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Title: The ban on engineered stone in Australia. A milestone in the fight against emerging silica hazards

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Authorship

All authors have

1. substantially contributed to the conception and design of the work; and
2. drafted the article and revised it critically for important intellectual content; and
3. given their final approval of the version to be published; and
4. agreed to be accountable for all aspects of the work, in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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(1 269 words)

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Engineered stone-associated silicosis, also called artificial stone-silicosis (AS-silicosis) has been an emerging respiratory health issue over the last 20 years. AS-silicosis is caused by the inhalation of crystalline silica dust generated during the manufacturing and processing (cutting, bevelling, polishing, etc.) of this high-silica content (more than 80%) material. Engineered stone is notably used for kitchen benchtops and bathroom coverings. A significant proportion of the inhaled silica particles produced during engineered stone processing is ultrafine or nanometric and can penetrate deeply into the respiratory tract. The accelerated silicosis in workers exposed to these particles – often young, healthy men – is characterized by a rapidly progressive fibrotic interstitial lung disease with a massive decline in lung function (1). Beyond AS-silicosis, inhalation of engineered-stone dust has led to recent outbreaks of systemic autoimmune diseases with severe lung involvement, including systemic sclerosis, a systemic autoimmune disease with the highest individual mortality rate among all rheumatic diseases (2,3). The emergence of AS-silicosis and AS-related systemic autoimmune diseases has highlighted several challenges for occupational prevention policies, healthcare and welfare systems in numerous countries.

On December 13th 2023, the Australian government became the first in the world to ban engineered stone from July 1st 2024 (4). Such a drastic and unusual decision was based on extensive scientific evidence gathered since 2019 by respiratory and occupational health experts (the National Dust Disease Taskforce, NDDT) (5) and a dedicated independent government agency (Safe Work Australia, SWA) (6). In 2021, the NDDT warned all stakeholders that if “significant improvements in worker safety” were not achieved within three years, immediate action should be taken to ban the product (5). SWA recommended the ban (7) following an extensive public consultation with all stakeholders – formally through a Consultation Regulation Impact Statement (CRIS) – and review of the available medical evidence by experts from the University of Adelaide and Monash University.

Importantly, the ban covers the use of all engineered stones, regardless of their content in crystalline silica. One of the three proposals presented by SWA during the CRIS process consisted in banning only engineered stone containing at least 40% silica. SWA’s final recommendation emphasised that there was no evidence-based knowledge of a silica threshold that would be toxicologically safe, and that industries had not brought such evidence to the consultation process. Beyond the high-silica content, AS hazards may also rely on the “cocktail effect” of resins and metal oxides respectively used as binders and pigments in this material, some of those substances being potentially carcinogenic (e.g. styrene and naphthalene) (8) or pro-inflammatory (e.g. aluminium) (9). SWA argued that creating new regulations on the percentage

of silica in engineered stone would miss the target, if the toxicity of the material also relied on its composite nature rather than on its sole silica content.

The ban is also consistent with preventive measures to reduce workers' exposure to carcinogens, including substitution with a less harmful substance when technically possible – as established in European regulations on this matter (e.g. Directive 2022/431 (10)). Since 1997, silica has been classified as a Group 1 carcinogen by the IARC. The legacy of asbestos in Australia, a country that has been witnessing one of the highest death rates from mesothelioma and other asbestos-related diseases, has indeed influenced the decision on the ban of engineered stone (5). SWA pointed out the obvious: kitchen benchtops can be made from materials other than engineered stone. Therefore, substitutability poses no major difficulty, and this possibility should be used to reduce the health hazards to which workers are exposed.

Although most cases of AS-related diseases have been reported in high-income countries (e.g. Spain, Italy, USA, Israel, Australia), in recent years the production of this material has been massively moving to countries where workers' health, safety, and insurance regulations are poorly implemented (11). Banning a single product in a single country will certainly not address the whole systemic poisoning due to occupational exposure in the current era. Yet Australia's ban should help to raise public awareness worldwide, showing that public health policies do not have to resign themselves to a toxic world (12).

