



Epidemiology of Platinum Salt Sensitivity (PSS)

Cases of allergy in workers handling chloroplatinates were first reported over a century ago (Karasek et al, 1911). Various health surveys and occupational epidemiology studies of Platinum Salt Sensitivity (PSS) have been completed since that time. These have variously investigated which specific platinum substances are responsible for the sensitisation response, what is the exposure-response relationship of those substances and PSS, and what are the influences of other potential contributing factors such as smoking and atopy.

The epidemiology studies have collectively demonstrated chloroplatinates to be the causative agents responsible for PSS, provided evidence that smoking increases the risk of becoming sensitised while indicating atopy may have only a minor influence, and tracked the decreasing incidence of PSS over time.

Only a few studies have attempted to provide insight into the exposure-response relationship, i.e. the relationship between the level of occupational exposure – to total soluble platinum since this is what is routinely measured in the absence of analytical capability to measure chloroplatinates specifically – and the consequent likelihood of becoming sensitised. The lack of sufficiently informative data on the exposure-response relationship was acknowledged by the EU Scientific Committee on Occupational Exposure Limits (SCOEL) when it evaluated platinum in 2011 (SCOEL, 2011).

IPA subsequently sponsored the conduct of a retrospective occupational epidemiology study of PSS at five PGM refineries spanning South Africa, Europe, and the USA. The study, which covered the period 2000-2010 was published in the scientific literature in 2016 (Heederik et al, 2016). The study was later extended, taking the study period up to 2015 (Smit et al, 2023; Smit et al, 2025). The extension was expected to provide both better exposure data, due to improved sampling and analysis of workplace exposure to soluble platinum, and increased power to better delineate the exposure-response relationship. An examination of the effect of different approaches to managing workers with PSS on health outcomes was also included in this second phase, but there were too few cases of PSS to draw any meaningful conclusions.

The industry-sponsored epidemiology studies provide the best insight into the exposure-risk relationship for chloroplatinates and PSS. The nature of such retrospective studies and the limitations of the data upon which the analyses are based, though, mean there remain multiple uncertainties about the true exposure-risk relationship. Some of these limitations include:

- use of total soluble platinum as a surrogate measure of chloroplatinates exposure;
- use of historical industrial hygiene measurements for which the sampling strategy is unknown and hence the data may not represent either typical exposures or the full range of exposures for a group;
- incomplete / inaccurate record-keeping and misclassification of workers' job roles;
- modelling of exposure data to generate exposure levels for all workers at all times, and assuming a linear change in exposure level over time (whereas exposure levels are likely to change step-wise, periodically as new exposure controls are introduced)



Moreover, as workplace exposure levels of chloroplatinates and the incidence of PSS have progressively decreased, the potential for various undocumented factors unaccounted for in the epidemiology studies to affect the apparent exposure-response relationship may be expected to increase. In addition to factors such as genetic susceptibility, these include *inter alia*:

- the influence of peak exposures from routine process work as well as unplanned losses of containment (spills) or malfunctioning exposure controls;
- exposure to higher levels of chloroplatinates than would be expected based on a worker's job title – for example if a worker participates in a stock take, or regularly walks through other parts of the facility;
- the contribution of dermal exposure, including the added effect of damaged skin or conditions such as eczema, especially if the focus of attention at a facility was primarily on preventing inhalation exposure;
- behavioural aspects such as improper use of Respiratory Protective Equipment (RPE) and other Personal Protective Equipment (PPE).

With the high value of the precious metal materials being worked with, and also the potential compensation awarded to workers that do become sensitised, there are incentives for nefarious actions that may result in increased unprotected exposure and sensitisation. Cases of theft and removal of material off site do occur, and there has been at least one known case of a worker intentionally inhaling chloroplatinate to become sensitised.

Some of the above limitations could potentially be addressed through the conduct of a detailed prospective epidemiology study, but the incidence of PSS has now decreased to such an extent – sometimes no cases at a site in a given year – it is unlikely that any conceivably viable future epidemiology study of PSS would achieve sufficient power to provide significant new insight. Further advances in the understanding of PSS and Type I hypersensitivity of the respiratory tract more generally, though, may still provide greater confidence in what the true exposure-response relationship is likely to be, and this may influence target levels for occupational exposure controls.

Despite the various uncertainties, the industry-sponsored epidemiology studies provide an evidential basis upon which to base policy decisions for taking further action to limit workplace exposure to chloroplatinates (see **Occupational Exposure Limit and Voluntary Guidance Value**).



References

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