) were used for electromagnetic waves. Six rats were used for every group. For all Experimental Groups, Mobile phones were placed above cages for 5hours switch on mode. Mobile is not used for control group.

Groups were formed as followed:-
Group I – Control,
Experimental Groups :- Group II – Exposed to mobile phone radiation for 5hours (4 and half hours on standby mode and half hour on answering mode, intermittently daily for two months)
Group III – Mobile Phone radiations for 5 hours (4 hours on standby mode and 1 hour on answering mode, daily for 2months).
Group IV – Exposed to mobile phone radiation same as that of Group II and kept for 1 month without exposure.
Group V – Exposed mobile phone radiation same as that of Group III and kept for 1 month without exposure.

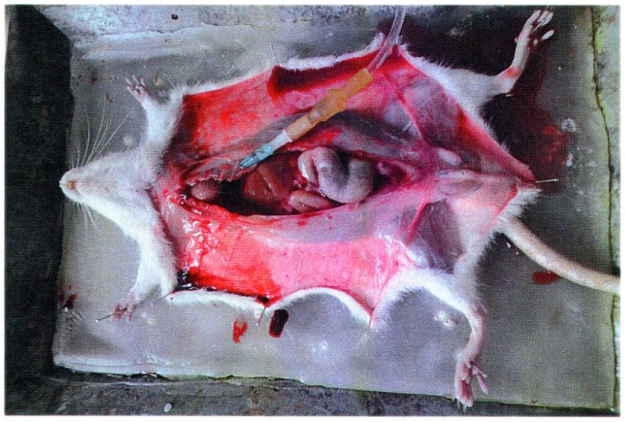
Procedure

Rats were anaesthetized by intra peritoneal administration of Nembutol (30mg/100g body weight).

After anaesthetized, opened the body cavity of Rats and Testis with Epididymis was taken out for study.



Photograph No. 1 Showing method of exposure to electromagnetic radiation (in cage of rats)



Photograph No. 2 Showing in vivo perfusion of rat.

Testis and Epididymis were washed with normal saline. Vaso sperms were taken out for study of sperms i.e. sperm count percentage of abnormal and morphology of sperms. Sperms were taken out by mincing the epididymis into 1 ml normal saline. Sperm count was counted by Neubauer chamber method i.e. Routine lab method. The improved Neubauer chamber was loaded and the sperms were allowed to settle for about 5minuets. The sperms were counted in four corner-squares.

$$\text{Sperms per ml of semen} = \frac{\text{Sperms count in 4 square} \times 16 \times 20 \times 1000}{4}.$$

Method of staining for morphological study of sperms were used Hematoxylin and Eosine staining method.

Microscopic observation was performed under KYOWA TRINOCULAR MICROSCOPE. Microphotography was taken by Sony Digital Camera body weight of the Rats was observed before and after experiment.

OBSERVATION AND RESULTS

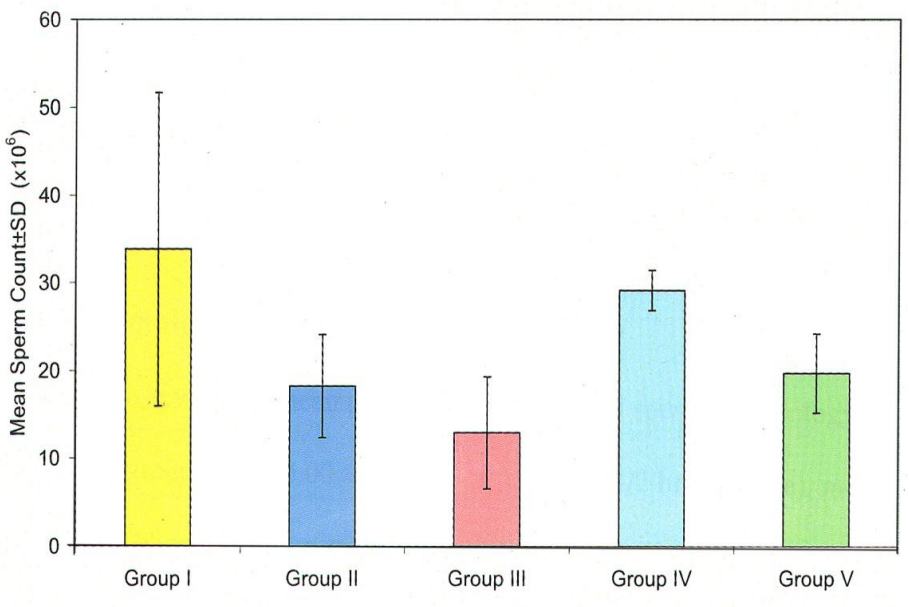
Present study was observed for the parameter of percentage of abnormal sperms, sperm count & morphology of sperm in control and experimental group which are as follows:-

