

# What's Santa Claus poisoned with? --- For Christmas awaiting fans!

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**Abstract:** Santa Claus' universal fame and adoration comes with considerable health impacts for children. His image of an obese man that wears a fur-lined red suit, travels to cold and hot places and handles lots of physical work in a short period of time comes with a variety of occupational health hazards. Although rumors suggest he has quit smoking, photos of him with his famous pipe are still published from time to time. He enters millions of homes via chimneys that come with tar and soot exposure. He drinks brandy and seems to be a reckless persona, and walking with spatio-temporal gait characteristics. Apparently he is unemployed for majority of the year. He claims that he knows and sees every good and naughty child, meeting the criteria for hallucination!

I will try to examine his image through a health and toxicology lens here, and present it in a way that could be discussed at home with your children and grandchildren over the Christmas dinner as a sweet story to cheer every one up, with knowledge translation potential. Enjoy! --- We need to improve Santa's image in 21<sup>st</sup> century!

## Introduction

Half a century ago when I was a kid, the world was a surreal mix of facts and fantasies that made it astonishingly beautiful. In particular, when each Christmas Papá Noel was coloring my world. I suppose this good memory goes for everyone.

Research has shown that Santa Claus's persona is universal, and despite the fact that some are not happy with his fantasy existence, he keeps many cheerful even just by given them the benefits of the doubt.

### COGITO, ERGO SUM!

I think [I doubt] , therefore I am  
René Descartes (1596 - 1650)

Today, we live in a more realistic post-Santa world, but this does not mean the end of great Santa's gifts!

First, Santa could be real. Who knows? No one has done a thorough study in this regard. In fact science by itself cannot disprove anything, but just provide or rule out evidence.

Second, even a doubtful Santa is good for us. Descartes explained we cannot *doubt* of our existence while we *doubt!* Santa's fantasy keeps some of us cheerful.

Third, The North American Aerospace Defense Command has openly admitted that Santa's December travels are tracked in 1955, indicating that Santa could be real [!?] (Figure 1);<sup>1</sup> a tradition that they keep continuing. Anyway, I would like to see it that way.



Figure 1. Colonel Harry Shoup, NORAD's First Santa Tracker (1917 – 2009). Adopted from reference (<sup>1</sup>)

## Who was Santa Claus?

Santa Claus is the most unmistakable Christmas iconography that even displaced Virgin Mary and baby in the modern era. He brings gifts to well-behaved children on Christmas Eve and in the early morning of Christmas Day (24 and 25 December).

*The historic Santa figure* was a bounty bishop named Nikolaus in Myra in Asia Minor, the present Turkey (then A Roman Territory) in the 300's CE and was canonized as Nicolas Nikolaus (Saint Nicholas or Santa Claus) after his death. Some claim that Santa still lives, others doubt it, but as long as there is doubt there is hope.

*The modern Santa Claus* is a discovery of recent era by Disney and cigarette manufacturers.<sup>2</sup> He:

- is a white old man with a big beard
- is recklessly obese with a large red nose and a big belly
- wears a bulky fur-lined red suit
- smokes
- walks with spatio-temporal gait characteristics
- enters homes via chimneys
- knows and sees every child and lists and double checks their behaviour to the minutiae

Have you ever wondered why he is depicted in this particular manner? Given his fame, he has considerable potential to affect individual and public health.<sup>3</sup>

## What are Santa's health hazards?

### A) Non toxicological health hazards

#### A-1) Obese role model

Cheerful Santa is impersonated with a rotund sedentary image. This life style jeopardises his health as well as his fans seeing him as a role model. In fact one study has shown a correlation between countries that venerate Santa Claus and those that have high levels of childhood obesity [!].<sup>4</sup>

Although this association could be a simple coincidence, it could also be due to a causal relationship as a temporal pathway whereby "Santa promotes a message that obesity is synonymous with cheerfulness and joviality"<sup>3</sup> Please refer him to BCCDC's [Healthy Eating & Healthy Weights service](#) when he visits your home this year!

