

## Clothing is a Poison in Real Life



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### Mini Review

With the improvement of living standards, people have higher and higher requirements for clothing. As the garment processing base in the world, more than one-third of the garment processing in the world comes from China. Since the spring of 2010, Greenpeace, a world-renowned environmental group, has sampled industrial waste water from Youngor Textile Industrial City in Ningbo of Zhejiang Province and Zhongshan Guotai Dyeing and Finishing Co., Ltd. In Zhongshan City of Guangdong Province. And then samples were sent to the Greenpeace Research Laboratory in the United Kingdom to perform Independent environmental analysis and testing. The results showed that the main toxic and harmful substances in wastewater were nonylphenol(NP) perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) [1]. These substances interfere with the endocrine system and are toxic to the reproductive system and affect the immune system and liver. Studies have shown that these substances, even in small amounts, are extremely harmful and contain environmental hormones that disrupt endocrine and affect the reproductive system [2]. The reason for choosing these two units for testing is that they are two suppliers of 14 well-known international and domestic clothing brands such as Nike, Adidas and Li Ning in China. In people's impression, all the above brands are synonymous with fashion. What has the fashion industry brought to our environment? What is the impact of our garment and textile industry on human health and the environment?

### Environmental Hormone

The environmental hormones are chemicals that exogenous endocrine disrupting organisms. These substances mimic the natural hormones in the body, bind to hormone receptors, and affect the levels of hormones in the body. Or directly stimulate and inhibit the endocrine system, so that the endocrine system disorders, and then hinder reproduction, development and other functions, and even lead to malignant tumors and biological extinction. Environmental hormones enter the water body and contaminate fish, which accumulate through the food chain

and eventually reach the human body. According to statistics, about 60% of the total amount of these chemicals consumed by Japanese people through food comes from fish. Greenpeace collected wild carp samples in the Yangtze River basin and sent them for testing. It found that environmental hormones nonylphenol and octylphenol had been detected in all but one carp sample in Ma On Shan, and some had been found to contain PFOS [3]. Environmental hormones can lead to an increase in the incidence of human tumors. By analyzing the incidence of tumors from 1973 to 1991, American scholars found that the incidence of hormone-dependent organ tumors increased significantly, including breast cancer (24%), ovarian cancer (47%), testicular cancer (41%) and prostate cancer (126%). Among the many possible causes, environmental hormones are to blame. The most serious harm of environmental hormones is to affect the reproductive function of human beings, which can lead to the decrease of sperm count and the increase of the incidence of prostate cancer, endometriosis, pregnancy-induced hypertension, uterine cancer, breast cancer and so on [4].

Among the mentioned environmental hormones, NPE is called nonylphenol polyoxyethylene ether, which is widely used in dyeing, cleaning and other processes in textile industry. In addition to the textile industry, NPE can also be used as a surfactant, detergent. Once NPE enters the environment, it rapidly decomposes into the more toxic environmental hormone NP, or nonylphenol. NPE is recognized as an environmental hormone all over the world. Studies have shown that even if the emission concentration is very low, it is very harmful. NP is persistent and bioaccumulative. In other words, once it is discharged into the environment, it will exist in the environment for a long time, and it can enter the food chain, and be enriched through the food chain, concentration gradually increased. At the same time, it also has the effect of mimicking estrogen, so once the substance enters the organism, it will affect the normal reproduction and development of the organism, which can lead to the reduction of human male sperm number [5].

### Poison Hazard

Some people describe the structure of our skin as a leaf with many pores that serve as an inlet and outlet for carbon dioxide, oxygen and water vapor. Stomata have a layer of tension in the skin film, play a role in blocking the invasion of external substances. Among our long-term daily necessities (organic solvents, cosmetics, pesticides, metal compounds), Almost all contain solvents and surfactants that dissolve the skin's stratum corneum, lowering the tension of the barrier's skin membrane and causing harmful chemicals to enter the body through the skin-the process by which toxins enter the skin. Toxins that enter the body in this way are known as "transdermal toxins." The higher the body temperature, the stronger the skin's ability to absorb transdermal toxins. These absorbed toxins enter different organs with the metabolism of the human body, if they cannot be metabolized out of the body in a timely manner, may have adverse effects on various organs of the body, such as causing cell variation, and even can induce cancer in severe cases. This means that hazardous chemicals are exposed to us at zero distance every day by hiding in substandard clothing. In the long run, skin aging, allergies, hormonal disorders, rapid egg decline and other health problems will be uninvited and may even increase the risk of cancer in humans [6]. Don't underestimate the impact of harmful substances in clothing, to know that the human skin area of 1.5-2 square meters, about 10% of the weight of more than, it can be a large area of organs. And there are many kinds of harmful substances in unqualified clothing. These substances are extremely harmful to the health of the user when they exceed the limit. Below we will list several common high-risk compounds with toxic toxicology as examples to illustrate the influence of harmful substances in clothing.

### Formaldehyde

Formaldehyde in garments and textiles is mainly used in ironing-free finishing and color fixation of durable dyeing and printing aids, so it comes mainly from bright and beautiful dyes and auxiliary products which keep the color of garments, and adhesives used in garment printing. The formaldehyde content of colorful garments and printed garments is generally high, while the formaldehyde content of plain garments and non-printed garments is low. Formaldehyde can bind to protoplasm in vivo, change protein structure and coagulate it, which has strong irritation to human respiratory tract and skin, and can cause respiratory tract inflammation, skin inflammation and skin allergic diseases. Formaldehyde rapidly binds to or begins to polymerize with different functional groups in the respiratory and digestive tract mucosa [7].

