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# REVIEWER'S REPORT

by Prof. Ivan Zhechev Traikov, MD, PhD
Specialist in Plastic-Reconstructive and Aesthetic Surgery

of the dissertation submitted for the award of the educational and scientific degree "Doctor"
**Professional field:** Medicine (7.1)
**Doctoral programme:** Plastic-Reconstructive and Aesthetic Surgery, 03.01.43

**Author:** Dr Stancho Stoyanov Prodanov
**Form of doctoral training:** Independent study
**Department:** Propaedeutics of Surgical Diseases, Section of Burns and Plastic Surgery, Medical University – Plovdiv
**Title:** *Electrical Injuries - Contemporary Aspects of Pathogenetic Mechanisms and Surgical Management*
**Thesis Supervisor:** Assoc. Prof. Elean Zanzov, MD, PhD

## 1. General overview of the procedure and the doctoral candidate

Under Rector's Order No. R-4473/12.09.2025 of the Medical University – Plovdiv, I was appointed to the Scientific Jury. At its first meeting on 29 September 2025, I was designated as the reviewer of Dr Stancho Prodanov's dissertation.

The dossier submitted in hard copy and electronic form complies with Art. 70(1) of Section I, "Acquisition of the educational and scientific degree 'Doctor' and the scientific degree 'Doctor of Sciences'" at MU–Plovdiv, and with the Regulations of MU–Plovdiv dated 28 January 2021. It includes the following documents:

- Application to the Rector of MU–Plovdiv to open the procedure for defence of the dissertation
- Curriculum vitae in the European (Europass) format, signed by the doctoral candidate
- Notarised copy of the higher-education diploma
- Orders for enrolment in the doctoral programme and for discharge with the right to defend
- Order for an examination under the individual study plan and the corresponding record confirming that the doctoral minimum in the specialty has been passed
- Minutes of the Departmental Council on the preliminary discussion of the dissertation and the decisions to open the procedure and appoint the scientific jury
- Dissertation
- Author's abstract

- List of scientific publications related to the dissertation topic
- Copies of the scientific publications
- Declaration of originality and authenticity of the submitted documents
- Certificate of completion from MU–Plovdiv's Doctoral School (68 credits)

## 2. Brief biographical data on the doctoral candidate

Dr Stancho Stoyanov Prodanov graduated in Medicine from the Medical University – Plovdiv (2000–2006). He is a specialist in Plastic-Reconstructive and Aesthetic Surgery (2014) and holds a Master's degree in Health Management (2015).

**Professional experience (chronological):** MBAL Pazardzhik, Second Department of Surgery (2006–2007); UMHAT "St George" – Plovdiv, General and Operative Surgery with Coloproctology (2007–2008); UMHAT "St George" – Plovdiv, Department of Plastic-Reconstructive and Aesthetic Surgery (2008–2016); UMHATEM "N. I. Pirogov" – Sofia, Clinic of Burns and Plastic Surgery (2016–2021). Since 2022 he has been a plastic surgeon and Managing Director of the Medical Centre "PRO Academy", Plovdiv; since September 2025 he has also been a plastic surgeon at University Hospital "St Ekaterina", Sofia. In 2017, after a competitive procedure, he was appointed Assistant at the Clinic of Burns and Plastic Surgery, UMHATEM "N. I. Pirogov", Sofia. Since December 2021 he has been a doctoral candidate by independent study at MU–Plovdiv on the topic "Electrical injuries – contemporary aspects of pathogenetic mechanisms and surgical management."

He has completed international training and fellowships in France, England, Poland, Serbia, Slovenia, Georgia, Sweden, Romania, Italy and Australia, with a focus on aesthetic and reconstructive surgery and modern technologies. He is proficient in English and French. He is a member of the Bulgarian Association of Plastic, Reconstructive and Aesthetic Surgery (BAPREH) and the Bulgarian Medical Association (BMA).

## 3. Relevance of the topic and appropriateness of the stated aims and objectives

The topic of electrical injuries has high clinical and public importance: it involves workplace and domestic accidents, causes severe local and systemic damage, and requires a coordinated multidisciplinary approach. The work is timely both scientifically and in applied terms, as it links pathogenetic mechanisms to concrete surgical decisions and synthesises findings from a large clinical dataset drawn from two highly specialised centres.

Its relevance is multi-layered:

(a) Scientific — updates understanding of pathogenesis and risk factors in electrical injuries;

(b) Clinical-practical — addresses early surgical strategy and reconstructive choices with the potential to reduce complications and length of stay;

(c) Organisational — supports standardisation of assessment and management in referral units;

(d) Educational — provides systematised material useful for teaching and for introducing best-practice algorithms.