#### A-2) Reckless role model

Leaving Santa a cup of brandy, which is a tradition in many societies, could be perceived as a symbol of encouraging drinking. It is particularly important as Santa travels a lot and this may be perceived as drunk driving.<sup>3</sup> Research has also shown that although Santa Claus visits most of the paediatric wards in the UK, the odds of him not visiting wards are significantly higher for deprived areas! Apparently, his rewards for children are not based on how nice or naughty they have been in the previous year, but their backgrounds.<sup>5</sup>

### A-3) Occupational hazards and health

Apparently, Santa is unemployed throughout the year, but during an approximately 36-hour stretch during the Christmas period, his workload is very high and certainly exceeds a typical eight-hour work day.<sup>6</sup>

--- Santa's work is limited to Christmas Eve and the early morning of Christmas Day, let's say 12 hours on 24 and 25 December, and he works in 24 hour time zones that accounts for an overall period of work of 23 hours.

He is old and not retiring. It is not fair to him and his fans. What if he has an accident? Doesn't he travel too much? There were no occupational toxicology and safety regulations when he was young 1,700 years ago. Someone should let him know about the new regulations. I am not even sure whether WorkSafeBC covers him!

He is apparently registered in Norway or somewhere else. I looked online for his name but apparently his business is not listed in Canada. The roles, rights, responsibilities, claim information, health and safety issues for workers are clearly explained on WorkSafeBC's website <https://www.worksafebc.com/en><sup>7</sup>. Santa Claus faces an increased risk of falling when filling or carrying his Christmas sack with 20 kg of presents.<sup>8</sup> Someone tell him please!

I am also concerned about his loneliness! Apparently loneliness 'gets under the skin' and is associated with changes in inflammatory and metabolic markers.<sup>9</sup> Loneliness is also associated with increased risk of depression and dementia.<sup>10</sup> --- What if he forgets our home addresses? Please ask him to visit PHSA's [Health Promotion Video Library](#) if he is one of our staff.

### A-4) Heat Stress

Santa Claus is acclimatized to the colder climate of the North Pole, therefore he may suffer from heat stress when delivering presents in warmer climates such as Australia in December!<sup>11</sup> His high physical workload is also a heat stress hazard, and his fur-lined red suit does not help the thermoregulation. Heat stress and high workload is a cardiovascular risk factor.<sup>11</sup>

Aren't you worried about him? --- HealthLinkBC provides a very good source of information for [Heat-related illnesses](#). Although this particular issue should fall in the jurisdiction of Australian and New Zealand governments!

### A-5) Travel concerns and jet lag

Santa travels and may act as a vector for diseases across the globe. It is expected that Santa would suffer from significant jet lag due to the amount of travel required to meet his December 25th deadline each year. Vaccination and prevention is needed to travel to some parts of the world. Vancouver Coastal Health – [Travel Clinic](#) could help him, I suppose (Ph 604 736 9244).

### A-6) Santa's psychology profile

Absolute nostalgia; Do you remember?<sup>11 12</sup>

*Santa Claus is coming to town!  
You better watch out,  
You better not cry,  
You better not pout,  
I'm telling you why?  
Santa Claus is coming to town!  
He sees you when you're sleeping  
He knows when you're awake  
He knows if you've been bad or good  
He's making a list, Checking it twice!*

Santa's psychological profile is complex. Apparently, he is omniscient! He sees, knows and feels everyone. He documents the names of all children and even compulsively checks their names twice!<sup>11</sup> These are not normal abilities. Could he be delusional?!

## B) Santa's toxicology related risks

### Santa's toxidrome

In brief, Santa's toxidrome consist of a recklessly obese old male figure that walks with a spatio-temporal gait, smokes and drinks brandy and enters millions of homes via their chimneys. He is an obsessive person who claims that he can see everyone across the Globe, and lists their names. Apparently he can avoid sleeping and work hard across the Globe in a 36 hour period but is unemployed for majority of the year!

--- Does this sound familiar from a medical toxicological perspective!?

