Abstract for the general public

Road accidents still remain a significant social and economic problem. Literature review showed that some social groups were more likely to be injured in road accidents than others. One of the most common types of injuries in these accidents are spine injuries. They are characterized by high social and economic costs, causing human suffering. The aim of this project is to identify risk factors of spine injuries in road accidents. The influence of anthropometric occupant characteristics and various initial conditions of a road accident on the risk of injuries in various spine locations will be researched. The project is a continuation of previous research of the National Center for Research and Development and General Directorate for National Roads and Highways, conducted by the research team from Gdansk University of Technology, which was concerned with the analysis of vehicle impacts against road safety equipment. Currently, these studies are being extended and now they include the analysis of specific types of spinal injuries along with the assessment of risk factors for their occurrence. As part of the project, it is planned to conduct a full-scale crash test and a series of numerical simulations using finite element method. The obtained results will be subjected to two types of analyzes. In the first type, the assessment of severity and classification of the accident will be carried out on the basis of European Standards. The second type of analysis will assess the severity of the accident on the basis of the author's classification, which will take into account the relationship between the initial conditions of the accident and the location and severity of the spine injury. In developing this classification, machine learning algorithms will be used, including automatic division of data into clusters. The results of the project will not only shed new light on the normative methods of assessing the severity of an accident, but also may indicate elements of road safety equipment and of vehicles that may increase the risk of serious injuries. The use of artificial intelligence methods and numerical simulations of collisions, that include human body models, is a new approach to determining the level of severity of a road accident. The results and conclusions obtained during the project will contribute to the development of the field of road safety. The implementation of the project will also tighten the ongoing interdisciplinary cooperation between research teams from the field of engineering and medical studies.