### 4. Knowledge of the subject

The doctoral candidate shows a very good command of the topic. The literature review is broad and up to date (281 sources; 17 in Cyrillic and 264 in Latin script). It covers the pathogenesis of electrical injury, clinical forms, early surgical management, and reconstructive approaches. There is clear familiarity with key international and national publications, as well as recent trends in risk assessment, patient stratification, and care pathways/algorithms.

The review is not only descriptive but also critical. It discusses debated issues (e.g., the extent and timing of necrectomy [eschar excision], indications for fasciotomy, and the choice of tissue coverage/reconstructive techniques) and points out gaps in the evidence (inconsistent definitions, differing centre protocols, limited external validation). On this basis, the aim and the seven objectives are clearly stated and address the identified gaps step by step—from mapping the clinical spectrum and identifying factors linked to adverse outcomes to practical recommendations for surgical management.

### 5. Research methodology

The chosen methodology is appropriate to the aim and allows reliable answers to the stated objectives. The study is two-centre, retrospective and descriptive, with a clearly defined study population and units of observation, and a large clinical sample (n = 707) from two referral centres. Data were collected using a standardised clinical case form (Appendix 1), which improves comparability; the doctoral candidate's involvement in data extraction and verification enhances internal validity. Statistical analysis was performed with IBM SPSS Statistics 25.0 and MedCalc 14.8.1 at a significance level of $p < 0.05$, using suitable descriptive and comparative methods, tests of distribution, correlation/regression analysis, and receiver operating characteristic (ROC) analysis where appropriate—aligned with the data type and clinical questions.

The two-centre design increases the generalisability of the findings; limitations arise from the retrospective nature of the study (possible missing data, inter-centre protocol differences, selection bias) and limited control over some factors. These are reasonably addressed through harmonised definitions and appropriate statistics. In this form, the methodology provides a sufficient basis for valid, clinically useful conclusions.

## 6. Characteristics and evaluation of the dissertation

The dissertation is 204 pages long and includes 75 tables, 39 figures and 3 appendices. It is clearly and logically structured: introduction and analytical literature review; materials and methods; results (by thematic blocks); discussion; conclusion; key findings; contributions; and appendices. The order of sections and the transitions between them follow the standard academic format and make it easy to trace the line "problem → methods → results → interpretation → contribution." The content plan includes focused subsections on pathogenesis (including the Joule–Lenz effect, electroporation, and membrane mechanisms), clinical features, treatment and rehabilitation, where the relevant concepts and terminology are summarised.

The **Literature review** is well organised and uses a practical framework: historical overview, mechanisms of injury, clinical manifestations, and therapeutic approaches. This helps to set the aim and objectives as a logical continuation of the identified gaps in knowledge. The emphasis on pathophysiology and clinical typology is developed enough to inform the later choices in methods and analysis.

The **Methodology** fits the aim: a two-centre, ambispective/retrospective clinical-epidemiological study with clearly defined study population and units of observation, standardised data recording, and a sufficiently large sample—n = 707 patients in total (519 at UMHATEM "N. I. Pirogov", 188 at UMHAT "St George"). Operational definitions and units are specified, and data were extracted using a unified clinical form, which improves comparability between centres and the reliability of subsequent analyses.

The **Results** section is arranged in thematic blocks that mirror the objectives: demographic and epidemiological characteristics; depth/location and type of injury; diagnostic criteria and operative management; prognostic indices (ABSI, Revised Baux, PBI); ROC analysis for threshold values; and binary logistic regression for factors associated with prolonged hospital stay; finally, a retrospective comparative analysis between the two centres. This layout ensures a clear progression from descriptive findings to explanatory and prognostic models, while keeping the clinical perspective.

The **Discussion** interprets the results in the context of the published literature: it outlines the epidemiological frame, comments critically on classification and treatment choices, and sets out practical implications for early surgical management and reconstruction. Thus, the study goes beyond statistics and leads to applicable clinical conclusions and a proposed management algorithm.

## 7. Contributions and significance for science and practice

The dissertation offers balanced contributions combining scientific and applied results, based on a large clinical dataset (n = 707) from two national referral centres, with a clear line from aim → methods → results → contribution. In particular:

(a) a comparative analysis between the two leading Bulgarian centres (incidence, mortality, and effectiveness of treatment approaches);

(b) justification for the clinical use of specific prognostic indices (e.g., ABSI) in our setting;

(c) development of a treatment algorithm and a standardised patient record/form for electrical injuries;

(d) systematisation of surgical indications for operative versus non-operative management.

These results are consistently derived from the presented material and have clear clinical applicability.

