RHINOLIGHT® ENDONASAL PHOTOTHERAPY IN PRIMARY CARE: FIRST IMPRESSIONS

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INTRODUCTION

Rhinolight® is a novel endonasal phototherapy treatment for allergic rhinitis using the immunosuppressive effects of ultraviolet radiation[1].

It is in widespread use in many European countries as well as Japan and Australia.

This study aims to evaluate its efficacy in the Irish population using the first Rhinolight® treatment offered in UK/Ireland.

The Rhinolight® endonasal phototherapy device (left) and the device in use (right). Typically patients receive six to eight sessions of therapy, lasting between 2 - 3 minutes, through each nostril over a course of six weeks.

METHODS

Patients with intractable rhinitis were invited to undergo endonasal phototherapy using Rhinolight® at our Dublin clinic. Participants underwent between six to eight (most had eight) sessions of phototherapy and subsequently stopped or reduced their pharmacological treatment.

Symptom scores and intra nasal digital images were recorded before and after the courses of treatment. Eight symptoms were each scored on a scale of 0-5 giving a total possible score of 40. Symptom scores were evaluated using simple statistical comparison of differences between before and after scores.

RESULTS

112 patients were recruited and consented for inclusion in the study comprising 50 females and 62 males. Ages ranged from 7-74 with a mean and median of 30. Most participants experienced a reduction of symptoms with mean and median symptom reduction of 9 points. Nose related symptoms were more likely to improve than systemic symptoms. 17 patients experienced no reduction or a worsening of their symptoms. There were no identifiable trends within this group. Individual nasal symptoms were most reduced (blocked, runny, itchy) with mean reductions of one or two while systemic symptoms (cough, wheeze, headaches) were less likely to be improved with mean reductions of one or less.

CONCLUSIONS

This first evaluation of Rhinolight® in UK/Ireland shows it to be a successful treatment for intractable rhinitis, especially for nasal symptoms. Most patients achieve relief of symptoms with reduction or cessation of pharmacological therapy.

REFERENCES

1. Detlef Brehmer: Endonasal phototherapy with Rhinolight® for the treatment of allergic rhinitis. Expert Rew. Med. Devices 2010, 7(1): 21-26

slievemore clinic

An oral presentation on this study will be given by Paul Carson at 11.42am on Tuesday, 3rd October in Beckworth 3 (Primary Care)

THE UNIVERSITY of EDINBURGH
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rhinolight

RhinoLight is a very innovative and interesting treatment modality for **Seasonal and Perennial/Persistent Allergic Rhinitis**. So it is an alternative or complement to allergen immunotherapy and long-term pharmacotherapy such as steroids/bronchodilators, antihistamines, mast-cell stabilisers, etc.

RhinoLight is a Class IIa **Medical Device**. CE marked, and so legal to supply and sell and utilise clinically in UK and Ireland.

Over **150,000 treatments**, in tens of thousands of patients worldwide, with over **300 instruments** globally.

Now available to ENT Specialists and Allergy Consultants and other HCPs in UK and Ireland.

The RhinoLight **mode of action** is to direct controlled doses of uVA and uVB and visible light up each nostril of a patient where the emitted rays in effect give the mucosal surfaces a suntan, and so knock out the Mast Cells and Eosinophils and other cells involved in the inflammatory cascade of Allergic Rhinitis. With the repeated treatments (6 for Seasonal AR and 8 for Perennial AR) the inhibition is maintained usually for several months or longer.

The actual **administration** of RhinoLight treatment can be done either by the ENT or Allergist, or by their trained Nurse.

The RhinoLight IV instrument is a single capital purchase with no ongoing costs other than the 220v AC electrical power supply. This allows the treatment of **~3,000 patient/years** before requiring a factory service, after which it is good for another ~3,000 patient/years.

Hospital Usage: The cost economy of treatment with RhinoLight for the treatment of allergic rhinitis is truly astounding, and is incomparably better than SCIT or SLIT or symptomatic therapy. In NHS hospital practice the instrument cost is equivalent to the cost of just 5 to 7 patients on SLIT or SCIT immunotherapy over 3 years. RhinoLight treatment cost is a very small fraction of the cost of immunotherapy and therefore allows Allergy Clinics that have little or no budget for Immunotherapy to be able to offer an effective treatment for Allergic Rhinitis. If the hospital doesn't either have any budget for the modest capital purchase, then a leasing arrangement can be negotiated.

Private Practice Usage: Conversely, the earning potential of this medical device in private practice is just as astounding as its cost economy for hospital usage. Contact us for further information.

Clinical documentation of safety and efficacy is good; with >22 published scientific and clinical papers.
Expect an efficacy rate similar to immunotherapy, so approx. 80% to 90%.
Formal personal **evaluation** is encouraged.

Information materials on RhinoLight are available, including training manual, regulatory documents, printed brochures, bibliography, reprints of scientific and clinical papers, videos, web-pages of users, etc.

For **further information** on RhinoLight here at BSACI Congress:

1. See the exhibition stand of Bio-Diagnostics Ltd
2. Hear the oral presentation by Dr Carson at 11:42 on Tuesday 3rd October in Beckworth 3 room in Category Primary Care
3. Meet Dr Carson and Bio-Diagnostics Ltd at a lunch-time seminar in the Beckbury 1 Meeting Room at the Telford International Centre on Sunday October 1st at 12:45 to 13:45 and on Monday October 2nd at 14:00 to 15:00.

For **further information** on RhinoLight after BSACI Congress contact:
1. Dr Paul Carson at Slievemore Clinic Dublin, www.allergy-ireland.ie
2. Bio-Diagnostics Ltd at 01684-592262 or jayne@bio-diagnostics.co.uk or www.bio-diagnostics.co.uk

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Original Article

Effects of Rhinophototherapy on Quality of Life in Persistant Allergic Rhinitis

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Objectives. To investigate the effect of rhinophototherapy with medical therapy on quality of life in persistent allergic rhinitis.

Methods. A prospective, randomized study was being performed between December 2009 and March 2010. The study included 65 patients with persistent allergic rhinitis. The diagnosis was confirmed with positive skin tests. All of the patients had house dust mite allergies. We divided the patients into two groups. First group (n=33) was given topical mometasone furoate 200 mcg/day and levocetirizine 5 mg/day for a month. Rhinophototherapy was applied with the same medical therapy to the second group (n=32), twice a week for three weeks continuously. Rhinophototherapy included visible light, ultraviolet A and ultraviolet B. We evaluated patients before the treatment, at the first month and at the third month after treatment with rhinoconjunctivitis quality of life questionnaire, nasal symptom scores and visual analogue scale (VAS) scores.

Results. Improvements of all variables of the quality of life questionnaire, nasal symptom scores and VAS were statistically significant in the second group both on the first and the third months when compared with the first group.

Conclusion. Allergic rhinitis is a social problem and impairs quality of life. Rhinophototherapy with medical therapy improves the quality of life in allergic rhinitis.

Keywords. *Allergic rhinitis, Rhinophototherapy, Quality of life, Symptoms scores, Visual analogue scale*

INTRODUCTION

Allergic rhinitis is an allergen-induced, IgE-mediated inflammation of the nasal mucosa [1], and it is the most frequent atopic disease which effects 25%-35% of the population with increasing prevalences [2,3]. Allergic rhinitis is also a social problem that negatively effects the patients' quality of life, performance and productivity, and thus, it is accepted as a major chronic respiratory disease with economic burdens and the risks for asthma [4]. There are several different therapy strategies for allergic rhinitis [4,5]. Allergen avoidance and patient education are important for every allergic patient [6,7]. Immunotherapy is the main treatment modality that changes the course of the disease [8]. Pharmacotherapy plays an important role in the management of allergic rhinitis, with aims to improve patient's quality of life by reducing the symptoms. However, in some patients, symptoms cannot be reduced with only medical treatment or medical treatment can be restricted due to several reasons. Alternative modalities are necessary for such patients.

