RESEARCH QUESTIONS / PROBLEMS:
• Conduct in vitro tests to obtain corrosion rates of biodegradable materials during a time laps by mass loss, µ-CT and evolution of hydrogen gas measurements
• Build computational models of corroded material geometries to characterize corrosion/degradation process through trends of mechanical integrity change. Investigate relationship between mechanical and volume loss of these biomaterials to understand long term load-bearing capacity for future design and potential clinical applications
• Develop statistical predictive model in association with selected feature engineering parameters obtained from empirical in vitro data to predict corrosion rates of biodegradable materials

METHODS:
• Experimental (In vitro tests and Instron)
• In silico experiment (Non-linear Finite Element Analysis)
• Supervised machine learning algorithm (Random Forest)

RESULTS / FINDINGS:
• In vitro study results indicates uncertainties between corrosion rates evaluations arise from hydrogen gas that may diffuse into physiological medium during experimental process and may not evolve for eudiometric calibration
• Ultimate strength change of corroded metals (Zn,2.3%; Mg,4.5%) while their volume loss exhibit (Zn, 3.2%; Mg, 4.0%). Biodegraded alloys suffer average (ultimate strength change of 26.4% and 16.8% volume loss) during immersion period
• Performance of validated statistical model predictability was 83.09% accuracy

SIGNIFICANCE / IMPLICATIONS:
• This research work on biodegradable materials opens gate way to have potential applications in orthopedics to avoid second surgery procedures for removal of metals after tissue rejuvenation

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