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Once upon a time Radioactive toothpaste!?

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To the Editor,

We are writing to inform patients and dental practitioners about a somewhat forgotten product, a result of humanity's ignorance of the harms of some discoveries.

At the end of the 19th and the beginning of the 20th centuries, after the discovery of radium by Marie and Pierre Curie, radioactivity was considered a "miraculous" force. Marie Curie herself wore an ampoule of radium on her chest as a talisman, which resulted in her developing leukemia, from which she died in 1934.

In America, the craze for radium was all-engulfing, and its use in the manufacture of household and medical products and appliances was widespread—from medicines for colds and cancer to children's toys, drinking water, cosmetics, and even toothpaste (1). Advertisements promised "freshness, disinfection, enamel strengthening, rejuvenation, and more energy." One of the most advertised advantages of the elements was their ability to glow in the dark. Most often, radium or thorium were added to radioactive toothpastes, and less often uranium compounds!

Doramad Radioactive Toothpaste was produced in Germany in the 1920s and 1930s (2). It was advertised, in Bulgaria as well, very actively as a means of achieving a "bright smile and healthy gums". The toothpaste was slightly radioactive because it contained a by-product obtained during the production of gas lanterns. Its use was advertised as contributing to good health, through its "antibacterial" action and as strengthening "the protection of teeth and gums", among other benefits. The company promised sparkling white teeth and the elimination of bacteria due to the ionizing radiation of radioactive substances. It was advertised as a "miracle cure" (3).

The following was written on the back of the tube (4):

"What does Doramad do? Through its radioactivity, it increases the protective powers of the teeth and gums. The cells are charged with new, energetic vitality, which suppresses the destructive abilities of bacteria. Hence its exquisite appearance and preventive healing effect on gum disease. It polishes the enamel to the softest shiny white color. It prevents the formation of tartar. Good foam, new taste - pleasant, soft, and refreshing. Use generously."

During the German occupation of France in World War II, a group of German scientists stole all the thorium they could gather while in France. The Allied mission believed that the radioactive elements would be used to produce an atomic bomb, but it was later revealed that the scientists were not trying to develop a bomb at all, but to make toothpaste with thorium. According to physicist Samuel Goodsmith, employees of a German chemical company realized that after the end of the war they would not be able to profit from the production of military equipment and decided

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that cosmetic products would be their best option for future sales. This led to the theft of all French thorium to produce radioactive toothpaste (5).

Similar products were also available in France and in the US, often sold in pharmacies as "medicinal." Tho-Radia is a line of radioactive cosmetics that includes toothpaste containing thorium. Founded in 1932 in Paris, the toothpaste (Dentrifice Tho-Radia) was advertised as firming and antimicrobial. The iconic branding of a woman bathed in radioactive light remained for decades, even though radioactive elements were no longer used in the products after 1937 (6).

At that time, people were unaware of how dangerous radiation was. Constant exposure to radioactive elements can cause increased frequency of malignant bone sarcomas, benign exostoses, growth retardation, tooth breakage, kidney diseases, liver diseases, cataracts, ulceration, telangiectasia, pigmentary anomalies, atrophy or keratosis (1,7).

Figure 1: Various product advertisements

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Workers who manufactured or packaged such products often became seriously ill. The so-called "Radium Girls" in the United States between 1917 and 1926 in Orange, New Jersey, are well known. The U.S. Radium Corporation hired about 70 women to paint the numbers on watch dials by hand with a brush. The pay was 27 cents for each dial painted, so the more the women worked, the more money they earned. In their free time, the girls entertained themselves by painting their nails, teeth, and faces with a glow-in-the-dark paint called UnDark. They often licked the brushes to make it easier to apply the paint.

In the 1920s, the "Radium Girls" began to experience a host of strange health symptoms for no apparent reason - tooth loss, terrifying weight loss, fainting spells. In 1922, one of the workers quit her job because of a mysterious illness that started with a toothache. The dentist had to pull out all her teeth one by one, but the pain didn't stop. During a visit to the dentist because of loose teeth, another worker's upper jaw unexpectedly "came off, and a few days later the same thing happened to her lower jaw." (8,9)

In the 1930s and 1940s, scientific evidence began to emerge about the harmful effects of radiation. After World War II and the atomic bombings, fears about radiation grew and such products were withdrawn from the market.

Najeba Salih et al. in 2016 determine the concentration of 222Rn, 226Ra, and 238U in 25 different toothpastes available in the local market in Penang, Malaysia. They found that the average annual effective dose (0.3118 mSvy-1) was below the range (3-10 mSvy-1) reported by ICRP (1993), and therefore there is no evidence of health problems (10).

Conclusion

Today, radioactive toothpastes are museum rarities and collector's items. Some tubes of old toothpastes still emit low levels of radiation.

The story of radioactive toothpaste is a striking example of how humanity can be blinded by a new discovery without fully understanding its nature. At the beginning of the 20th century, radioactivity seemed like a miraculous force – a symbol of progress, health, and energy. Such products were perceived not as a threat, but as a modern means of strengthening the body. It was only later that science revealed the true destructive consequences of uncontrolled exposure to radiation. This example shows how easily enthusiasm and the desire for quick application can overtake knowledge and reason. It is a warning that every innovation must be met with scepticism, verification and critical thinking. And it reminds us that progress is not measured simply by introducing new ideas, but by the ability to draw clear boundaries between discovery and recklessness.

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