Phototherapy, which has been mainly used for inflammatory skin diseases dermatologically for a long time, is becoming a new choice of alternative treatment in allergic rhinitis [9]. It has been reported that intranasal applications of phototherapy in allergic rhinitis patients has been effective, similarly to the applications on dermatological diseases [10-13]. Both atopic dermatitis and allergic rhinitis are different manifestations of the atopy and most of the their pathways are similar [14]. Phototherapy con-

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*This study was presented at 29th European Academy of Allergy and Clinical Immunology Congress in London, UK 2010 as a poster presentation.

sists of ultraviolet and a visible light and its therapeutic effect is mostly attributed to its local immunosuppressive and immunomodulant actions. Phototherapy is able to inhibit the effector phase of the allergic reactions, such as inhibition of antigen presentation by dentritic cells, inducing apoptosis of immune cells, inhibition of synthesis and release of pro-inflammatory mediators from eosinophils, mast cells, basophils and T cells [14].

With this positively correlated data, we aim to investigate the effects of rhinophototherapy with medical therapy on the quality of life with persistent allergic rhinitis in this study.

MATERIALS AND METHODS

A prospective, randomized study was performed between December 2009 and March 2010. The study included 65 patients with a history of at least 2 years of moderate to severe persistent allergic rhinitis. The diagnosis was confirmed with positive skin tests, and all of the patients had house dust mite allergy. The study protocol was approved by the local ethical committee and written consent was obtained from each volunteer. Patients with nasal polyps, nasal septal deviation, nasopharyngeal pathologies, asthma, acute respiratory infections were excluded. All of patients in the study had used antihistamines and/or intranasal steroids previously but not within two weeks prior to beginning of the study.

We divided the patients into two groups for different treatment regimens. A randomization list was formed using simple randomization. The patients were assigned to their respective study groups by an investigator who blinded to the study treatment, using the randomization list. First group (n=33) was given topical mometasone furoate 200 mcg/day and oral levocetirizine 5 mg/day for a month. With the same medical therapy, rhinophototherapy was applied to the second group (n=32), twice a week for three weeks continuously. We evaluated the patients before the treatment, at the first and third months after the treatment with rhinoconjunctivitis quality of life questionnaire (RQLQ), symptom scores and visual analogue scale (VAS) scores. Nasal symptoms evaluated in this study were sneezing, nasal obstruction, rhinorea and nasal itching. All symptoms were graded according to the severity (0, none; 1, mild; 2, moderate; 3, severe). The RQLQ had 28 questions in seven domains (activity limitation, sleep problems, nose symptoms, eye symptoms, non-nose non-eye symptoms, practical problems and emotional function) and each question was scaled from 0 (not impaired at all) to 6 (severely impaired). VAS scores for severity of allergic rhinitis were also evaluated.

Statistical analyses

Data were analysed using the SPSS ver. 13.0 (SPSS Inc., Chicago, IL, USA) and Sigmastat ver. 3.1 (Systat Software Inc., San Jose, CA, USA). Chi square test was used to compare the sex and age distributions of the patients. Comparison of age distribution of groups was performed using independent samples *t*-test. Variation of mean values of nasal symptom scores, VAS scores and RQLQ scores during the treatment periods within the groups were compared by Wilcoxon signed rank test and Friedman test. The initial mean values of nasal symptom scores, VAS scores and RQLQ scores and the variation during the treatment period for all parameters between the groups were compared by the Mann-Whitney *U*-test. Results were expresed as mean and a $P<0.05$ was considered statistically significant.

RESULTS

Demographics and patient evaluation

The study population consisted of 24 male and 41 female patients. Mean age of the first group was 32.5 years (range, 18 to 55 years) and that of second group was 30.6 years (range, 17 to 61 years). In the pretreatment evaluation, there was no statistically significant differences between mean age, skin prick tests results, symptom scores, RQLQ scores, and VAS scores of the two groups. There was also no difference in compliance for the medication of each group. At first month and third month after treatment, the symptom scores, VAS scores and RQLQ scores were compared within each group and between the two groups.

Symptoms scores

For nasal obstruction, sneezing, rhinorea, and nasal itching; statistically significant improvement was found after the treatments at both 1st and 3rd month evaluations for each group when compared with pretreatment scores (for each symptoms $P<0.05$). The mean of symptom values increased at 3rd month when compared with 1st month. Statistically significant difference was found between 1st and 3rd month within the groups ($P<0.05$). When the two groups were compared for nasal symptoms; the scores of the second group were better than the first group at both 1st and 3rd months (for each symptoms $P<0.05$) (Table 1).

Rhinoconjunctivitis quality of life questionnaire

In each group, the RQLQ scores seven domains, namely: limited activity, sleep quality, non-nasal non-eye symptoms, practical problems, nasal symptoms, eye symptoms and emotional functions; such average results were statistically better after the treatment at 1st and 3rd month evaluations (for each domains $P<0.05$). The mean values of RQLQ scores increased at 3rd month when compared with 1st month. Statistically significant difference was found between 1st and 3rd month within the groups ($P<0.05$). When the two groups were compared at 1st and 3rd months; RQLQ average results for each seven domains were significantly better in the second group (for each domains $P<0.05$) (Table 2).

Original article

Rhinophototherapy: A new therapeutic tool for the management of allergic rhinitis

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Background: Phototherapy has a profound immunosuppressive effect and is able to inhibit hypersensibility reactions in the skin.

Objective: We evaluated whether phototherapy using a combination of UV-B (5%), UV-A (25%), and visible light (70%), referred to as mUV/VIS, is effective in treating allergic rhinitis.

Methods: We conducted a randomized, double-blind study, in 49 patients with hay fever. The study was performed during the ragweed season. Each intranasal cavity was illuminated 3 times a week for 3 weeks with mUV/VIS or with low-intensity visible light. Symptom scores, inflammatory cells, and their mediators were assessed in nasal lavages. *In vitro* effects of mUV/VIS irradiation on T-cell and eosinophil apoptosis and its inhibitory effect on mediator release from basophils were examined.

Results: Rhinophototherapy was tolerated well and resulted in a significant improvement of clinical symptoms for sneezing ($P < .016$), rhinorrhea ($P < .007$), nasal itching ($P < .014$), and total nasal score ($P < .004$). None of the scores improved significantly in the control group. Scores for nasal obstruction slightly improved after mUV/VIS treatment and significantly increased in the control group ($P < .017$). In the nasal lavage, phototherapy significantly reduced the number of eosinophils and the level of eosinophil cationic protein and IL-5. *In vitro* irradiation of T cells and eosinophils with mUV/VIS light dose-dependently induced apoptosis. Furthermore, mUV/VIS irradiation inhibited the mediator release from RBL-2H3 basophils.

Conclusion: These results suggest that phototherapy is an effective modality to treat allergic rhinitis and offer new options for the treatment of immune-mediated mucosal diseases. (J Allergy Clin Immunol ■■■■;■■■:■■■-■■■.)

Key words: *Allergic rhinitis, phototherapy, eosinophils, T cells, IL-5, apoptosis*

Allergic rhinitis is one of the most common health problems. It is a high-cost and high-prevalence disease with a major effect on the quality of life. It is also considered to be a risk factor for asthma.[1-3] Although new antihistamines and local steroids are used with good results, there are cases in which complete resolution of the symptoms cannot be obtained. Moreover, the use of these drugs is controversial in special subsets of patients such as pregnant and breast-feeding women.[4] All of these characteristics of allergic rhinitis highlight the need for effective new treatment options.