Sperm Density

Sperm count was observed that mean count in control group I was high than group II. Sperm count of group III was also less as compared to group I and II, while in group IV mean sperm count was higher than group II but was less as compared to group I. Sperm count of group IV was higher than the group III but the value was less as compared to control group (group I).

Table 1: Mean sperm density in animals of different groups (values are x10^6).

S.N.	Group	n	Mean	SD	Minimum	Maximum
1.	I	6	33.83	17.84	9	49
2.	II	6	18.25	5.90	13	26
3.	III	6	12.92	6.41	3	21
4.	IV	6	29.20	2.28	26	32
5.	V	6	19.75	4.54	15	28



Mean sperm density was to be found maximum in group I and minimum in group III. Statistically, the difference among groups was highly significant (p=0.005). Group I and III, are showed maximum differences while minimum difference between group I and IV, group I and III was highly significant.

Table 2: Between groups comparison of mean sperm density in animals of different groups (Tukey's HSD).

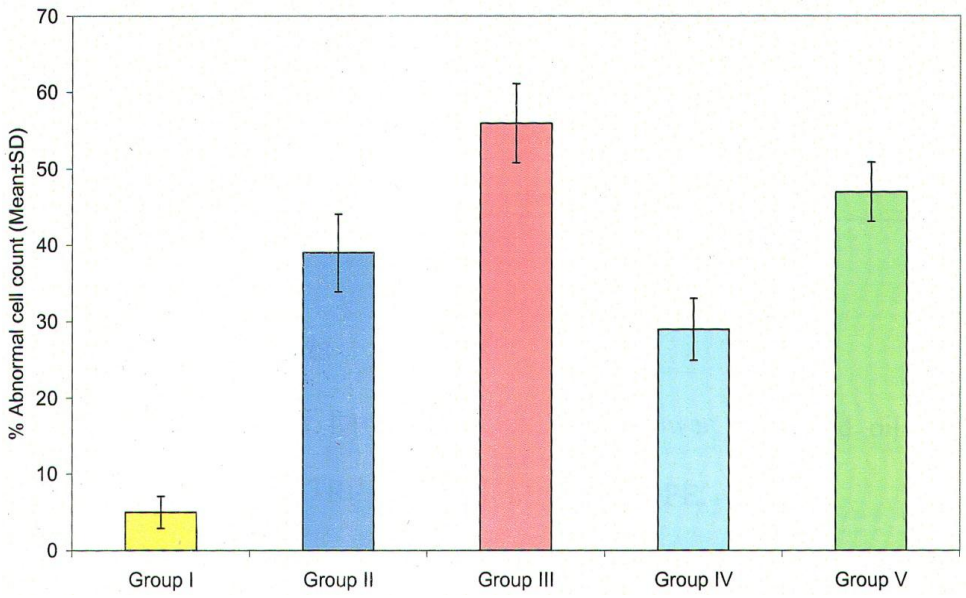
S.N.	Comparison	Mean Difference	SE	"p"
1.	Group I vs Group II	15.583	5.392	0.056
2.	Group I vs Group III	20917	5.392	0.006
3.	Group I vs Group IV	4.633	5.656	0.922
4.	Group I vs Group V	14.083	5.392	0.100
5.	Group II vs Group III	5.333	5.392	0.858
6.	Group II vs Group IV	-10.950	5.656	0.326
7.	Group III vs Group V	-1.500	5.392	0.999

Abnormalities of sperm

The percent of abnormal sperms were more in group II as compared to group I. As well as it was more high in group III. Abnormal percentage of sperm morphology of group IV was less than the group III but the value was higher in comparison to control group (Table 3).

