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Editorial

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International Inventory of Occupational Exposure Information: OMEGA-NET

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Employment is a major determinant of health and healthy ageing. The working life comprises a large proportion of the total life span, including vulnerable life stages such as the reproductive period. Occupation can also invoke a broad range of exposures often higher than that encountered in the general environment. Assessment of occupational exposure is thus a crucial aspect of assessing total exposure over the life course. To support such ambitious goals, concerted effort is needed to catalogue occupational exposure information. OMEGA-NET (the Network on the Coordination and Harmonisation of European Occupational Cohorts, http://omeganetcohorts.eu/) is a 4-year EU COST Action that started in 2017 intending to do just this.

Specifically, OMEGA-NET aims to enable optimization of the use of occupational, industrial, and general population cohorts across Europe to advance aetiological research and support public health. One obvious way to strengthen and elaborate ongoing research is to seek and leverage collaboration of cohorts with extensive occupational histories. The coordination and harmonization of occupational exposure assessment efforts, to facilitate an integrated research strategy for occupational health in Europe and beyond, is also of utmost importance (Turner and Mehlum, 2018).

Despite the numerous large cohort studies conducted world-wide, data on occupational risks as a whole are not being used to their full potential. We provisionally estimated approximately 30 million individuals in Europe are represented in existing cohort studies with extensive occupational and employment information (Turner and Mehlum, 2018). Pooling such cohorts would offer optimal exploitation of these resources, and unique opportunities for advancing aetiological research. Making the best use of a wide range of cohorts, however, requires high-quality large-scale systematic and harmonized exposure assessment.

Exposure assessment is a cornerstone in occupational epidemiology—one of the key methodological considerations—and not without its challenges. The goal in any study is to derive an accurate, precise, and biologically relevant exposure estimate for each worker under study (Nieuwenhuijsen, 2003). Without high-quality exposure assessment, the power of a study to detect an association between exposure and health outcome is diminished, which may bias results and lead to spurious interpretations. Study to study differences in exposure assessment quality are more apparent when drawing the evidence together. As has been shown in examples on benzene (Vlaanderen *et al.*, 2008), asbestos (Lenters *et al.*, 2011), and trichloroethylene (Purdue *et al.*, 2011), heterogeneity in findings across epidemiological studies are at least partly explained by variations in the quality of exposure assessment.

In addition to high-quality exposure assessment, it is essential to make the method objective, consistent, and transparent. These aspects are particularly important when pooling data to enable comparison of findings from different populations. Pooling of data is becoming increasingly important in detection of rare exposures, exposures with lower potency, and interactions with vulnerability including genetics.

The typical step before pooling of cohort data is harmonization. Harmonization of occupational histories is not straightforward though. Many different systems for coding of job titles are being used world-wide: there are national classification systems [such as the French PCS (*professions et catégories socioprofessionnelles*) or the Dutch SBC (*standaard beroepenclassificatie*)], and there is the International Standard Classification of Occupations (ISCO). These systems also have several version updates, which may be very different from each other. The same is true for industrial coding. In general, conversion between these different systems is not trivial. Ongoing efforts for developing cross-walks or automatic coding systems that allow free text to be transferred into standardized codes may provide solutions to harmonizing occupational and industrial coding. To have an easy entry point into finding these tools is one of the goals of OMEGA-NET.

This information on job title and industry collected in occupational histories within cohorts in fact forms the foundation for exposure assessment. Using existing cohorts, basic analyses of harmonized job titles alone may already be informative when large numbers are available, potentially revealing patterns between occupations and health outcomes. An example is the use of the RNV3P database in France, identifying emerging disease–exposure associations through a network approach (Faisandier *et al.*, 2011). The efforts within OMEGA-NET to draw together information about existing cohorts and exposure assessment tools ultimately aim to facilitate similar initiatives.

Job titles can also be translated into specific exposures via a job-exposure matrix (JEM). A JEM consists of a job axis and an exposure axis, sometimes expanded with time and/or regional dimensions. JEMs provide exposure assessment in a systematic and unbiased way, representing a highly efficient and reproducible methodology (Kromhout and Vermeulen, 2001). If observed patterns of associations between jobs and health outcomes cannot be explained by exposures covered in available JEMs, it is likely that unknown or non-suspected exposures are responsible, laying the groundwork for new hypotheses.

Numerous national and transnational JEMs have been developed. Examples in Europe are the Finnish FIN-JEM (Kauppinen *et al.*, 1998), the French Constances-JEM (Evanoff *et al.*, 2019), the Scandinavian NOCCA-JEM (Kauppinen *et al.*, 2009), and the international SYN-JEM (Peters *et al.*, 2016), to name a few. Transferability is of course a challenge, with JEMs based on different occupational coding systems, and a wide variation in the exposure definitions and exposure indices (e.g. intensity, probability, and peaks of exposure). OMEGA-NET strives to compile a listing of available JEMs; pairing these with the cross-walks mentioned above can facilitate linkage to a broader range of cohorts.

Since many methods and tools are used for occupational exposure assessment, and method uncertainties are largely unknown, systematic comparisons of epidemiological results are complicated. Another consequence is that many cohort data remain unexploited with regard to work-related exposures and diseases. It is our hope that sharing information on occupational exposure assessment methods and tools may accelerate research.

With this specific intention in mind, the OMEGA-NET consortium is compiling online inventories of existing cohort studies (Kogevinas *et al.*, submitted) and occupational exposure information. Recently, we have launched an online tool for these two inventories: http://omeganetcohorts.eu/resources/inventory/. The inventory for occupational exposure information specifically aims to collect metadata on all JEMs, exposure databases, occupational coding systems and the associated cross-walks available across Europe. This inventory will be the basis for a searchable web-based database, which will become publicly available.

To make such a comprehensive inventory possible, the OMEGA-NET consortium seeks the participation from all researchers involved in these types of studies or data collection. Via the searchable web-based database, researchers around the globe will have a quick and clear overview of all available information that they could use for assessing occupational exposures in their cohorts.

Our overall aim is to facilitate a concerted effort on harmonization of occupational exposure data to allow pooling and replication of findings, towards accelerating aetiological research.

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Conflict of interest

None declared.

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