Allergic rhinitis is an allergen-induced, IgE-mediated inflammatory disease of the nasal mucosa.[5] The development of the disease is characterized by an initial sensitization phase to a specific allergen, when no clinical symptoms are present. At later time points, the encounter of the same allergen by sensitized individuals is followed by the elicitation of an specific immune response and the activation of effector mechanisms. Previous studies have established that a shift toward T_H2 cells plays a role in the initiation and maintenance of the disease.[6,7] Eosinophils, mast cells, and basophils are considered to be the mayor effector cells in hay fever.[8,9] After an allergen challenge, these cells release inflammatory mediators such as histamine, tryptase, leukotrienes, prostaglandins, cytokines, and eosinophil cationic protein (ECP), which are responsible for most of the pathological processes occurring within the nasal mucosa.[5,9-11] Phototherapy has a profound immunosuppressive effect, and phototherapeutic methods using both UV and visible light are therefore widely used for the therapy of various inflammatory skin diseases, including atopic dermatitis.[12-15] The major mechanisms of immunosuppression induced by the various forms of

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Disclosure of potential conflict of interest: Lajos Kemeny, Attila Dobozy, Zsolt Bor, Gabor Szabo, and Ferenc Ignacz are cofounders of a company that will produce the light source for treatment and have submitted a patent application on this topic (patent pending).

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Effects of intranasal phototherapy on nasal mucosa in patients with allergic rhinitis

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Abstract

Rationale: Rhinophototherapy has been shown to be effective in the treatment of allergic rhinitis. Considering that phototherapy with ultraviolet light (UV) induces DNA damage, it is of outstanding importance to evaluate the damage and repair process in human nasal mucosa.

Methods: We have investigated eight patients undergoing intranasal phototherapy using a modified Comet assay technique and by staining nasal cytology samples for cyclobutane pyrimidine dimers (CPDs), which are UV specific photoproducts.

Results: Immediately after last treatment Comet assay of nasal cytology samples showed a significant increase in DNA damage compared to baseline. Ten days after the last irradiation a significant decrease in DNA damage was observed compared to data obtained immediately after finishing the treatment protocol. Difference between baseline and 10 days after last treatment was not statistically significant. Two months after ending therapy, DNA damage detected by Comet assay in patients treated with intranasal phototherapy was similar with that of healthy individuals. None of the samples collected before starting intranasal phototherapy stained positive for CPDs. In all samples collected immediately after last treatment strong positive staining for CPDs was detected. The number of positive cells significantly decreased 10 days after last treatment, but residual positive staining was present in all the examined samples. This finding is consistent with data reported in skin samples after UV irradiation. Cytology samples examined two months after ending therapy contained no CPD positive cells.

Conclusion: Our results suggest that UV damage induced by intranasal phototherapy is efficiently repaired in nasal mucosa.

Keywords: Phototherapy; DNA damage; Nasal mucosa

1. Introduction

Phototherapy is widely used for the treatment of several immune-mediated skin diseases like atopic dermatitis and psoriasis [1]. In the last decade new applications have been developed and ultraviolet (UV) light has been applied with good results in the treatment of oral mucosal diseases, such as lichen planus and graft versus host disease [2,3]. Recently, intranasal phototherapy with mixed UVA–UVB–visible light (mUV/vis) has been reported to be successful for the treatment of seasonal allergic rhinitis [4].

One of the main mechanisms of action of UV light is induction of DNA damage in the irradiated cells. This

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Research Note

Intranasal Phototherapy Is More Effective Than Fexofenadine Hydrochloride in the Treatment of Seasonal Allergic Rhinitis: Results of a Pilot Study

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ABSTRACT

We recently showed that intranasal phototherapy represents an efficient therapeutic modality for the treatment of patients with seasonal allergic rhinitis (SAR). The aim of this pilot study was to compare the efficacy of intranasal phototherapy with that of the new generation antihistamine fexofenadine HCl in SAR. A randomized open study was conducted in patients with a history of moderate-to-severe ragweed-induced SAR. Thirty-one patients were randomly assigned to receive either intranasal irradiation three times a week for 2 weeks, or 180 mg fexofenadine HCl per day for 2 weeks. Each patient kept a diary of symptoms for nasal obstruction, nasal itching, rhinorrhea, sneezing and palate itching. Total nasal score (TNS), a sum of scores for nasal symptoms, was also calculated. In the rhinophototherapy group the individual scores significantly decreased compared with baseline for all of the parameters. In the fexofenadine HCl group none of the scores improved significantly at the end of the treatment except sneezing. TNS was significantly decreased in the rhinophototherapy group, but no significant change was observed in the fexofenadine HCl group after 2 weeks of treatment. In conclusion, we found that intranasal phototherapy is more efficient than fexofenadine HCl in reducing clinical symptoms for SAR.

INTRODUCTION

We recently showed that intranasal phototherapy is an effective treatment for allergic rhinitis (AR) (1). Rhinophototherapy with low doses of mixed ultraviolet and visible light significantly improve the clinical symptoms of AR by acting at multiple points such as induction of T-cell and eosinophil apoptosis and suppression of release of mediators like eosinophil cationic protein and interleukin 5.

Allergic rhinitis is a common inflammatory disease that causes major illness and disability worldwide. The prevalence of AR was found to be around 25% in a study on the general population in Europe (2,3). Guidelines issued by the Allergic Rhinitis and its Impact on Asthma group recommend use of second-generation antihistamines as first-line treatment for AR (4,5). The newer generation oral antihistamines such as desloratadine, fexofenadine and levocetirizine have demonstrated efficacy in reducing the symptoms of AR, including rhinorrhea, nasal itching and sneezing, and in some clinical studies nasal congestion (6,7). Fexofenadine is a nonsedating antihistamine, has a rapid onset and a long duration of action (8). In addition to blocking H1 receptors, it has been shown to reduce allergic inflammatory responses mediated by mast cells, basophils, epithelial cells, eosinophils and lymphocytes (9).

The use of second-generation antihistamines in the treatment of seasonal allergic rhinitis (SAR) is well established (9,10). However, in clinical practice, SAR symptoms are not always satisfactorily controlled by medication and some patients fail to respond to treatment (11). A new phototherapeutic device has been developed emitting a combination of low-dose UVB, UVA and visible light for the treatment of AR in Hungary (12). The aim of this pilot study was to compare the efficacy of intranasal phototherapy with that of the new generation antihistamine fexofenadine HCl in SAR.

MATERIALS AND METHODS

Patients and study design. A randomized open study was conducted in patients with a history of at least 2 years of moderate to severe ragweed-induced AR. Positive skin prick test results and an elevated level of ragweed-specific IgE antibody confirmed the diagnosis. The Ethical Committee of University of Szeged approved the protocol. All patients gave their written informed consent. We excluded potential subjects from the study, if they had any significant nasal structural abnormalities; had asthma, or upper or lower respiratory infection within 4 weeks before the beginning of the study; or had used any of the following drugs: intranasal corticosteroids within 2 weeks, systemic corticosteroids within 4 weeks, membrane stabilizers within 2 weeks, antihistamines within 1 week, nasal decongestants within 3 days or immunotherapy within 5 years before the beginning of the study.

The patients were enrolled after the beginning of the ragweed season, when the pollen counts were greater than 50 m^{-3} in Szeged area. Thirty-one patients with moderate to severe symptoms

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Review

Ultraviolet light phototherapy for allergic rhinitis

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Abstract

Phototherapy has a profound immunosuppressive effect and is widely used for the treatment of immune mediated skin diseases. Phototherapy is able to inhibit immediate type hypersensitivity reaction in the skin. Intranasal phototherapy is a new approach for treatment of allergic rhinitis. In two open studies, 308 nm excimer laser and topical PUVA therapy efficiently inhibited clinical symptoms of allergic rhinitis. In a randomized, double-blind study combined low dose UVB, low dose UVA and visible light proved to be effective in reducing symptom scores for sneezing, rhinorrhea, nasal itching and the total nasal score in ragweed allergic patients. Mechanism of action of phototherapy is complex, it reduces the antigen presenting capacity of dendritic cells, induces apoptosis of immune cells and inhibits synthesis and release of pro-inflammatory mediator from several cell types. Therefore, intranasal phototherapy may represent an alternative treatment of allergic rhinitis and other inflammatory and immune mediated mucosal diseases.

