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Blood Back Spatter Caused by a Blunt Bullet Gunshot: Theory and Experiments[1] PATRICK COMISKEY, ALEXANDER YARIN, Univ of Illinois-Chicago, SUNGU KIM, DANIEL ATTINGER, Iowa State Univ — A theoretical model describing the blood back spatter pattern resulting from a blunt bullet gunshot is proposed and compared to experimental data. It is shown that the blunt bullet impact results in blood accelerating towards air opposite of the bullet motion creating a situation for the Rayleigh-Taylor instability which determines droplet sizes and initial velocities. Then, drop trajectories can be predicted accounting for all forces involved: air drag and gravity forces, as well as for the collective effect of drop-drop interaction through air which diminishes the drag force on drops moving in the wake of the others. Experimental data was acquired by shooting a blunt bullet into a porous substrate impregnated with swine blood and the spatter pattern was collected on a vertical surface located between the target and the shooter. The spatter pattern was analyzed for the number of droplets, the area of blood stains, total stain area, and location. Comparisons with the theoretical results reveal satisfactory agreement. The theory also predicts the impact angle at the collection surface, the Weber number corresponding to the drop impact onto the collection surface, and the stain ellipticity.

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