### B-4) Toxic exposure due to passing through chimneys

Santa's route of entry into the homes of his clients is via chimneys.<sup>11</sup> This could be a major chemical hazard for him. In fact, the first cancer linked to occupational toxic exposure, squamous cell carcinoma of the scrotum, was described in chimney sweeps in 1775 in England by Sir Perivall Pott (1714 – 1788).<sup>13 14</sup>

Soot, tar and Polycyclic aromatic hydrocarbons (PHAs) from gas of heat and coal ovens accumulate in chimneys that are still in use. These chemicals are well known carcinogens.<sup>15 16 17 18</sup>

The scrotum is a seven-layer pouch which covers the testes, testicular adnexae, and distal spermatic cord<sup>14</sup>. In Chimney-sweep's Cancer, carcinogen soot, etc. accumulate in these cells.<sup>19</sup>

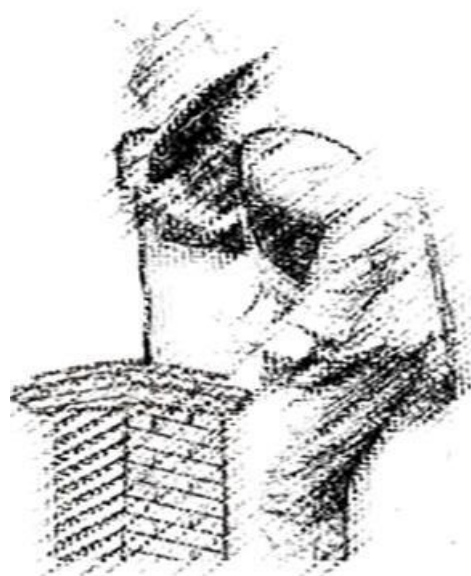


Figure 2. Chimney sweeps in 19th century. RA<sup>®</sup>

Santa passes through millions of chimneys each year, and it is highly probable that he has already developed squamous cell carcinoma of the scrotum! This carcinoma is a rare disease these days, and is also associated with poor hygiene and chronic irritation.<sup>14</sup>

--- Why not ask him to ring the doorbell instead of sneaking into our chimneys? Also it is fair to let him know of the Men's Health Institute and clinics that are widely available these days!

Santa's obesity, smoking and drinking are also risk factors of squamous cell carcinoma.<sup>20 21 22</sup>

His reckless lifestyle and unemployment during the majority of the year may also increase the risk of cancer. His travels across the globe in warm weather with his fur-lined red suit while working hard lead to heat stress. Heat stress is another risk factor for cancer.<sup>23 24</sup>

### B-2) Nicotine, hydrogen cyanide and formaldehyde poisoning

Santa used to be portrayed as a figure who smokes. Fortunately, he was forced to quit smoking a couple of decades ago and pictures that depict him smoking have been banned from advertising cigarettes. Unfortunately, his smoking portraits are still widely available on postcards and the internet!<sup>3</sup>

Tobacco smoke is made up of thousands of chemicals, including 70 that are known to cause cancer. Smoking kills 8 million people a year worldwide. --- BCTOX has estimated that current and past exposures to tobacco smoking monthly cause 500 premature deaths in British Columbia alone. Tobacco that includes a mixture of toxic agents is by far the most important toxicants health wise.

Santa's long term smoking is probably a precipitating factor for chemical-induced cancer.<sup>25 26</sup>

In addition, Santa is portrayed walking with spatio-temporal gait characteristics<sup>8</sup>, which could be related to [micro] strokes that are also precipitated by smoking.

### B-3) Cadmium toxicity

If Santa smoked for 17 hundred years [--- bearing in mind that smoking was popularised after European discovery of the Americas], he is certainly intoxicated with - long term low exposure - cadmium. Smoking is the most important single agent of cadmium toxicity.<sup>27 28</sup>

In fact research has shown that age and smoking status are the greatest contributors of cadmium burden in Canadian population.<sup>29</sup>

*Cancer* High cadmium exposure may controversially<sup>30 31</sup> increase the risk of cancer.<sup>32 33</sup>

*Osteoporosis* Cadmium toxicity even at body burdens that do not need treatment causes osteoporosis and formation of renal stones. Toxicologists should refer Santa for measuring calcium in his blood and urine<sup>34 35 36 37</sup>, and X ray studies for bone mineral density.<sup>38</sup>

Santa is old with high physical activity, alcohol use and frequent unemployment that also make him prone to osteoporosis, falls and bone fractures! What are we going to do if he falls and fails to show up one year?