Table 3: Mean percentage of abnormal sperms in different groups.

S.N.	Group	n	Mean	SD	Minimum	Maximum
1.	I	6	5.00	2.10	3	8
2.	II	6	39.00	5.10	35	49
3.	III	6	56.00	5.14	51	63
4.	IV	6	29.00	4.05	25	35
5.	V	6	47.00	3.90	41	52



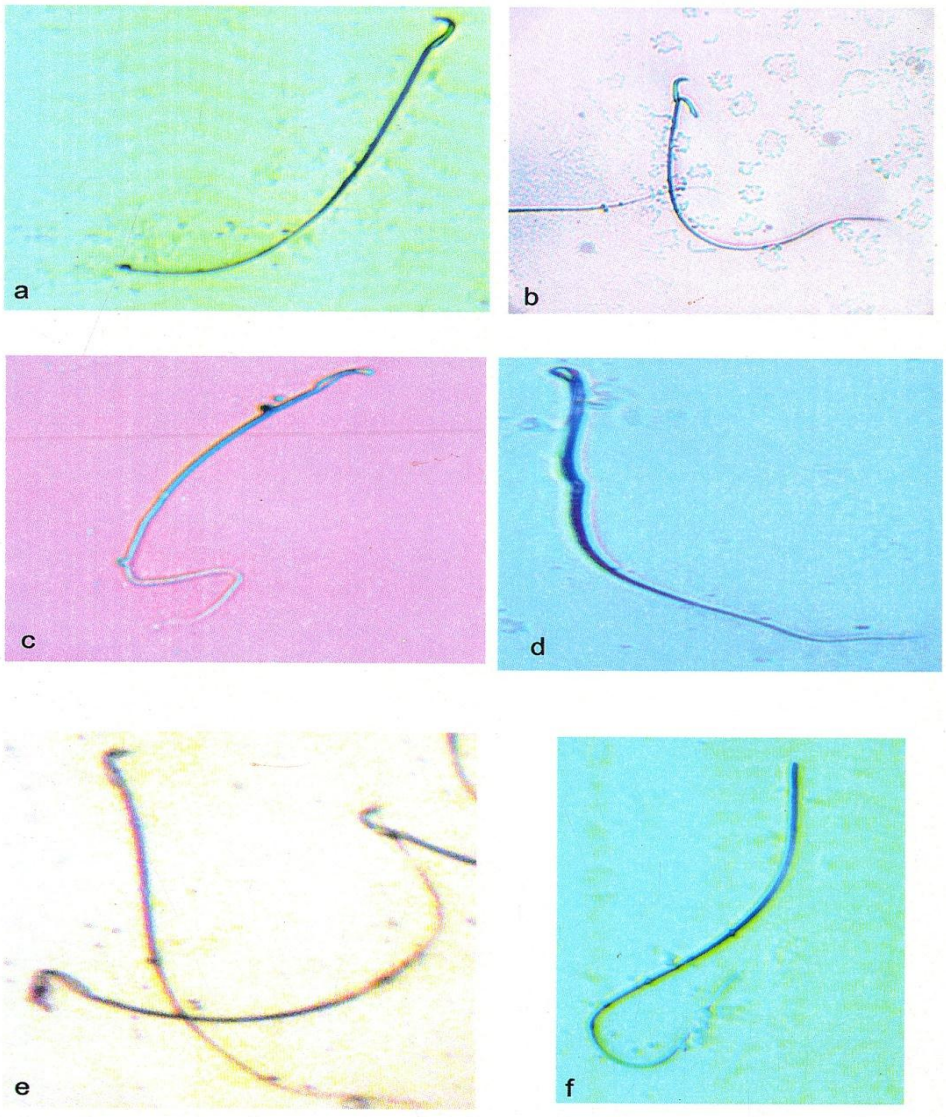
Minimum percentage of abnormal sperms were 3 in control group (group I) and maximum was 63 in group III. It is very highly significant difference in mean percent of abnormal sperm among different groups ($p<0.001$).

