IL sickness: Systemic sclerosis, Safety
G. Alonzi1, G. Natalello1, S. Fiore1, L. Verardi1, E. De Lorenzis1,2, P. G. Cerasuolo1, A. Zoli1, S. Di Muro3, M. A. D’Agostino1, S. L. Bosello1, Università Cattolica del Sacro Cuore, Policlinico Universitario Agostino Gemelli IRCCS, Roma, Italy, Rheumatology Department, Roma, Italy, 2 Scleroderma Program, Leeds Institute of Rheumatic and Musculoskeletal Medicine University of Leeds, Rheumatology Department, Leeds, United Kingdom

Background: Treatment of Systemic Sclerosis (SSc) remains challenging and some clinical studies reported the efficacy of Rituximab (RTX) in skin disease and in stabilizing lung involvement. Recently 2 randomized clinical trial demonstrated the efficacy of RTX in SSc and in lung involvement in connective tissue diseases (1,2), however current data are limited by the small number of samples examined and the short duration of follow-up.

Objectives: We aimed at retrospectively evaluate the efficacy, safety, and long-term persistence of RTX therapy in a monocentric SSc cohort.

Methods: All clinical records of SSc patients (pts) treated with RTX in our center were retrospectively analyzed. Demographic, clinical and disease characteristics, treatment approach, combination therapies, and adverse events during RTX were considered. Every 6 months, skin score, pulmonary function test and swollen joint count (SJC) modifications as well as digital ulcer occurrence were recorded.

Results: Fifty-two SSc pts (pts) have been treated with RTX in our center since 2005. The mean age of the pts was 53.3±24.3 years and 21.5% were male. The disease duration at the time of the first treatment with RTX was 4.4±2.8 years and the mean reached follow-up was 6.6±2.0 years (range 2-17 years). Forty pts (77.0%) had a diffuse cutaneous involvement, 33 pts (63.6%) had anti-topoisomerase positivity, 45 (88.2%) an intestinal lung involvement on high resolution chest CT, 30 pts (59.2%) arthritis or tenosynovitis, and finally 38 pts (73.1%) presented any history of digital ulcers. Twenty-three (44.2%) pts had been previously treated with cyclophosphamide. During RTX treatment, 39 pts (75.0%) received an immunosuppressive combination therapy, most with mycophenolate mofetil (53.8%). Concomitant glucocorticoids treatment was assumed by the 53.8% of pts. Twenty-five pts (48.1%) were treated with Rituximab for only one clinical involvement, 27 pts (51.9%) received treatment for more than one organ involvement including skin, lung or joint. Overall, 82.7% were treated for progression of skin disease, 50.0% for lung involvement deterioration and 23.1% for active arthritis. Treatment showed improvement in the skin score, arthritis, and/or stabilization of the pulmonary functional status in 44 pts (84.6%), while in the remaining 8 pts, therapy was stopped because of worsening of the disease over the 6 months of follow-up. Among responders, skin score improved from 17.3±8.9 to 10.3±8.6 (p=0.04), while FVC and DLco remained stable (87.4±3.5% to 86.2±20.5% and 66.3±23.9% to 64.3±22.1%, respectively). As expected, there was an improvement in DASI (4.9±0.8 to 1.9±0.5; p<0.01). Finally, there was a reduction in the rate of ulcer occurrence (46.15% to 21.70%, p=0.04). Twenty-two pts (42.3%) were treated with one single cycle of therapy (1 gr two weeks apart), while the remaining 30 pts were treated with repeated cycles of RTX, with a mean number of cycles of 4.3±2.0. Among the re-treated pts, 50% were treated every year and 50.0% at the time of new clinical worsening, and retreatment was done every 60.5±14.1 months. All pts re-treated with RTX on demand responded to the therapy. Nineteen percent of pts developed adverse events (5.7% leukopenia, 7.7% infusion reactions, 1.9% sepsis, 3.8% pneumonia). Ten pts (19.2%) died during follow-up: 8 deaths were related to organ complication of SSc and 2 to cancer.

Conclusion: Our data suggest long-term efficacy and safety of RTX in pts SSc. Further real world studies will be necessary to evaluate the best therapeutic approach with RTX (regular cycles or retreatment when clinical worsening occurs) and/or the combination with other immunosuppressing drugs.

REFERENCES:

Figure 1 Associations between SSc and HRT. Panel a) and b) show associations with different HRT medications and results of sensitivity analyses, accordingly.
DIFFERENTIATING “SCLERODERMA” WITH "NON-SCLERODERMA" PATTERNS IN NAILFOLD CAPILLARY MICROSCOPY USING A DEEP LEARNING MODEL

Keywords: Systemic sclerosis

V. Korendovych¹, P. Korsten¹, ¹University Medical Center Göttingen, Department of Nephrology and Rheumatology, Göttingen, Germany

Background: Nailfold capillary microscopy is used for diagnostic purposes in rheumatology since many years. Abnormal nailfold capillaries are also listed in the 2013 ACR/EULAR classification criteria for systemic sclerosis (SSc) [1]. A fast-track algorithm to differentiate between “scleroderma” and “non-scleroderma” patterns of capillary microscopy was published in 2019, and is being applied in clinical routine as a useful decision algorithm [2]. Artificial intelligence is being increasingly implemented in many spheres of everyday life, including medicine. Keras is a publicly available deep learning framework, which is widely used for research purposes, in particular for constructing artificial neural networks [3].

Objectives: To estimate the ability of a deep learning model, to differentiate between scleroderma and non-scleroderma capillary microscopy patterns.

Methods: Capillary microscopy was performed using Optilite Digital Capillaroscope. We analyzed capillary microscopy images, which were equally subdivided into two groups, including scleroderma and non-scleroderma patterns. Subsequently the pictures were assigned to training, validation and test sets. Each set contained the same number of images with scleroderma- and non-scleroderma patterns. Then we trained a deep learning model using training and validation datasets to differentiate between the aforementioned capillaroscopy patterns. A test set was applied to estimate the model performance in an independent data set. The technical side of the study was performed using a 2D convolutional neural network, which was constructed based on Keras deep learning libraries (example Picture 1).

Results: A total of 1078 capillaroscopy images from 70 patients were analyzed: a total of 768 images from several centers were used for training, validation and test sets accordingly. Each image dataset contained an equal amount of pictures from scleroderma- and non-scleroderma capillaroscopy patterns. The trained model showed an accuracy of 92%, a sensitivity of 96% (95% CI 0.91 to 0.99), a specificity of 88%, an accuracy of 87.8% with sensitivity of 94.9% (95% CI 0.905 to 0.99), specificity of 88% (95% CI 0.79 to 0.97) and an AUC of 0.9972.

Conclusion: Despite the relatively small image dataset, the developed deep learning model could successfully discriminate scleroderma- vs. non-scleroderma capillaroscopy pictures, which may be applied in an automated assessment of capillaroscopy pictures in the future.

REFERENCES: