
Imaging and epidemiology

Imaging and epidemiology are two large fields of health sciences that overlap. However, it does not take much exploring to start wondering whether there is any epidemiology without visualisation, and on the other hand, is there any sensible medical imaging without being based on population studies? The “visual” component of research and communication is so ubiquitous that we hardly are conscious about its importance until it is brought to a different level of apprehension as in the first article of this issue of the Norwegian Journal of Epidemiology. Christakis and Fowler demonstrate how abstract social factors can be assigned to visual symbols providing a dynamic map that instantly puts the reader on a train of thoughts and imagination. Social networking is an extremely important component of human life and development. Here the authors show how their elegant approach supplements epidemiology by visualising central and peripheral persons in a network, clusters and relationship and interaction dynamics that may escape conventional statistical methods.

The two methods, epidemiology and clinical imaging, have not gone hand in hand in the past, because high costs have restricted the application of medical imaging in population studies. We are therefore proud to include several papers using imaging modalities to address health issues in the general population. Johnsen and Mathiesen review the “Tromsø-study” based on a population of 6800 addressing the relationship between the carotid sonogram and stroke, myocardial infarction and cognitive impairment and the development with time. Acharya et al. suggest that ultrasound visualisation techniques now are ready for the assessment of endothelial function in the general population as women at risk of pregnancy induced hypertension seem to have permanently altered endothelial function.

An ultrasound image identifies your entrance into this world while you are still in the womb, and images follow your entire life. Hardly any individual has escaped two or more ultrasound scans during fetal life. The scans are most commonly used for age and growth assessment, and refined longitudinal methods have been developed for the purpose as shown by Johnsen et al. Three-dimensional ultrasound is also useful in more detailed anatomical studies such as in fetal bone formation. Mahon et al. establish the method for assessing fetal femur development and its relationship to maternal nutritional status such as vitamin D level.

But ultrasound imaging can also detect fetal malformations and induce a series of adverse effect in the mother. Kaasen and Haugen address these aspects.

Rosendahl and Dezateux describe possibilities to tie together ‘Epidemiology and Imaging’ with genetic analyses in children with congenital hip dysplasia. This is an example of translational research where imaging, here the ultrasound of the hip, measures endophenotypes. In general, imaging modalities produce continuous data and may thus better reflect the underlying polygenetic nature of the human body and mind than the categorical classification used in contemporary clinical diagnostics does. Both imaging the endophenotype and genetic testing improve their validity with high numbers of included individuals and benefit from the continuous nature of population-based data.

Ursin and Qureshi address important questions concerning the benefit of population-based screening for breast cancer and emphasize that tissue density is underused as a biomarker for risk of developing breast-cancer and when evaluating studies of prophylactic intervention. The authors also point out the problem that technical advances in imaging at times are taken into application before validated protocols for automated or half-automated data processing are established, and reproducibility studies are lagging behind.

An interesting perspective of imaging effects is discussed by Werner and Gross who determine factors that predict whether patients with low back pain are referred to MRI examination. Beliefs among health care providers and in the general population turn out to be important. The authors even tried to change the attitudes through a media campaign, but despite an increased skepticism concerning the usefulness of X-ray, CT and MRI in the case of low back pain, the rate of examinations increased. Accessibility of the MRI services was the best predictor of referral numbers.

Finally, the paper by Aßmus et al. describes a mathematical approach for filtering periodic components in panels of time series applied to genomic microarray data. This approach is also relevant for the two main topics of this issue: first, to analyze periodic events in epidemiology, and second, in the analyses of e.g. functional imaging data, for analyses that look into networks and the relation of time-series.

Quite a diversity!

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