When it was compared to the different groups related to percent of abnormal sperm morphology. It was revealed maximum difference between group I and III and minimum was between group III and V. It was statistically observed that highly significant was between group II and group IV, group III and group V. Whereas all other intergroup difference were statistically very highly significant in Table 4.

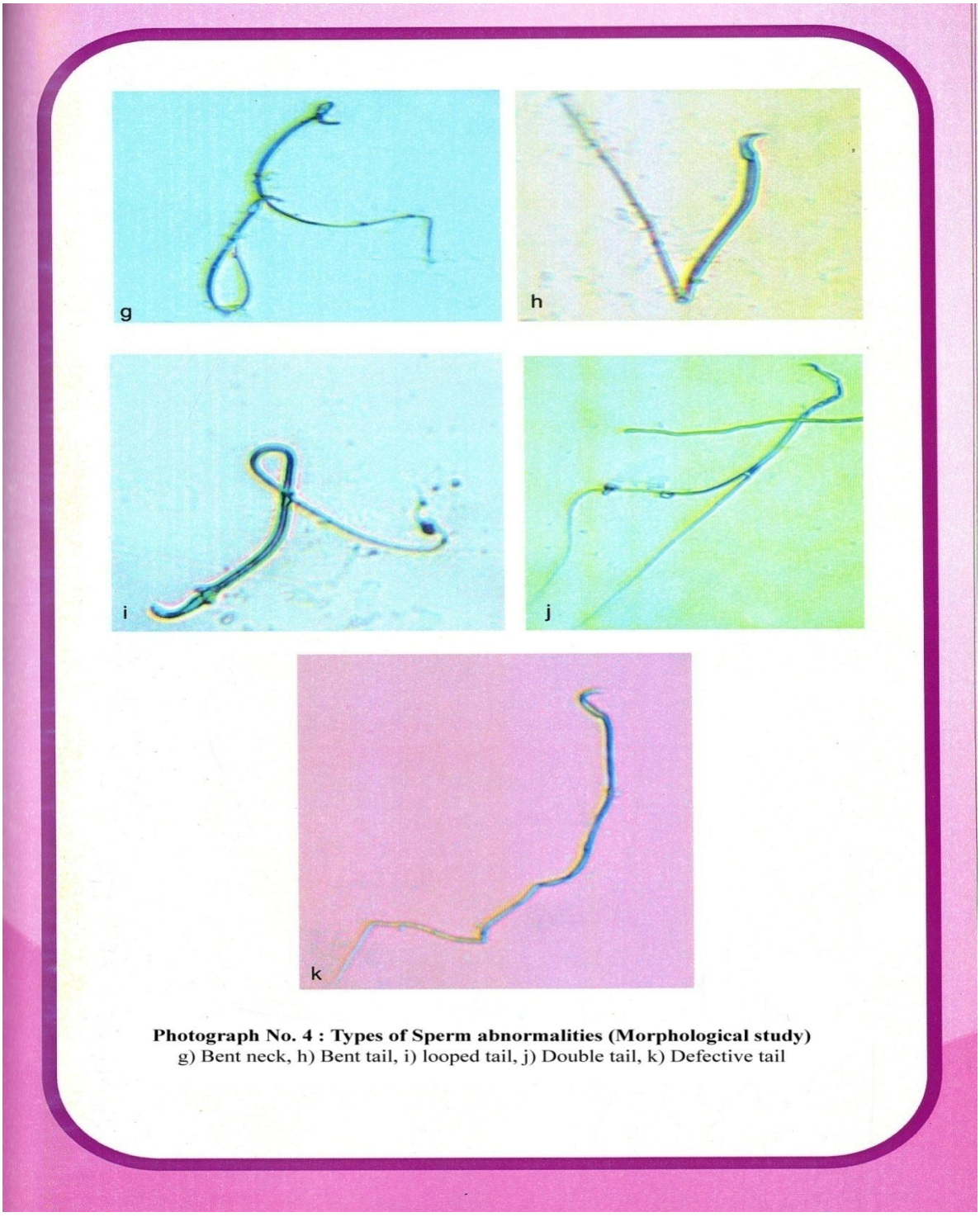
Table 4: Between group comparisons of Mean % of abnormal sperms in animals of different groups (Tukey's HSD).

