lation of DNA adducts arising from the inhalation to 0, 1, 30, 300 ppb [$^{13}C^{2}H_{2}$]-formaldehyde for 28 days (6 hours/day).

Ultrasensitive nano-liquid chromatography mass spectrometry, including triple quadruple and high resolution Orbitrap mass spectrometer, was used to improve the sensitivity and detection of DNA monoadducts and DPC. Our data clearly show that low exogenous formaldehyde exposure did not cause detectable amounts of exogenous DNA monoadducts or DPC in any tissue of exposed rats. In contrast, endogenous formaldehyde adducts were detectable in all tissues analyzed, with mean levels ranging from 2.35 to 5.06 adducts per 10^7 dG and 1.52 to 8.03 adducts per 10^8 dG for DNA monadducts and DPC in different tissues, respectively. These novel findings substantiate the threshold mode of action of carcinogenesis and will further improve risk assessment of low formaldehyde exposures in the range of regulatory limit values.

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P11-22
Investigation of the effects of infrared rays on DNA strand in hot environment workers by comet assay

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IR rays extend from the nominal red edge of the visible spectrum at 700 nm to 1 mm. Occupational exposure of infrared (IR) radiation can emerge in many industrial processes such as bakery, food processing, glass and porcelain productions, iron foundry and mining. IR radiation has beneficial uses for industrial, scientific, and medical applications; however, its possible unhealthy outcomes are unclear. When the thermal comfort conditions are not provided for the bakery employees, especially in the working environments with high temperature values, effects such as fatigue, cramps and heat stroke are observed in the early period. These health problems arise, in particular, from shorter IR wavelengths. In addition, there are not enough studies on the genotoxic risks of bakery workers. In the present study, we aimed to investigate the DNA damage in bakery employees occupationally exposed to the IR rays in hot environment.

This study was performed with the employees of a bakery company in Istanbul. A total of 80 male individuals (n = 30, control; n = 50, subject) were included and all of them were volunteers. Control group consisted of healthy individuals not exposed to IR rays. Fresh blood samples were collected from participants and conduct with the comet assay within the same day to evaluate the DNA damage. The standard protocol for alkaline comet assay was operated for the lymphocytes of the participants with minor modifications of Singh et al, 1988. Randomly selected 100 cells per sample (two duplicate sample slides, 50 cells for each) were scored to count the percentage DNA in tail (%DNA_T) using BAB Bs200Pro image analysis software (BAB LTD., Ankara, Turkey).

DNA damage assessed in 80 subjects showed that the mean %DNA_T was significantly high ($p < 0.001$) in occupationally exposed subjects as $31{,}61 \pm 4{,}43$ compared with unexposed controls ($15{,}62 \pm 3{,}18$). Nonsmoker subjects also showed higher level of the mean %DNA_T ($21{,}79 \pm 1{,}98$) respect to controls. In conclusion, we suggested that, exposure to IR rays may induce genotoxic effect in the peripheral lymphocytes and smoking has synergistic effect on DNA damage.

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P11-23
Sericin nanocarriers loaded with doxorubicin induce DNA damage in breast cancer cells

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Doxorubicin is a well-known effective chemotherapeutic agent administrated especially in breast cancer treatments. Despite its efficacy, doxorubicin causes severe toxicity to most major organs, especially irreversible cardiotoxicity. In order to manage this dangerous toxicity, a smart therapeutically approach would be the use of drug – delivery systems for doxorubicin targeted delivery. More, using a drug – delivery system for doxorubicin could protect the drug from degradation, improve its therapeutic concentration and significantly increase its bioavailability. In this view, the aim of our study was to develop and *in vitro* validate a nanosized drug delivery system for doxorubicin based on the natural polymer silk sericin.

After nanoparticle synthesis, the sericin nanocarriers obtained were characterized in terms of size and morphology. The doxorubicin uptake was determined by UV – VIS spectrophotometry and the drug release potential was investigated using UV – VIS spectroscopy. Using the MCF – 7 breast cancer cell line, the lethal dose 50 (DL_{50}) of the sericin nanoparticles was determined. Moreover, the toxicity of the unloaded and doxorubicin loaded nanoparticles was evaluated in MCF – 7 cells after 12 h and 24 h of treatment in terms of cell viability and proliferation potential, as well as by highlighting the morphological changes that the treatment regimen triggers in the breast cancer cells. Additionally, the genotoxic potential of the sericin nanoparticles was also investigated by measuring the DNA damage induced by treatment through comet assay.

Our results show that we obtained small nanoparticles that presented the typically round shape morphology. The treatment with the unloaded sericin nanoparticles did not exert any cytotoxic effects on MCF – 7 cells as it did not affect MCF – 7 cell viability, proliferation potential and morphology and no comets that indicate DNA damage were observed after comet assay. However, the treatment of the same cells with doxorubicin loaded sericin nanoparticles dramatically decreased cell viability and proliferation potential, altered the extracellular matrix shape and induced serious DNA damage as numerous comets could be observed after the treatment.

Doxorubicin loaded sericin nanoparticles exert cytotoxic effects on breast cancer cells and could be further used for *in vivo* studies on animal models in order to better describe their mechanism of action and to determine their distribution pattern and clearance.

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