

3D printing: Research projects on health risks launched

Communication No 048/2019 of the BfR of 4 December 2019

3D printers are now also available for private households. These printers can be used to produce spare parts, household items or gifts at home. Children can even make their own toys using special 3D printers.

The Federal Institute for Risk Assessment (BfR) is currently conducting various research projects in order to assess the potential health risk and derive recommendations.

The fused deposition modeling is the most used method in the hobby sector, due to its simple handling and low costs. In this printing process, a thermoplastic material, the so-called filament, is melted and applied layer by layer with the aid of a movable print head until the three-dimensional object is finished. For these 3D printers, digital models are freely available online or can be designed in many different drawing programs.

Scientific publications^{1/2} have shown that particulate and volatile substances are released during the heating process of the plastic. Most printers for hobby use are not airtight and do not have a suction device for exhaust fumes so that they can enter the room air unhindered. These emissions depend on various parameters, such as the plastic used or the print temperature. Filaments can be ordered online and their ingredients are often not clearly declared. In addition, new filaments containing additives such as metal or wood are constantly appearing on the market.

For a better understanding of the release and the health risks, the BfR will look more closely at the 3D printing process and the used filaments. Systematic investigations of different filaments from different manufacturers and testing of several 3D printers and 3D pens should enable recommendations to be made on consumer health protection.

About the BfR

The Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the scope of the Federal Ministry of Food and Agriculture (BMEL). It advises the Federal Government and the Länder on questions of food, chemical and product safety. The BfR conducts its own research on topics that are closely related to its evaluation tasks.

¹ Kim, Y., et al. (2015). "Emissions of Nanoparticles and Gaseous Material from 3D Printer Operation." *Environmental Science & Technology* 49(20): 12044-12053

² Stefaniak, A. B., et al. (2017). "Characterization of chemical contaminants generated by a desktop fused deposition modeling 3-dimensional Printer." *Journal of Occupational and Environmental Hygiene* 14(7): 540-550