# CHAPTER V
# CONCLUSIONS

Nanocellulose was fabricated using a synergistic approach that combines high-pressure homogenization and enzymatic digestion, resulting in the smallest nanocellulose with an average size of 278.9 nm. The optimal scaffold composition consisted of 65.000 wt% PLA, 26.814 wt% PBS, and 8.186 wt% nanocellulose, exhibiting good hydrophilic properties. Biopolymer scaffolds incorporating nanocellulose demonstrate significant potential for tissue engineering applications due to their biocompatibility and safety profile. The scaffold showed the lowest residual weight (1.57%), suggesting a high degree of biodegradability, which is advantageous for controlled degradation in biomedical applications. Additionally, Cells exhibit strong adhesion at multiple sites on the scaffold and demonstrate effective hepatogenic differentiation. This study represents the initial phase in the development of scaffolds that could encourage enhanced cellular adhesion and lay the foundation for advancements in the field of tissue engineering.

Future in vivo studies will be essential to validate these promising in vitro results and thoroughly evaluate the scaffold's performance within a living organism, ultimately paving the way for potential clinical translation. However, this study has some limitations, particularly concerning the translation of these 2D findings into complex 3D structures, which are often required for functional tissue regeneration. The next steps in scaffold refinement involve not only optimizing the scaffold's mechanical properties and degradation rate but also focusing on the fabrication of 3D scaffolds with controlled architecture and porosity, potentially using techniques like 3D bioprinting, to better mimic the native tissue environment and enhance tissue formation.