### Prohibited Azo dyes

The banned azo dyes are also called decomposable aromatic amine dyes, that is, dyes synthesized from carcinogenic aromatic amines. At present, 23 aromatic amines are known to synthesize hundreds of dyes, among which 2-naphthylamine and benzidine

are the most carcinogenic, exceeding the well-known "Sudan red", and can lead to the occurrence of malignant tumors. As early as in the late 1980s and early 1990s in China, Tianjin was used as a sample for medical research. The results showed that the incidence of bladder cancer was 28 times higher in people who frequently exposed to benzidine than in the normal population. Benzidine can cause bladder, ureter, and pelvic cancers, with an incubation period of up to 20 years. To this end, countries around the world have formulated laws and regulations to prohibit the use of such toxic dyes. But because of the low price of such toxic dyes, there are still producers in the textile and clothing processing process used illegally. The banned azo dyes remaining in garments not only cause pathological changes and induce cancer, but also are more toxic than formaldehyde. Because formaldehyde has irritating odor, discernable, and soluble in water, consumers buy back textiles, generally washed with water can remove most of the formaldehyde; But the banned azo dyes are not only insoluble in water, but also colorless and tasteless, and cannot be removed. Viewed from the outside of textiles alone, the average consumer simply cannot tell if there is a banned azo dye in it [8].

Textile enterprises use aromatic amine dyes in large quantities, in addition to low prices, but also because the dyes have a full range of colors, strong coloring power, bright colors, long-lasting color, color fastness and other advantages. Azo dye-treated clothing can greatly improve the aesthetic feeling, with more brilliant colors and excellent performance, more attractive to consumers, thus promoting sales.

### Heavy metal

Harmful heavy metals mainly refer to arsenic, cadmium, chromium, cobalt, copper, lead, mercury and nickel. The heavy metals in textiles mainly come from the following aspects: the planting, manufacturing and processing of textile fiber materials, such as planting from the soil; Metal Complex Dyes Used in Jeans Printing and Dyeing; Chemicals and auxiliaries used in textile processing; Cross-contamination of equipment and materials in the production and use of textiles. Generally speaking, the addition of heavy metals in the promoter will make the color of textiles brighter and brighter, and the heavy metals as catalyst will make the reaction more thorough and faster. However, in the above process, heavy metals will enter the fiber with the addition of additives, which is difficult to remove. The cumulative toxicity of heavy metals to human body is very serious. Once absorbed by human body, heavy metals will accumulate in the liver, bone, kidney, heart and brain. When accumulated to a certain extent, it will cause irreversible huge damage to human health. To this end, in 1999, the EU imposed the following regulations on imported clothing: it is prohibited to use in the market excipients containing more than 0.5 mg/square centimeter of harmful heavy metals in contact with human beings [9]. Lead, which is familiar to most parents, is used in dyes ranging from orange to red, as well as in paints, glass, ceramics, and other industries.

Familiar zippers may contain trace amounts of lead on their zippers, which children sometimes play with in their mouths, so that lead enters the body through the mouth.

Lead can lead to anemia, headache, dizziness, fatigue, sleepiness, constipation and limb pain and other symptoms; Infants with high levels of lead in the body, there will be growth retardation, loss of appetite, mobility and constipation, insomnia and so on; If the body of primary school students lead content is too high, in addition to the above-mentioned symptoms, but also accompanied by hyperactivity, hearing impairment, attention deficit, mental retardation and so on. Because children are at a developmental stage, they are more sensitive to lead than adults.

### Perfluorooctane Sulfonate Compounds

Perfluorooctane sulfonate (PFOS) is the raw material of perfluorinated finishing agent and perfluorinated surfactant. It is the representative of perfluorinated compounds and is mainly used for waterproof oil repellent decontamination and special surface finishing. Once ingested by organisms, PFOS preferentially adsorbs on proteins, most of which bind to plasma proteins in the blood and accumulate in liver and muscle tissues. PFOS is toxic and carcinogenic to the liver, nerves, cardiovascular system, reproductive system and immune system, and causes respiratory diseases. And the toxicity of PFOS is very persistent. Tests have shown that the half-life of PFOS in humans takes 8.7 years and that when the body's PFOS concentration accumulates to 2 mg/kg, it kills people. Moreover, PFOS is one of the most difficult organic pollutants to decompose, and there is no hydrolysis, photolysis or biodegradation in any environment. In other words, it accumulates in the environment and accumulates in human and animal tissues through the food chain. In addition, the organotin used in the process of sportswear finishing, although can make the clothing has the function of anti-bacteria and anti-odor, but it has neurotoxicity, the harm is also greater. Textiles are an important medium for microbial survival and reproduction. Microorganisms on textiles multiply rapidly when exposed to appropriate temperature, humidity and nutrients (such as dirt, sweat, and some textile finishing agents). As a result, textiles in contact with human beings multiply and increase the risk of skin infection. Toxic and harmful substances residues on textiles and microorganisms will induce irritation, allergic and systemic toxic reactions when they come into contact with skin [10].

Thus, it is conceivable that long-term exposure to these chemicals, especially harmful substances with incubation period, is harmful to human health. Imagine that all the diseases we suffer today are caused by a dress we wore 20 years ago. To whom should we complain of our sickness and mental suffering, and to whom should we hold ourselves responsible?

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