*Kidney problems* Chronic exposure to cadmium can lead to kidney problems. To hasten diagnosis, one could monitor for renal function, proteinuria<sup>39</sup> and measure beta 2-microglobulin in urine, which is a nonspecific biomarker for kidney disease.<sup>40 41 42</sup>

### B-4) Substance use

Santa smokes and drinks, he is reckless and unemployed for the majority of the year, which resembles stereotypic substance users! He is overweight which could be related to high alcohol consumption or even cannabis use which increases appetite!{?}

His obsessive compulsive behaviour, manifested by listing everyone and double checking the names is seen in stimulant use. He works hard for 36 hours across the Globe on Christmas eve and day and does not sleep, which is also consistent with stimulants. However, stimulants usually decrease appetite.

Santa knows and sees everyone, with whom he has no physical contact. Isn't this the definition of visual hallucination? I bet this way of presenting Santa, hi might be accused of using some sort of hallucinogen/stimulant substances at around Christmas time!!

--- We really need to improve Santa's image in 21<sup>st</sup> century!

## C) Real world Santa's health risks

Setting aside the fantasy Santa, we meet real Santas in shopping malls and celebrate Christmas with lots of delight every year. Santa is a source of food toxicity outbreaks In the real world. Numerous studies have shown food toxicities increase during Christmas time.

Christmas feasting comes with dangerous delights<sup>43 44</sup>, high food intake and pet chocolate poisonings.<sup>45</sup> Accidental overdoses due to ingestion of white phosphorus firecrackers still kill hundreds of children in the developing world including the Philippines and south and central America.<sup>46 47</sup>

Santas in the real world are not tested for health issues, some with smell of smoke and some are coming into close contact with children while they have the common cold and influenza. "Santa is potentially a point source for infectious diseases outbreaks".<sup>3</sup>

Infectious mononucleosis due to kissing and influenza (Figure 3) due to close contacts are known examples. --- Real Santas are not subjected to health check, which is extraordinary taking the fact that they come to close contact with so many children.

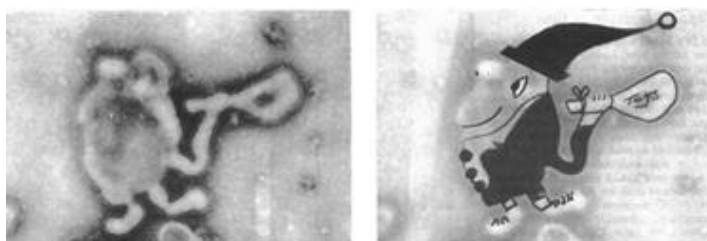


Figure 3. Resemblance of the influenza virus to Santa Claus. An electron micrograph of an influenza virus that resembles Santa Claus! Getty B. from Royal Liverpool Hospital reported in 1984 that Santa is not in the clouds of sky but under microscope! Adopted from reference<sup>48</sup> with permission, BMJ©).

In fact, Christmas comes with many other health risks including lower media activity that limits public communication with health messaging and alerts<sup>49</sup>, furthermore, suicide and parasuicide rates change during the Christmas holidays.<sup>50 51</sup>

Santa Claus as well as Christmas could be health risks.<sup>4</sup> Santa in particular should be studied more rigorously!

## Conclusion

Santa Claus, in the way he is presented, is not a good role model in the 21<sup>st</sup> century due to smoking, obesity, reckless behaviour and passing through chimneys!

When some turned Saint Nicholas to fantasy Santa Claus, they cheered up many generations. We have to be grateful to them. It is now time to modify his image to a healthier persona. New Santa should be a more well-rounded and healthy person, sometimes young, female and African American that leans toward the less advantage part of the societies!

## What do you think?

--- *What toxic hazards Santa is exposed to?*

--- *What poisonings (above or below treatment levels) could he have?*

Take a guess, and email back your response to be entered in the BCTOX drawing for \$20 gift card. --- There is no right or wrong answer for this competition. You may select a given diagnosis or provide a new one. **(Deadline December 23 2018)**

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