How is Europe affected? Engineered stone has become an everyday European consumers' product, and several countries (e.g. Italy, Spain) are manufacturing this material in the European Union (EU). Not surprisingly, the world's first cases of AS-silicosis were reported in Europe (13), where both accelerated silicosis and systemic autoimmune diseases keep being diagnosed among workers involved in the production, processing or installation of engineered stone. Thus, the regulatory framework for occupational exposure to crystalline silica should be a priority. While recognising the carcinogenicity of crystalline silica, Directive (EU) 2017/2398 set a Threshold Limit Value-Time-Weighted Average (TLV-TWA, $0.1 \text{ mg}\cdot\text{m}^{-3}$ over 8 working hours for alveolar crystalline silica) that had previously been considered too high by the EU Commission's scientific expertise (14) and independent expert reports (15,16). The need to lower this threshold has been called for by European regulators themselves (10). In 2020, Australia set the standard at $0.05 \text{ mg}\cdot\text{m}^{-3}$. Shortly afterwards, a new recommendation was made to further reduce it to $0.025 \text{ mg}\cdot\text{m}^{-3}$ (7). This threshold has been recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) as the TLV-TWA for respirable crystalline silica since 2006, and was established as the action level regarding occupational

crystalline silica exposure by the Occupational Safety and Health Administration (OSHA) in 2016 (17). We have now reached a crossroads on such decisions regarding TLV-TWA for crystalline silica. Given the convergence of scientific evidence over the past twenty years, it seems reasonable to recommend that the EU should not take measures which are too late and insufficient. The TLV-TWA of 0.025 mg.m^{-3} , towards which Australia is moving, appears appropriate considering current knowledge on silica hazards. Moreover, we should not forget that this threshold is not sufficient to protect against all deleterious health effects of crystalline silica. Indeed, exposure to 0.025 mg.m^{-3} over 45 working years is still associated with an increased risk of mortality (from cancer and other diseases caused by crystalline silica) at least equal to 3 per 1,000 exposed workers. (16,17)

Furthermore, as the toxicity of engineered stone has now been firmly established, it is essential that all operations involving such materials benefit from reinforced labour inspection, regardless of the TLV-TWA. As TLV-TWAs are often exceeded in real working conditions (18), exposure monitoring needs to be strengthened throughout the whole silica manufacturing and processing chain. Beyond engineered stone, this principle should apply to any occupational exposure to crystalline silica, given the large number of exposed workers (particularly construction workers) (19).

Finally, based on the “value of statistical life” (20), Australian expertise (7) has shown that a cost-benefit calculation provides a rational way out of the so-called “unsolvable” dilemma between job preservation and workers’ health. Following the Australian example, we believe that Europe should urgently initiate a reflection on applying this concept of the “value of statistical life” as a lens to regulate silica hazards and, more broadly, any occupational health and safety issues. Over the past three decades, the failure to reform certain European systems for recognizing occupational diseases, such as the French system (21) has shown the tedious process that workers have to face to access compensation. This journey is often likened to an obstacle course, where compensation is rarely granted at a level equal to the “price of life” – the most notable exception being the compensation received by asbestos victims in France. The criterion of the “value of statistical life”, historically established as a public policy instrument at a macro level (22), could serve as relevant guidelines for Europe to determine whether the production, processing and installation of engineered stone should be banned in the EU.

REFERENCES

1. León-Jiménez A, Hidalgo-Molina A, Conde-Sánchez MÁ, Pérez-Alonso A, Morales-Morales JM, García-Gámez EM, et al. Artificial Stone Silicosis: Rapid Progression Following Exposure Cessation. *Chest*. 2020;158(3):1060-8.