Keywords: Phototherapy; Immunosuppression; Allergic rhinitis

Contents

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EXPERT REVIEWS

Endonasal phototherapy with Rhinolight® for the treatment of allergic rhinitis

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Allergic rhinitis, although not life threatening, significantly affects the quality of the patient's daily life. The three major steps in the treatment of the condition are avoidance of allergens, treatment of symptoms (in particular, antihistaminics and topical nasal corticosteroids) and specific immunotherapy. Avoidance of the allergen is usually not possible and symptom relief is often limited, despite the availability of a number of pharmacological options. Specific immunotherapy demands a high level of cooperation on the part of the patient for at least 3 years. Endonasal phototherapy with the Rhinolight® device (Rhinolight Ltd, Szeged, Hungary) for the treatment of immunoglobulin E-mediated allergic rhinitis is a new option that utilizes the immunosuppressive effects of UV radiation. The method directs a combination of UV-B (5%), UV-A (25%) and visible light (70%) into the nasal cavity, and its effectiveness has been demonstrated in one double-blind, placebo-controlled study. The results of additional studies have been presented at various medical conferences and in abstracts. Reports in the literature confirm that phototherapy is a well-established and successful treatment of atopic dermatitis and other skin diseases.

KEYWORDS: allergic rhinitis • phototherapy • Rhinolight® • ultraviolet therapy

Allergies represent one of the greatest health problems in modern societies [1]. A tentative estimate of the prevalence of allergic rhinitis (AR) suggests a figure of 500 million sufferers worldwide [2]. This would make AR one of the most common allergic diseases in the world, with increasing prevalence and often far-reaching consequences for quality of life, since it also reduces the patient's efficiency and leads to labor and productivity losses [3,4]. The condition, therefore, has a significant socioeconomic impact.

Exposure of the nasal mucosa to various allergic stimuli can cause rhinitis. AR is defined clinically as a symptomatic disease of the nose caused by a specific type of IgE-mediated inflammation of the nasal mucosa triggered by exposure to an allergen. It is classified into a seasonal, a perennial and an occupational form. The WHO has proposed a classification based on the duration of the symptoms [2]:

- Intermittent: less than 4 days per week, or less than 4 weeks total
- Persistent: more than 4 days per week, or longer than 4 weeks total

The severity of the symptoms are to be defined on the basis of their intensity and their effect on the patient's quality of life:

- Mild: symptoms are present but do not impair quality of life
- Moderate/severe: symptoms are present and troublesome; quality of life is impaired

In the Allergic Rhinitis and its Impact on Asthma (ARIA) updates, a joint effort of the WHO and the Global Allergy and Asthma European Network (GA²LEN), specific immunotherapy (SIT) is the recommended treatment for the moderate-to-severe intermittent and persistent forms of AR [2]. Apart from allergen avoidance, SIT is the sole causal therapeutic concept for the treatment of IgE-mediated allergic diseases.

Role of immunotherapy in allergic rhinitis

The effectiveness of SIT, both in the subcutaneous (SCIT) and sublingual (SLIT) application forms for the treatment of AR, has been confirmed in double-blind, randomized, placebo-controlled studies and in various

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Rhinophototherapy: A new therapeutic tool for the management of allergic rhinitis

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Background: Phototherapy has a profound immunosuppressive effect and is able to inhibit hypersensibility reactions in the skin.

Objective: We evaluated whether phototherapy using a combination of UV-B (5%), UV-A (25%), and visible light (70%), referred to as mUV/VIS, is effective in treating allergic rhinitis.

Methods: We conducted a randomized, double-blind study, in 49 patients with hay fever. The study was performed during the ragweed season. Each intranasal cavity was illuminated 3 times a week for 3 weeks with mUV/VIS or with low-intensity visible light. Symptom scores, inflammatory cells, and their mediators were assessed in nasal lavages. *In vitro* effects of mUV/VIS irradiation on T-cell and eosinophil apoptosis and its inhibitory effect on mediator release from basophils were examined.

Results: Rhinophototherapy was tolerated well and resulted in a significant improvement of clinical symptoms for sneezing ($P < .016$), rhinorrhea ($P < .007$), nasal itching ($P < .014$), and total nasal score ($P < .004$). None of the scores improved significantly in the control group. Scores for nasal obstruction slightly improved after mUV/VIS treatment and significantly increased in the control group ($P < .017$). In the nasal lavage, phototherapy significantly reduced the number of eosinophils and the level of eosinophil cationic protein and IL-5. *In vitro* irradiation of T cells and eosinophils with mUV/VIS light dose-dependently induced apoptosis. Furthermore, mUV/VIS irradiation inhibited the mediator release from RBL-2H3 basophils.

Conclusion: These results suggest that phototherapy is an effective modality to treat allergic rhinitis and offer new options for the treatment of immune-mediated mucosal diseases. (J Allergy Clin Immunol 2005;115:541-7.)

Key words: *Allergic rhinitis, phototherapy, eosinophils, T cells, IL-5, apoptosis*

Allergic rhinitis is one of the most common health problems. It is a high-cost and high-prevalence disease with a major effect on the quality of life. It is also considered to be a risk factor for asthma.[1-3] Although new antihistamines and local steroids are used with good results, there are cases in which complete resolution of the symptoms cannot be obtained. Moreover, the use of these drugs is controversial in special subsets of patients such as pregnant and breast-feeding women.[4] All of these characteristics of allergic rhinitis highlight the need for effective new treatment options.

Allergic rhinitis is an allergen-induced, IgE-mediated inflammatory disease of the nasal mucosa.[5] The development of the disease is characterized by an initial sensitization phase to a specific allergen, when no clinical symptoms are present. At later time points, the encounter of the same allergen by sensitized individuals is followed by the elicitation of an specific immune response and the activation of effector mechanisms. Previous studies have established that a shift toward T_H2 cells plays a role in the initiation and maintenance of the disease.[6,7] Eosinophils, mast cells, and basophils are considered to be the mayor effector cells in hay fever.[8,9] After an allergen challenge, these cells release inflammatory mediators such as histamine, tryptase, leukotrienes, prostaglandins, cytokines, and eosinophil cationic protein (ECP), which are responsible for most of the pathological processes occurring within the nasal mucosa.[5,9-11] Phototherapy has a profound immunosuppressive effect, and phototherapeutic methods using both UV and visible light are therefore widely used

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Disclosure of potential conflict of interest: Lajos Kemeny, Attila Dobozy, Zsolt Bor, Gabor Szabo, and Ferenc Ignacz are cofounders of a company that will produce the light source for treatment and have submitted a patent application on this topic (patent pending).

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P60

TREATMENT WITH HOUSE DUST MITE SUBLINGUAL TABLETS IN ALLERGIC RHINITIS SUBJECTS: HOUSE DUST MITE SPECIFIC IGE AND IGG$_4$ RESULTS

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Background: House dust mite (HDM) sublingual tablets at 300IR, the recommended dose, have been proven to be beneficial in subjects with HDM-associated allergic rhinitis (HDM-AR). Here we report the immunological data evaluated in a Phase II/III study.

Methods: A double-blind placebo-controlled study (NCT00674700) was conducted in Europe in adults (18–50 years) with HDM-AR for at least 1 year confirmed by a positive skin prick test and HDM-specific IgE ≥0.7 kU/L). Participants were randomised to receive 300IR, 500IR or placebo once daily for 1 year (Year 1) and followed up for one post-treatment year (Year 2). The primary endpoint was the average Adjusted Symptom Score (ASS, a rhinitis symptom score adjusted for rescue medication use) over the last three treatment months (ANCOVA). HDM-specific IgE and IgG$_4$ were assessed (ImmunoCap, Phadia) before, after treatment and at the end of the treatment-free year. End of treatment/baseline and end of follow-up/baseline ratios were analyzed descriptively in each group.