The contributions are clearly defined, demonstrable within the presented material and methods, and of immediate practical value for diagnostic and therapeutic practice in burn centres. At the same time, they provide a framework for further research and for standardising the management of electrical injuries at the national level.

### 8. Appraisal of the publications related to the dissertation

The publications linked to the dissertation comprise three peer-reviewed articles, two of which list the doctoral candidate as first author. The international paper is published in *Dermatologic Therapy*, indexed in Web of Science, with a Journal Citation Reports (JCR) 2018 impact factor of 1.740. The other two papers appear in national peer-reviewed journals: *Meditsinski Pregled* ("Medical Review," indexed in CABI/EBSCO) and *Khirurgiya* ("Surgery," the official journal of the Bulgarian Surgical Society).

This publication portfolio provides both international visibility and national relevance. It covers the main strands of the dissertation—clinical–surgical, epidemiological, and management/therapeutic. The doctoral candidate's personal contribution is leading, especially in the first-author papers (concept, selection and processing of material, analysis and interpretation, primary drafting).

Under the current points-based rules, the presence of a JCR-indexed publication and first authorship ensures the required weight and meets the criteria for defence under the LDASRB and MU–Plovdiv's internal regulations.

### 9. Personal contribution of the doctoral candidate

Based on the submitted materials, the publications, and the traceable work across the sections of the dissertation, I assess Dr Stancho Prodanov's personal contribution as leading. In collaborative activities (access to archives, agreement on structure, problem definition, editorial adjustments, etc.), the supervisor's input is acknowledged; however, the dominant role in processing the material, conducting the analysis, and formulating the contributions is the doctoral candidate's.

In conclusion, the degree of personal contribution is high. The results achieved and the stated contributions are, for the most part, his own work and meet the requirements for independent research.

**10. Author's abstract**

The author's abstract is clearly structured and comprises 89 pages, 34 tables, 22 figures and 3 appendices. It has been prepared correctly, meets the required formal elements, and accurately reflects the main results, conclusions and contributions of the dissertation. On this basis, my assessment of the content and quality of the author's abstract is positive.

**11. Critical remarks and recommendations**

I recommend that the next stage of similar research be prospective, with harmonised definitions and protocols, clearly pre-specified endpoints, and long-term follow-up (functional outcomes, quality of life). It would be useful to establish a national registry for electrical injuries, assess the real-world implementation of the proposed algorithms, and compare alternative surgical approaches in routine practice.

**12. Personal impressions**

I have first-hand impressions of Dr Stancho Prodanov's work in both clinical and academic settings. He is consistent, disciplined and precise in collecting and verifying data; he bases his decisions on the literature and statistical analysis, without over-interpreting results. His professional communication with colleagues and patients is respectful and calm; he is ready to take responsibility and performs well under pressure. He accepts critical feedback constructively and implements changes within a reasonable timeframe. Overall, he is a mature clinician-researcher who works independently and is also an effective team player.

**13. Recommendations for future utilisation of the dissertation's contributions and results**

I recommend the formal adoption of the clinical record/form and the algorithm into local protocols, with monitored indicators (time to first operation, compartment syndrome, acute kidney injury, bed-days), and the integration of ABSI stratification and a creatine kinase (CK) threshold into routine documentation. It would be feasible to create an inter-centre registry with regular feedback, short training modules/simulations for on-call teams, and a simple decision-support calculator. From a research standpoint: prospective external validation of ROC thresholds and models (TRIPOD), publications on implementation (pre–post analyses), and a joint initiative with BAPREH to establish a minimal national standardised approach to electrical injuries.

## CONCLUSION

The dissertation contains scientific, applied-scientific and practical results that constitute original contributions to the field and meets all requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), its Implementing Regulations, and the Regulations of the Medical University – Plovdiv. The submitted materials and dissertation results fully comply with MU–Plovdiv's specific requirements.

The dissertation shows that the doctoral candidate, Dr Stancho Stoyanov Prodanov, possesses in-depth theoretical knowledge and professional skills in Plastic-Reconstructive and Aesthetic Surgery, and demonstrates the ability to plan, conduct and interpret scientific research independently.

In view of the above, I give a clear positive assessment of the work—based on the dissertation, the author's abstract, the results achieved and the stated contributions—and I recommend that the Scientific Jury award the educational and scientific degree "Doctor" to Dr Stancho Stoyanov Prodanov in the doctoral programme in Plastic-Reconstructive and Aesthetic Surgery.

Заличено на основание
Чл.5 §1, б."В" Регламент (ЕС)2016/679

**13 October 2025**

**Reviewer:** Prof. Ivar