Editorial

Personal Computers - Risk Factors for Renal Failure

Sivakumar J T Gowder
College of Applied Medical Sciences, Qassim University, Buraidah, Kingdom of Saudi Arabia

Kidneys perform various biological functions in the human body, and hence, they are called multi-talented powerhouses in our physiological system. Increased blood flow, occurrence of metabolizing enzymes, and transport proteins are important factors enhancing the sensitivity of the kidney. In this context, the kidney is an important candidate organ for the evaluation of the adverse effects of environmental chemicals. Although kidneys reside in the abdominal cavity and are protected by other tissues, they still behave like security forces working at the border of a country facing the onslaughts of external agents.

With reference to its structure, the kidney is a complicated organ, comprising various cell types and having a neatly designed three-dimensional organization. Due to this complexity, the intact kidney is difficult to use for an adequate study of many biochemical, pharmacological and physiological processes. Renal proximal tubule cells derived from primary cultures have been considered an appropriate model for the study of either proximal tubule cell function or renal intact function. Culturing of renal proximal tubule cells derived from primary culture is a critical issue in renal research. The newly designed protocol of Gowder and McMartin will provide an appropriate method to grow good quality renal proximal tubule cells to evaluate toxicity and transport properties of drugs/chemicals. [(1)] Since reductionism (Einsteinian theory) dominates over the holism (Newtonian theory) in personal medicine, investigation of cells will provide more compromising results than that of whole individuals. [(2)] Kidney damage has been considered to be a major public health hazard in recent years. Common lifestyle diseases, such as diabetes, hypertension, and infectious diseases, are significant causes of renal failure. Sugar-sweetened beverages, food additives, sodium, drugs, toxins, and smoking cause renal failure. [(3-7)]

In this modern age (computer age), computers are essential to our routine life. On the other hand, the waste products of computers will accumulate in our environment. Electronic waste products have become a severe threat to society in terms of various adverse effects on our physiological system. The development of new devices due to the advancement of science and technology also leads to the disposal of existing products in large quantities.

Many of the hazards associated with computers arise when the equipment is disassembled, recycled, incinerated, or deposited in a landfill. The computer products contain cadmium, mercury, chromium, lead, beryllium, etc. - compounds known to be hazardous to humans and the environment. Cadmium is used in chip resistors, semi-conductors, infrared detectors, stabilizers, cables, and wires. Circuit boards, switches, and relays contain mercury and chromium; circuit boards also contain lead and motherboards, and connectors contain beryllium. [(8)]

Cadmium accumulates in the human body through environmental exposures, mainly through diet. When inorganic mercury spreads out in the water, it is transformed to methylated mercury in the bottom sediments. Methylated mercury accumulates in living organisms and concentrates through the food chain, particularly via fish. Chromium enters our body system through water, and lead comes from dusts and fumes. People may be exposed to beryllium at the time of manufacturing or shredding of computer parts. These compounds (cadmium, mercury, chromium, lead, and beryllium) exhibit nephrotoxicity. [(9)] Bisphenol-A (BPA) is the primary compound in the production of polycarbonate plastics and epoxy resins. Computer parts also contain polycarbonate plastics. BPA is used as a softening agent for all electronic devices, including computers. BPA also exhibits nephrotoxic effect. [(10)] From various available reports, we can conclude that these chemicals may induce oxidative stress and thereby result in renal damage or failure.

Proper waste disposal methods, appropriate handling methods for computer devices, safety methods, etc. are ways to prevent health hazards.

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Correspondence:

Sivakumar J T Gowder
College of Applied Medical Sciences,
Qassim University,
P. O. Box 6800,
Buraidah, 51452,
Kingdom of Saudi Arabia
Tel: +966566873969;
Fax: +96663802268;
Email: sivakumargowder@yahoo.com