Results: 509 subjects (300IR = 170, 500IR = 169, placebo = 170) were included. After one treatment year, the average ASS was significantly reduced in the 300IR and 500IR groups vs. placebo with relative differences of −17.9% and −20.2%, respectively. The treatment effect was maintained after cessation of treatment. At the end of treatment, HDM-specific IgE were increased (1.2−1.5-fold) and HDM-specific IgG$_4$ more than doubled (2.4−5.0-fold) in both active groups. Over the year post-treatment, IgE and IgG$_4$ were also increased (1.2−1.3-fold and 1.4−3.3-fold, respectively) in the active groups. In the placebo group, no or little change of IgE and IgG$_4$ were observed for both years.

Conclusion: In subjects with HDM-AR, the results of immunological markers confirmed that 300IR and 500IR doses are immunologically active over treatment and remain so in the year post-treatment.

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HAY FEVER SUFFERERS ARE ENTHUSIASTIC ABOUT RHINOLIGHT™

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Our aim was to assess the effectiveness of our Rhinolight™ (UV nasal phototherapy) treatment protocol in reducing nasal symptoms in patients with Chronic Allergic Rhinitis in primary care.

We surveyed 113 patients who had completed the Rhinolight™ treatment course between June 2016 to June 2017. Participants were from various age groups (6 years and above) and gender. The survey consisted of 14 questions most of which were adapted from the Nasal Symptoms Score. Patients who performed the course were diagnosed with allergic rhinitis based on history and nasoendoscopic examination by allergy trained GP's.

A Rhinolight™ treatment course consisted of UV phototherapy to both nasal cavities two times a week for 4 weeks with initial dose of 2 min and gradually increased by 15 s in each visit until the second week. UV phototherapy treatment duration was maintained for 3 min in the remaining two weeks.

98% of participants completed the treatment course and 83% of those surveyed were satisfied with the treatment outcomes. Only 8% participants said they did not notice any change in their rhinitis symptoms. All nasal symptoms such as nasal congestion, nasal itching, sneezing and runny nose showed trends towards improvement. 85% of patients considered repeating Rhinolight™ treatment again with a seasonal flare and 98% would recommend this treatment to a friend or family member.

The Rhinolight™ phototherapy treatment protocol was well tolerated and is an effective treatment for allergic rhinitis symptoms.

While obviously our survey result is extremely limited, these results are still very promising and are supported by the growing pool of studies with good evidence that UV phototherapy for the nose to treat hay fever is a safe, effective and potential treatment that could be offered by primary care Doctors.

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COTININE LEVEL IS ASSOCIATED WITH ASTHMA SEVERITY IN PASSIVE SMOKER CHILDREN

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Background: Second hand smoke exposure is known to affect the frequency and severity of childhood asthma symptoms, cotinine, the primary nicotine metabolite serves as a biomarker of second hand smoke exposure and could potentially identify pediatric patients at risk of more severe asthma symptoms.

Objectives: The aim of this study was to determine degree of association of asthma severity and cotinine level as a marker of passive smoking.

Methods: In a cross-sectional study, 140 pediatric patients (ages 1–16 years) with asthma were enrolled, 70 of whom, had been exposed to passive smoking and 70 others included as controls. A complete clinical history, lab exam, and spirometry were performed. A sample of urine, serum and saliva was collected from all enrolled patients and controls in the study after confirmation of diagnosis and determination of severity of asthma.

Results: The results revealed that age, sex, age of onset of asthma, family history and allergic history was not significantly different between two groups of patients. We found that percentage of patients with severe asthma was significantly higher in passive smoker group (P = 0.001). Serum (P = 0.001), saliva (P = 0.001), and urine (P = 0.0014) levels of cotinine were significantly higher in passive smoker group compared to control group in serum (P = 0.0014), saliva (p = 0.001), and urine (P = 0.0014). cotinine levels were significantly raised in serum (P = 0.001), urine (P = 0.0014), as well as saliva (p = 0.01) of patients with severe asthma than moderate and mild asthma.

Conclusions: In summary cotinine levels were higher in passive smokers compared to non-passive smokers.

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ETHNICITY AND ATOPY: THE PREVALENCE OF RHINITIS AND OTHER ALLERGY AMONGST PATIENTS WITH EPIDEMIC THUNDERSTORM ASTHMA

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Introduction: In November 2016, Melbourne experienced the world's most devastating episode of epidemic thunderstorm asthma (ETSA). Allergic rhinitis and grass pollen allergy have been associated with ETSA. The aim of our study was to characterise the prevalence of rhinitis, asthma, undiagnosed asthma and previous allergy in ETSA patients who presented to emergency departments (ED) and whether this relates to their ethnicity.

Methods: ED respiratory presentations at Eastern and Monash Health (east and southeast Melbourne) were reviewed. Those with ED records indicating acute asthma were included. A standardised questionnaire was developed to assess ethnicity; prevalence of asthma; prevalence of undiagnosed asthma; prevalence of rhinitis; and history of previous allergy. Variation in characteristics between ethnicity was evaluated.

Results: 599 of 779 patients (76.9%) with ETSA completed the questionnaire; 55% (n = 330) were male with mean age of 30.6±18.8 years. 86% (n = 513) had a history of rhinitis, while only 42% (n = 250) had a history of asthma. 26% (n = 158) had symptoms to suggest undiagnosed asthma. 50% (n = 298) had a history of grass pollen allergy. 40% (n = 237) identified themselves as Caucasian, 22% (n = 129) Asian, 25% (n = 150) Indian and 14% (n = 83) other. Patients of Asian and Indian ethnicity were older (mean age 34.74 ± 18.9 and 36.74 ± 15.6 respectively, P < 0.0001). They also had higher rates of rhinitis (91% and 91%, P = 0.019) and lower rates of asthma (37% and 29%, P = 0.0004). Those of Indian ethnicity reported higher rates of grass pollen allergy (61%, P = 0.01).

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Narrow-band UVB phototherapy of nasal polyps: Results of a pilot study ☆

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ABSTRACT

Nasal polyposis (NP) is characterized by high recurrence rate despite medical and/or surgical treatment. The major mechanism of action of ultraviolet B light (UVB) is induction of apoptosis in inflammatory cells. Therefore phototherapy may represent a new therapeutic approach in NP.

A pilot feasibility study was performed to assess the tolerability and clinical efficacy of UVB phototherapy in NP.

Thirteen subjects with bilateral grade 1–3 NP were enrolled in an open-labeled prospective pilot study. Patients were exposed to gradually increasing doses of UVB light over a 12 week period (3 exposures/week). Subjects rated their nasal obstruction symptom scores weekly on a visual analogue scale from 0 to 6. The NOSE quality of life questionnaire was used at baseline and end of treatment period. Adverse events were monitored by endoscopy. Ten subjects completed the study. Nasal obstruction symptom scores and quality of life (NOSE) improved at end of treatment compared to baseline. Treatments were well tolerated and no device related adverse events were reported. The results suggest that phototherapy may represent a potential new treatment option in nasal polyps.

1. Introduction

Nasal polyposis (NP) is a chronic inflammatory disease of the upper airways with an overall prevalence rate in the general population ranging from 1% to 4% [1]. Clinically, nasal polyps are characterized by edematous masses which prolapse into the nose, leading to nasal obstruction, loss of smell, secretion, headache and reduced quality of life. Nasal polyposis is a multifactorial disease in which chronic inflammation is a major factor. The inflammatory infiltrate comprises a variety of cells, including eosinophils, mast cells, lymphocytes, neutrophils and plasma cells. The majority of nasal polyps belong to the eosinophilic type, in which more than 60% of the inflammatory cell population is represented by eosinophils [2]. The presence of high levels of proinflammatory mediators and of epithelial damage are also characteristic of NP. Expression of cytokines such as IL-4 and IL-5 and of inflammatory mediators like eosinophilic cationic protein (ECP) is strikingly similar to the immunopathological profile documented in allergic rhinitis and asthma, two diseases with which nasal polyposis is often associated. Therapeutic strategies for NP include medical treatment, especially topical or systemic corticosteroids, surgical treatment or a combination of both. However, notwithstanding treatment, NP is characterized by high recurrence rate and a subset of patients has to undergo repeated surgeries [1,3,4].

Several studies suggest that apoptosis of inflammatory cells is the major mechanism of action for systemic and topical corticosteroids. It has been shown that treatment of NP with topical corticosteroids induces apoptosis of eosinophils and T cells and when applied long-term, reduces the number of eosinophils and T cells in vivo [5,6].

Phototherapy utilizing narrow-band UVB light (NB-UVB) has been widely used in the treatment of various inflammatory skin diseases, including atopic dermatitis and psoriasis [7]. Intranasal phototherapy has been shown to be effective in inflammatory mucosal diseases such as oral lichen planus and seasonal allergic rhinitis [8–10]. The therapeutic effect of UVB light is primarily attributed to its local immunomodulatory action. One of the most important mechanisms that explain the effects of UVB light is induction of apoptosis in inflammatory cells [11–14]. Therefore, UV phototherapy may represent a new therapeutic tool for the management of nasal polyps.

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RHINOLOGY

Endonasal phototherapy significantly alleviates symptoms of allergic rhinitis, but has a limited impact on the nasal mucosal immune cells

Detlef Brehmer · Michael P. Schön

Received: 11 July 2010 / Accepted: 20 August 2010

Abstract The literature documents the fact that UV irradiation of cutaneous Langerhans cells (LC) in vivo prevents the development of contact allergy and produces long-lasting immunosuppression. However, not much is known about the effect of UV irradiation on the LC of the nasal mucosa and their connection with clinical scores. Local antigen presentation may be necessary for both primary and recall T cell responses to birch pollen in patients with hay fever. Endonasal phototherapy combination of UVB (5%), UVA (25%) and visible light (70%) utilises the immunosuppressive effects of UV irradiation. The aim of this study was to correlate clinical symptom scores with possible changes in the LC of the nasal mucosa induced by UV radiation. The clinical effectiveness of this form of treatment is discussed. Nasal biopsies were obtained from ten birch pollen-sensitive patients with seasonal rhinitis before and after endonasal phototherapy. All patients showed a significant clinical benefit post-treatment as assessed by standardised instruments, including total nasal symptom score, nasal congestion score, nasal itching score, sneezing score, nasal secretion score and impairment-to-health score. However, we found no significant morphological changes, to, or quantitative differences in, the CD1a+, CD4, CD8 or CD31 cells before and 14 days after treatment. Despite the positive clinical effect, the study revealed no effect of UV irradiation on the LC and other analysed cells of the nasal mucosa immune system. Possible reasons for this are discussed.

Keywords UV radiation · Endonasal phototherapy · Nasal Langerhans cells · CD1a · Allergic rhinitis

Introduction

Our knowledge of the therapeutic effect of ultraviolet (UV) irradiation has a long history extending back to the ancient Egyptians [1]. In 1893, the physician, Niels Finsen, developed one of the first appliances to enable the production of artificial sunlight, which he successfully employed to treat lupus vulgaris [2]. Margaret Kripke was the first author to describe the immunosuppressive effect of UV irradiation in a series of transplantation experiments on murine skin cancers induced by UVB radiation [3]. The last decades have seen an increase in our knowledge regarding the range of indications for, and the therapeutic modalities of broadband UVB (290–320 nm), narrow-band UVB (311 ± 2 nm), endonasal phototherapy, 308-nm UVB excimer laser, UVA (320–400 nm), photosensitisers and UVA (PUVA), combined UVA/UVB, high-dose UVA1 (340–400 nm) and high-dose visible light (400–800 nm) [4]. Koreck et al. [5] reported the results of a randomised controlled double-blind study aimed at investigating the efficacy of endonasal phototherapy in ragweed-induced hay fever.

A recent prospective, randomised, single-blind, placebo-controlled study investigating the effects of this form of treatment on allergic rhinitis found a highly significant

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RHINOLOGY

The effects of phototherapy on quality of life in allergic rhinitis cases

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Received: 12 April 2009 / Accepted: 7 July 2009

Abstract Phototherapy, using a combination of UV-A (25%), UV-B (5%) and visible light (70%), is known to be affective in suppressing the clinical symptoms of allergic rhinitis significantly. It has also been shown that phototherapy locally reduces the number of inflammatory cells and the level of mediators. We aimed to investigate the efficacy of phototherapy in improving the quality of life of patients with allergic rhinitis using Rhinoconjunctivitis Quality of Life Questionnaire, besides checking the total symptom scores of 100 consecutive cases. When the previous and after treatment data were compared, statistically significant differences were found in all quality of life variables ($P < 0.001$). These results suggest that phototherapy is an effective method to relieve symptoms of allergic rhinitis and has a positive effect on the quality of life of allergic patients. Further studies are needed to plan an ongoing treatment of phototherapy at certain intervals for continuous relief of symptoms and a better and longstanding quality of life.

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Keywords Allergic rhinitis · Phototherapy · UV light · RQLQ · Rhinoconjunctivitis Quality of Life Questionnaire · Quality of life

Introduction

Phototherapy has a profound immunosuppressive effect, and phototherapeutic methods using both UV and visible light are therefore widely used for the therapy of various inflammatory skin diseases [1]. It is also proposed that phototherapy, using a combination of UV-A (25%), UV-B (5%) and visible light (70%), may represent a therapeutic alternative to patients with allergic rhinitis. Various studies on the successful results of phototherapy treatment on allergic symptoms have been published [1–5]. Koreck et al. [2] assessed the efficacy of phototherapy in allergic rhinitis and stated that phototherapy locally reduced the number of inflammatory cells. They also revealed that UVAB significantly suppressed the clinical symptoms of allergic rhinitis.

The Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) was developed to measure the functional problems (physical, emotional, social and occupational) that are most troublesome to adults (17–70 years) with either seasonal or perennial rhinoconjunctivitis of either allergic or non-allergic origin [6]. Many studies were carried out in order to develop, standardize and validate the questionnaire for uses in clinical trials [7–11]. Another advantage of using RQLQ is that it has been translated to Turkish recently and validity and reliability tests have been performed.

Herein, we aimed to investigate the efficacy of phototherapy treatment on patients with allergic rhinitis by means of the clinical findings, total nasal symptom score (TNSS) and RQLQ.

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Phototherapy for allergic rhinitis: a prospective, randomized, single-blind, placebo-controlled study

Cemal Cingi, Hamdi Cakli, Aytekin Yaz, Murat Songu and Cengiz Bal

Abstract: Phototherapy has a profound immunosuppressive effect, and phototherapeutic methods using both ultraviolet (UV) and visible light are therefore widely used for the therapy of various inflammatory skin diseases. It is also proposed that phototherapy, using a combination of UV-A (25%), UV-B (5%) and visible light (70%), may represent a therapeutic alternative in patients with allergic rhinitis. Seventy nine patients were randomly assigned to receive either a combination of UV-A (25%), UV-B (5%) and visible light (70%), in the phototherapy group, or low-intensity visible light, in the control group. The efficacy of treatment was assessed by means of total nasal symptom score before treatment and 1 month after the end of treatment. Total nasal scores decreased in both groups but the decrease was highly significant in the active treatment group when compared with the placebo ($p < 0.001$). This study demonstrates that phototherapy may be an effective modality in the treatment of allergic rhinitis especially in cases of which commonly used drugs either are contraindicated and/or have insufficient efficacy.

Keywords: allergic rhinitis, phototherapy, rhinophototherapy, UV, ultraviolet

Introduction

Allergic rhinitis is considered to be one of the most frequent health problems. A costly and highly prevalent disease with a major effect on the quality of life, it is also considered to be a risk factor for asthma [Salib and Howarth, 2003; Togias, 2003; Kay, 2001]. Despite the fact that new antihistamines and local steroids have been used with good results, complete resolution of the symptoms is practically difficult. In a special subsets of patients, such as pregnant and breastfeeding women, application of these drugs is disputed [Law *et al.* 2003]. As a result, the above characteristics of allergic rhinitis firmly show the need for effective treatment modalities.

Phototherapy has a profound immunosuppressive effect, and phototherapeutic methods using both ultraviolet (UV) and visible light are therefore widely used for the therapy of various inflammatory skin diseases [Koreck *et al.* 2005a]. It is also proposed that phototherapy, using a combination of UV-A (25%), UV-B (5%) and visible light (70%) (UVAB), may represent a therapeutic alternative in patients with allergic rhinitis. Various papers on the successful results of phototherapy treatment on allergic symptoms have been published [Kemény and Koreck, 2007; Csoma *et al.* 2006; Koreck *et al.* 2005a, 2005b, 2007]. Koreck and colleagues assessed the efficacy of phototherapy in allergic rhinitis and stated that phototherapy locally reduced the number of inflammatory cells [Koreck *et al.* 2005b]. They also revealed that UVAB (UV-A, UV-B, visible light) significantly suppressed the clinical symptoms of allergic rhinitis.

Herein, we aimed to investigate the efficacy of phototherapy treatment on patients with allergic rhinitis by means of total nasal symptom score (TNSS).

Materials and methods

Study design

We conducted a prospective, randomized, single-blind, placebo-controlled study in patients with a history of at least 2 years of moderate-to-severe persistent allergic rhinitis that was not controlled

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Original Article

Effects of Rhinophototherapy on Quality of Life in Persistant Allergic Rhinitis

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Objectives. To investigate the effect of rhinophototherapy with medical therapy on quality of life in persistent allergic rhinitis.

Methods. A prospective, randomized study was being performed between December 2009 and March 2010. The study included 65 patients with persistent allergic rhinitis. The diagnosis was confirmed with positive skin tests. All of the patients had house dust mite allergies. We divided the patients into two groups. First group (n=33) was given topical mometasone furoate 200 mcg/day and levocetirizine 5 mg/day for a month. Rhinophototherapy was applied with the same medical therapy to the second group (n=32), twice a week for three weeks continuously. Rhinophototherapy included visible light, ultraviolet A and ultraviolet B. We evaluated patients before the treatment, at the first month and at the third month after treatment with rhinoconjunctivitis quality of life questionnaire, nasal symptom scores and visual analogue scale (VAS) scores.

Results. Improvements of all variables of the quality of life questionnaire, nasal symptom scores and VAS were statistically significant in the second group both on the first and the third months when compared with the first group.

Conclusion. Allergic rhinitis is a social problem and impairs quality of life. Rhinophototherapy with medical therapy improves the quality of life in allergic rhinitis.

Keywords. *Allergic rhinitis, Rhinophototherapy, Quality of life, Symptoms scores, Visual analogue scale*

INTRODUCTION

Allergic rhinitis is an allergen-induced, IgE-mediated inflammation of the nasal mucosa [1], and it is the most frequent atopic disease which effects 25%-35% of the population with increasing prevalences [2,3]. Allergic rhinitis is also a social problem that negatively effects the patients' quality of life, performance and productivity, and thus, it is accepted as a major chronic respiratory disease with economic burdens and the risks for asthma [4]. There are several different therapy strategies for allergic rhinitis [4,5]. Allergen avoidance and patient education are important for every allergic patient [6,7]. Immunotherapy is the main treatment modality that changes the course of the disease [8]. Pharmacotherapy plays an important role in the management of allergic rhinitis, with aims to improve patient's quality of life by reducing the symptoms. However, in some patients, symptoms cannot be reduced with only medical treatment or medical treatment can be restricted due to several reasons. Alternative modalities are necessary for such patients.

Phototherapy, which has been mainly used for inflammatory skin diseases dermatologically for a long time, is becoming a new choice of alternative treatment in allergic rhinitis [9]. It has been reported that intranasal applications of phototherapy in allergic rhinitis patients has been effective, similarly to the applications on dermatological diseases [10-13]. Both atopic dermatitis and allergic rhinitis are different manifestations of the atopy and most of the their pathways are similar [14]. Phototherapy con-

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Efficacy of Different UV-emitting Light Sources in the Induction of T-cell Apoptosis¶

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ABSTRACT

Ultraviolet B (UV-B) radiation is a modality widely used for the treatment of different skin diseases. One of the major mechanisms of UV-B immunosuppression in this treatment modality is thought to be an apoptosis-inducing effect on T cells infiltrating the skin. We examined the T-cell apoptosis-induction capacities of four different UV light sources, with and without UV filters. The xenon chloride (XeCl) laser proved to be the strongest apoptosis inducer. The use of a phtalic acid filter eliminated UV radiation almost completely below 300 nm, which resulted in a severe decrease in the apoptosis-inducing capacity of different UV-B sources. Using the results of the measurements with polychromatic UV light sources, the wavelength dependence of UV-B light for the induction of T-cell apoptosis was also determined. The regression line of the action spectrum demonstrated a continuous decrease from 290 to 311 nm. The apoptosis-inducing capacity of the XeCl laser was almost four times higher than the calculated value according to the action spectrum, which might be attributed to the high irradiance of the laser as compared with nonlaser light sources.

INTRODUCTION

Ultraviolet B (UV-B) light (280–320 nm) is a modality widely used for the therapy of different skin diseases. Initially, broadband (BB)-UV-B light sources were applied in UV-B phototherapy; these emit wavelengths throughout the whole spectrum of UV-B light (1). In 1980, an action spectrum study was carried out in patients with psoriasis. With use of a monochromator, the action spectrum for the UV phototherapy of psoriasis was determined for radiation between 254 and 313 nm and compared with the action spectrum for erythema of the uninvolved adjacent skin. Wavelengths of 254, 280 and 290 nm proved to be erythemogenic but not therapeutic, even at 10–50 times the minimal erythema dose (MED). At wavelengths of 300 and 304 nm, complete clearing occurred on daily exposure to doses equal to or less than the MED. In every subject, suberythemogenic exposure doses of 313 nm resulted in complete clearance of the plaques (2). These findings led to the introduction of selective UV-B phototherapy and narrowband (NB)-UV-B phototherapy. NB-UV-B source emits polychromatic light, but the 311–313 nm wavelength range predominates in its emission spectrum. In a bilateral comparative study, the ability of suberythemogenic doses of NB-UV-B *versus* conventional BB-UV-B to remit psoriasis was compared. NB-UV-B radiation proved to be superior to BB-UV-B for the treatment of psoriasis (3). Because laser light can be selectively directed toward the lesional skin and all the energy of a 308 nm excimer laser is emitted within the action spectrum for the phototherapy of psoriasis, our group investigated the therapeutic effect of the 308 nm Xenon chloride (XeCl) excimer laser for psoriasis. This laser emits its total energy at 308 nm and may therefore be regarded as a "supernarrowband" UV-B light source. The cumulative dose required for the complete clearance of psoriatic plaques was six times less with the XeCl laser than with NB-UV-B phototherapy (4). The high clinical efficacy of the XeCl laser for psoriasis was later confirmed in other studies (5,6). The XeCl laser might therefore be regarded as a new and promising form of UV-B phototherapy, which seems to be superior to conventional UV-B sources in the treatment of psoriasis and vitiligo (7–10).

UV-B light has been shown to modify cutaneous immune responses, a phenomenon called photoimmunosuppression (11). Krueger *et al.* (12) observed that UV-B treatment produced a consistent and profound depletion of T lymphocytes from psoriatic epidermis. Dermal lymphocytes were much less affected (12). Because apoptosis is induced by the *in vitro* UV-B irradiation of T cells, it has been proposed that UV-B light may have immunosuppressive effects in psoriasis through the induction of apoptosis in disease-mediating T cells. Apoptosis, or programmed cell death, is a physiological suicide mechanism that preserves homeostasis, in which cell death naturally occurs during normal tissue turnover (13). To characterize the mechanism of T-cell depletion, Ozawa *et al.* (14) applied NB-UV-B radiation, on peripheral T cells and measured the extent of apoptosis. Application of 100 mJ/cm^2 NB-UV-B light resulted in measurable T-cell

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Abbreviations: AD50, the energy density necessary to induce apoptosis in 50% of the T cells; BB-UV-B, broadband ultraviolet B; mAb, monoclonal antibody; MECLR, mixed epidermal cell lymphocyte reaction; MED, minimal erythema dose; MLR, mixed lymphocyte reaction; NB-UV-B, narrowband ultraviolet B; PBMC, peripheral blood mononuclear cells; PBS, phosphate-buffered saline; UV-A, ultraviolet A; UV-B, ultraviolet B; UV-C, ultraviolet C; XeCl, xenon chloride.

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Short communication

Inhibition of immediate type hypersensitivity reaction by combined irradiation with ultraviolet and visible light

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Abstract

Recently we found that ultraviolet B (UVB) irradiation in erythematous doses significantly inhibited the immediate type hypersensibility reaction in the skin. In the present study we investigated the effects of different wavelengths on the skin prick test reaction (SPT). The forearm of ragweed allergic patients was irradiated with increasing doses of ultraviolet A (UVA), visible light (VIS) or combined UVB, UVA and VIS light, referred to as mUV/VIS. SPTs were performed 24 h after irradiation both on irradiated and non-irradiated control skin areas using ragweed extract. UVA and VIS irradiation led to a slight, not significant inhibition of allergen-induced wheal formation. Mixed irradiation with mUV/VIS light resulted in a dose-dependent inhibition of the allergen-induced wheal formation. The inhibition was significant already at suberythematous doses. As there is a good correlation between SPT and the nasal symptoms in patients with hay fever these data suggest that phototherapy with mUV/VIS light might be an effective and safe treatment modality for immediate type hypersensibility reactions in the skin and nasal mucosa.

Keywords: Immediate type hypersensitivity; Skin prick test; Phototherapy

1. Introduction

Phototherapy has a profound immunosuppressive effect and phototherapeutic methods utilizing both ultraviolet (UV) and visible (VIS) light are therefore widely used for the therapy of various inflammatory skin diseases such as psoriasis and atopic dermatitis [1–4]. It has been also shown that UV irradiation of skin inhibits the development of contact hypersensibility and induces hapten-specific tolerance, which can be adoptively transferred in mice. The major mechanisms of immunosuppression induced by the various forms of phototherapy in the skin involve apoptosis induction in infiltrating T cells, reduction in the number and function of Langerhans cells, and the induction of immunomodulatory cytokines such as IL-10 [5–8].

Recently, we have found that UVB irradiation was capable to significantly inhibit the immediate type hypersensibility reaction in the skin at erythematous doses and that 308 nm xenon chloride (XeCl) eximer laser is effective for the treatment of allergic rhinitis [9]. The goal of our present study was to evaluate the effect of different wavelengths on the immediate type hypersensibility in the skin. As skin prick test (SPT) is the most widely used in vivo test for the diagnosis of immediate type allergic reaction we tested the capacity of different wavelengths to inhibit the wheal formation in SPT on irradiated and non-irradiated skin areas. We found that mixed irradiation with UVB, UVA and

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Intranasal irradiation with the xenon chloride ultraviolet B laser improves allergic rhinitis

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Abstract

We earlier reported that the 308 nm xenon chloride (XeCl) ultraviolet B (UVB) laser is highly effective for the treatment of inflammatory skin diseases. Since UVB irradiation has been shown to exert both local and systemic immunosuppression, we investigated the clinical efficacy of UVB irradiation in allergic rhinitis. In an open study, groups of patients with severe allergic rhinitis received intranasal irradiation with a 308 nm XeCl UVB excimer laser for two weeks. In the low-dose group ($n = 10$), treatment was given twice weekly, starting with $0.25 \times$ the individual minimal erythema dose (MED), whereas patients in the medium-dose group ($n = 8$) were treated four times weekly, starting with $0.4 \times$ MED. In each group, the dosage was gradually increased. Evaluation was based on the symptom scores. The effect of the XeCl laser on the skin prick test reaction was also studied. In the low-dose group, seven patients completed the study, and there was no improvement in the nasal symptoms. In the medium-dose group, the XeCl UVB irradiation significantly inhibited the rhinorrhoea, the sneezing, the nasal obstruction and the total nasal score ($p < 0.05$). The XeCl UVB excimer laser also inhibited the allergen-induced skin prick test in a dose-dependent manner. These results suggest that the XeCl UVB excimer laser might serve as a new therapeutic tool in the treatment of allergic rhinitis.

Keywords: Ultraviolet B; Laser; Immunosuppression; Allergic rhinitis

1. Introduction

Allergic rhinitis is one of the most common health problems in many countries, because it is a high-cost, high-prevalence disease, affecting about 15–30% of the population [1]. The number of the patients with allergic rhinitis is still increasing, especially in the well-developed, industrialized countries. Although it is not associated with severe morbidity and mortality, allergic rhinitis has a major effect on the quality of life. Its increasing prevalence, its impact on the individual quality of life and social costs [2,3] and its role as a risk factor for asthma [4], underline the need for improved treatment options for this disorder.

Allergic rhinitis is an inflammatory disorder of the nasal mucosa characterized by nasal itch, sneezing, nose running and nasal blockage. The inflammation is a type I, or immediate hypersensitivity reaction of the nasal mucosa that arises in consequence of an allergen-immunoglobulin E (IgE) interaction in senzitized individuals. For the treatment of the disease, well-established pharmacological therapies with antihistamines, corticosteroids, decongestants and mast cell stabilizers are available. New therapeutic options have recently become increasingly important, including leukotriene modifiers, anti-IgE antibodies, phosphodiesterase inhibitors and intranasal heparin, and there have been developments in appropriate allergen-specific immunotherapy [5]. However, complete suppression of the clinical symptoms cannot be achieved in most cases with the currently available drugs.

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BRIEF COMMUNICATION
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Effects of Intranasal Phototherapy on Nasal Microbial Flora in Patients with Allergic Rhinitis

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ABSTRACT

The objective of this study was to investigate the effect of intranasal phototherapy on nasal microbial flora in patients with allergic rhinitis.

This prospective, self-comparised, single blind study was performed on patients with a history of at least two years of moderate-to-severe perennial allergic rhinitis that was not controlled by anti-allergic drugs. Thirty-one perennial allergic rhinitis patients were enrolled in this study. Before starting the test population on their intranasal phototherapy, the same trained person took a nasal culture from each subject by applying a sterile cotton swab along each side of the nostril and middle meatus. Each intranasal cavity was irradiated three times a week for two weeks with increasing doses of irradiated. At the end of the intranasal phototherapy, nasal cultures were again obtained from the each nostril

The study found that after intranasal phototherapy, the scores for total nasal symptoms decreased significantly but bacterial proliferation was not significantly different before and after phototherapy.

We have shown that intranasal phototherapy does not change the aerobic nasal microbial flora in patients with perennial allergic rhinitis.

Keywords: Adult; Allergic rhinitis; Allergy; Bacteriology; İntranasal phototherapy; Middle nasal meatus; Nasal microbial flora; Phototherapy

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INTRODUCTION

Allergic rhinitis is defined as an inflammatory disease of the nose and the paranasal sinuses, characterized by a specific IgE- mediated hypersensitivity reaction. Allergic rhinitis is considered

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