S.N.	Comparison	Group Difference	SE	"p"
1.	Group I vs Group II	-34.000	2.428	<0.001
2.	Group I vs Group III	-51.000	2.428	<0.001
3.	Group I vs Group IV	-24.000	2.428	<0.001
4.	Group I vs Group V	-42.000	2.428	<0.001
5.	Group II vs Group III	-17.000	2.428	<0.001
6.	Group II vs Group IV	10.000	2.428	0.003
7.	Group III vs Group V	9.000	2.428	0.008

Different types of abnormal sperm morphology was observed in present study that were double head, banana head, amorphous head, defective head, headless, bent neck, double tail, looped tail, bent tail and defective tail (photograph No. 3 and 4).



Photograph No. 3 : Types of Sperm abnormalities (Morphological study)
a) Normal sperm, b) Double head, c) Banana head, d) Amorphous head
e) Defective head, f) Headless



Photograph No. 4 : Types of Sperm abnormalities (Morphological study)
g) Bent neck, h) Bent tail, i) looped tail, j) Double tail, k) Defective tail

DISCUSSION

Sperm density

It is a significant decrease in sperm density. In group II (1/2 hour exposure) sperm density was decreased in comparison to control but this decrease was statistically non-significant. In group III (1 hour exposure) sperm density was significantly ($p=0.006$) decreased in comparison to controls. Which showed in the experiment of Kesari et al. (2010) and Salama et al. (2010). Kesari et al. (2010) found a significant decrease in mean value of total sperm density (31.14 ± 13.6 vs. 61.33 ± 3.68) in rats exposed to cell phone RF- EMR for 2 hours per day for 35 days. Salama et al. (2010) in his study on rabbits found a significant decrease in sperm density after RF-EMR exposure of 8hours/day for 8weeks. Similarly Fejes et al. (2005) in an observational study on human beings analyzed 231 men over a 13 months period and showed that for heavy users of cell phones, sperm density were 30% lower than in men who did not use a cell phone.

Dasdag et al. (1999) reported non-significant decrease in sperm density in rats following exposure to electromagnetic radiation and the reason for non-

significant changes may be less duration of exposure. In study of Dasdag et al. (1999) showed that total duration of exposure was one month (2hours per day, during which phone was turned to answering mode for 3minutes only) while in present study total duration was 2months (5hours per day and phone was turned to answering mode for ½ hour in one group and one hour in other group).

Others also found non-significant decrease in sperm density in rats while Dasdag (2003) and Ribeiro (2007) reported no change in sperm density following EMR exposure.

After exposure period of 2months, we kept the animals for 1month without mobile phone in group IV and group V, to see the effect on sperm density and observe that sperm density was improved in both the exposed group. This study was not observed in research literature.

Sperm Abnormalities

Abnormal sperm was increased in group II (39%) and group III (56%) in comparison to control group (5%). This increase in abnormalities of the shape of the sperm morphology was statistically very highly significant in both the groups ($p<0.001$). Different types of abnormalities sperm were observed in the present study that was double head, banana head, amorphous head, defective head, headless, bent neck, double tail, looped tail, bent tail and defective tail(photograph No. 3 and 4).

Our findings are in accordance with Otitoloju et al. (2010) who exposed mice to RF-EMR at a workplace with one base station and at residential quarters with two base stations and found 39.78% and 46.03% sperm head abnormalities respectively as compared to 2.13% in control. Sahoo et al. (2010) found 54% abnormal sperm cell in cell phone treated group in comparison to 23% in control. All abnormalities of shape's of sperm was found in our experiment also.

Wdowiak et al. (2007) have observed in infertile male patients that normal sperms were present in 55.6% patients, who were not using mobile phone and 27.4% patients, who were sporadically using cell phone and in 16.7% patients, who were frequently using mobile phone.

Dasdag et al. (1999) and Aitken et al (2005) noted insignificant difference in sperm abnormalities in animals exposed to radiofrequency radiation whereas Dasdag (2003) found no change in sperm morphology.

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