2. Turner MT, Samuel SR, Silverstone EJ, et al. Silica Exposure and Connective Tissue Disease: An Underrecognized Association in Three Australian Artificial Stone Workers. *Am J Respir Crit Care Med.* 2020;201:378-380.3. Shtraichman O, Blanc PD, Ollech JE, et al. Outbreak of autoimmune disease in silicosis linked to artificial stone. *Occup Med (Lond).* 2015;65:444-50.
4. Commonwealth, State and Territory Workplace Relations and Work Health and Safety (WHS) Ministers. Communiqué - Meeting of Workplace Relations and Work Health and Safety Ministers [Internet]. Australian Government - Department of Employment and Workplace Relations; 2023. www.dewr.gov.au/work-health-and-safety-and-workplace-relations-ministers-meeting-13-december-2023-online-version. Date last accessed: December 23 2023.
5. National Dust Disease Taskforce. Final Report to Minister for Health and Aged Care. www.health.gov.au/sites/default/files/documents/2022/07/national-dust-disease-taskforce-final-report.pdf. Canberra: Australian Government, Department of Health; 2021; pp. 1-80.
6. Safe Work Australia. Decision Regulation Impact Statement: Managing the risks of respirable crystalline silica at work. www.safeworkaustralia.gov.au/sites/default/files/2023-02/decision_ris_-_managing_the_risks_of_crystalline_silica_at_work_-_for_publication_pdf.pdf. Date last accessed: April 24 2024. Canberra: Safe Work Australia; 2023; 102 p.
7. Safe Work Australia. Decision Regulation Impact Statement: Prohibition on the use of engineered stone. www.safeworkaustralia.gov.au/doc/decision-regulation-impact-statement-prohibition-use-engineered-stone Canberra: Safe Work Australia; 2023; 107 p.
8. León-Jiménez A, Manuel JM, García-Rojo M, et al. Compositional and structural analysis of engineered stones and inorganic particles in silicotic nodules of exposed workers. *Part Fibre Toxicol.* 2021;18:1-16.
9. Hornung V, Bauernfeind F, Halle A, et al. Silica crystals and aluminum salts activate the NALP3 inflammasome through phagosomal destabilization. *Nat Immunol.* 2008;9:847-56.
10. European Parliament, Council of the European Union. DIRECTIVE (EU) 2022/431 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2022 amending Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens or mutagens at work. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022L0431>. Date last accessed: April 24 2024. Official Journal of the European Union March 9. 2022; 14 p.
11. Burki TK. Silicosis and the countertop industry. *Lancet Respir Med.* 2021;9:1217.
12. Boudia S, Jas N. Gouverner un monde toxique. Versailles: Quae; 2019; 121 p.
13. Martínez C, Prieto A, García L, et al. Silicosis: a disease with an active present. *Arch Bronconeumol.* 2010;46:97-100.
14. Scientific Committee on Occupational Exposure Limits (SCOEL). Recommendation from the Scientific Committee on Occupational Exposure Limits for Silica, Crystalline (respirable dust). SCOEL (European Commission); 2003 November; 13 p. Report No.: SCOEL/SUM/94.

15. ACGIH. Product: Silica, Crystalline: alpha-Quartz and Cristobalite: TLV(R) Chemical Substances 7th Edition Documentation: ACGIH.. Cincinnati, OH: ACGIH; 2010; 18 p.
16. ANSES. ANSES Opinion on « Updating knowledge on the hazards, exposures and risks associated with crystalline silica ». www.anses.fr/en/content/anses-opinion-updating-knowledge-hazards-exposures-and-risks-associated-crystalline-silica. Accessed: Apr 24 2024. ANSES; 2019; 36 p.
17. Department of Labor, Occupational Safety and Health Administration (OSHA). Occupational Exposure to Respirable Crystalline Silica. Federal Register. 25 March 2016;81(58):16286-876.
18. Expertise collective ANSES. Dangers, expositions et risques relatifs à la silice cristalline [Internet]. <https://www.anses.fr/fr/system/files/AIR2015SA0236Ra.pdf>. Date last accessed: Apr 24 2024. Maisons-Alfort: ANSES; 2019; 478 p.
19. Ballerie A, Cavalin C, Lederlin M, et al. Association of silica exposure with chest HRCT and clinical characteristics in systemic sclerosis. *Semin Arthritis Rheum*. 2020;50:949-956.
20. The Office of Impact Analysis. Value of statistical life. Australian Government Department of the Prime Minister and Cabinet;2023; 4 p.
21. Cavalin C, Henry E, Jouzel JN, Pélisse J (dir.). Cent ans de sous-reconnaissance des maladies professionnelles. Paris: Presses des Mines; 2021. 296 p.
22. Cahen F, Cavalin C, Rosental PA, éditeurs. La mesure de la valeur humaine (Numéro spécial). *Incidence*. 2016;(12):303.