Dear Editors,

Surgery is an important iatrogenic risk factor for the development of venous thromboembolic disease (VTE) and deep venous thrombosis (DVT), arising in the leg and pelvic veins, is the cause of pulmonary embolism in almost 95% of cases [1]. The risk of DVT in dermato-surgical inpatients is unknown, with most studies conducted in the out-patient setting [2–4]. Although wide variation in the peri-operative management of anticoagulant therapy during dermato-surgical procedures has been identified [5], and despite S3 guidelines for thrombosis prophylaxis in general [6], there are no specific guidelines for thrombosis prophylaxis in dermato-surgical inpatients.

However, these patients often have several risk factors for DVT including (1) advanced age, especially in patients with non-melanoma skin cancer, (2) cancer, for example melanoma patients admitted for sentinel lymph node biopsy under general anesthesia, and (3) pre-existing peripheral vascular disease, particularly in patients admitted for varicose vein surgery. Moreover, patients admitted for micrographically controlled tumor surgery are often admitted for several days [7], which is inevitably associated with some degree of reduced mobility.

Therefore, combining clinical examination and compression sonography we carried out a prospective pilot study over eight months to ascertain the incidence of DVT in inpatients admitted for dermato-surgical procedures. Given the lack of published evidence regarding the incidence of DVT in dermato-surgical inpatients, the size of the cohort was based on the prevalence of DVT in (1) the general population, (2) post-operative patients and (3) hospitalized patients [8–10]. Following consultation with the Institute for Medical Statistics, University of Luebeck, recruitment of 150 patients was planned assuming an incidence of between 5–10% [8–10]. The study was performed according to the Declaration of Helsinki principles and all patients provided written informed consent. Institutional ethics committee approval was obtained (University of Lübeck, Ref. 15–044).

Clinical and demographic data was collected for 129 patients. Clinical examination and lower limb sonography (Logic 6, GE Healthcare) were performed on all patients on admission and repeated twelve to 14 days after surgery. All data were analyzed using SPSS (Versions 23–25).

One hundred and twenty patients completed the study (42 females and 78 males, range 28 to 92 years), nine patients were lost to follow-up. 24.1% of patients had a BMI > 30 (Table 1). The average length of hospital stay was 5.1 days (range 3–23 days) and the number of procedures was 2.2. The mean operating time was 111.9 min per patient (range 30–487 min). Ten procedures were performed under general and 247 under local anesthesia. Skin cancer surgery constituted almost 90% of the surgical interventions. 68.3% of patients had micrographically controlled tumor surgery and 3.3% had a sentinel lymph node biopsy.

Fifty out of 120 patients were already receiving oral anticoagulant treatment before surgery, predominantly platelet aggregation inhibitors (Table 2). In the post-operative period 33 patients received post-operative thrombosis prophylaxis, either in the form of compression or as prophylactic doses of low molecular weight heparin (Table 3). Despite the advanced age of our cohort (average age of 70 years), current or previous malignancy (17.5%), smoking (15%), ischemic heart disease (23.3%), previous VTE (12.5%), hospital admission for an average of 5.1 days and on average 2.2 procedures per patient, there were no cases of DVT. Nine patients were lost to follow-up, one of whom had a history of DVT. Nevertheless, none of these patients had a DVT on admission. Our study did not include pre-operative or post-operative assessment of D-dimer levels. In fact, routine measurement of post-operative D-dimer levels is not recommended due to the likelihood of false positive results [11].

Given that no single DVT was detected in 120 patients, further patient recruitment was terminated following
consultation with the Institute for Medical Statistics. Based on the rule of 3, it can be concluded with 95% confidence that fewer than 1 in 40 dermato-surgical patients (3/120) will develop a DVT, although the true incidence is likely to be even lower. Of course, large, prospective, multi-center studies are required to definitely determine the precise risk of DVT associated with inpatient dermato-surgical interventions in order to maximize patient safety.

Several factors may be responsible for the lack of DVTs in our cohort, including the presence of pre-existing oral anti-coagulation, the pre-existing use of compression stockings, the use of post-operative thrombosis prophylaxis and early and active mobilization.

Despite the heightened risk profile of dermato-surgical inpatients, the additional risk of DVT associated with dermato-surgery appears to be minimal. However, while the risk of DVT associated with dermato-surgery per se remains unclear, a pre-operative DVT risk assessment remains obligatory and the use of thrombosis prophylaxis should continue to be carefully determined on an individual basis [12].

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Conflict of interest

None.

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Table 2 Pre-operative oral anticoagulation.

| Drug Class          | Drug               | Patients (number/ percentage) |
|---------------------|--------------------|-------------------------------|
| Platelet inhibitor  | Acetylsalicylic acid (ASS) | 25 (20.8)                   |
|                     | Clopidogrel        | 2 (1.7)                      |
|                     | ASS plus clopidogrel | 3 (2.5)                      |
|                     | ASS plus dipyridamide | 1 (0.8)                     |
| Factor X inhibitor  | Rivaroxaban        | 5 (4.2)                      |
|                     | Apixaban           | 2 (1.7)                      |
| Indirect factor X inhibitor | Enoxaparin | 1 (0.8) |
| Thrombin inhibitor  | Dabigatran         | 1 (0.8)                      |
| Vitamin K antagonist | Phenprocoumon     | 10 (9.2)                     |

Table 3 Post-operative thrombosis prophylaxis.

| Modality                                           | Number of patients |
|----------------------------------------------------|--------------------|
| Pre-existing use of medical compression stockings   | 19                 |
| Pre-existing use of medical compression stockings plus low molecular weight heparin | 3*                 |
| Medical thrombosis prophylaxis stockings prescribed | 3                  |
| Medical thrombosis prophylaxis stockings plus low molecular weight heparin prescribed | 3*                 |
| Low molecular weight heparin prescribed            | 5*                 |

*All patients underwent dermato-surgical procedures on the lower limbs.
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