

Press Release

DEKRA research project with universities in Marseille and Montréal



High risk of injury when falling from an e-scooter – helmet offers some protection

- ▶ Direct impact absorbed, but still high loads on neck and brain
- ▶ First experimental study on head kinematics and helmet in e-scooter fall
- ▶ Results also raise questions regarding standards for helmet testing

A bicycle helmet can protect the head to a certain extent even during an e-scooter crash. Nevertheless, the risk of injury remains high. This is the result of an international research project conducted by DEKRA Accident Research together with two universities.

At the DEKRA Crash Test Center in Neumünster, Germany, two different accident scenarios were simulated at 20 km/h. In each case, the e-scooter's front wheel hit a curb – in one scenario at a right angle, in the other at 55 degrees. The crash test dummy was wearing a helmet in one series of tests, not in the other. During the crashes, the biomechanical loads that affect humans in such a scenario were measured at various points on the dummy. Researchers from the Université Gustave Eiffel in Marseille (France) and the École de Technologie Supérieure in Montréal (Canada) have evaluated the results together with DEKRA Accident Research.

“In essence, it can be said that the direct impact with the head is cushioned by the helmet. At the same time, the forces acting on the neck and brain due to the rotational movement of the head remain high,” explains Andreas Schäuble, a biomechanics expert at DEKRA Accident Research. “This means that helmets can reduce the severity of injuries, which clearly justifies their use. However, they cannot in all cases prevent brain injuries in such impact scenarios.”

The study is the first to experimentally examine the head kinematics and efficacy of bicycle helmets in an e-scooter crash. With a total of six individual crashes at the same speed level and with a single helmet model without a MIPS system, it cannot be fully representative of all conceivable scenarios. “However, with this series of tests, we have created a good starting point for further research,” says Schäuble. “As in previous

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projects, the real crash tests provide an excellent basis for developing and validating simulation models for further investigations.”

The crash test results also raise questions about the norms and test standards for bicycle helmets. “In today's helmet tests, only the direct impact energy, i.e., the linear acceleration, plays a role. As we have shown with these crash tests, angled impacts and rotational movements should also be taken into account,” recommends the DEKRA accident researcher, especially since these loads are not only relevant in e-scooter crashes, but also in falls from bicycles.

The scientific publication on the tests (in the journal *Traffic Injury Prevention*) can be found here:

<https://www.tandfonline.com/eprint/JWVM3YDQVXXWZY3H7EWU/full?target=10.1080/15389588.2025.2462685>

Caption

The tests at the DEKRA Crash Test Center show that when you fall off an e-scooter, a bicycle helmet can protect your head from direct impact. However, rotational movements still place dangerous strain on the neck and brain.

About DEKRA

For 100 years, DEKRA has been a trusted name in safety. Founded in 1925 with the original goal of improving road safety through vehicle inspections, DEKRA has grown to become the world's largest independent, non-listed expert organization in the field of testing, inspection, and certification. Today, as a global partner, the company supports its customers with comprehensive services and solutions to drive safety and sustainability forward—fully aligned with DEKRA's anniversary motto, "Securing the Future." In 2024, DEKRA is expected to generate revenue of 4.3 billion euros. Around 48,000 employees are providing qualified and independent expert services in approximately 60 countries across five continents. DEKRA holds a Platinum rating from EcoVadis, placing it among the top 1% of the world's most sustainable companies.