Seit > 5 Jahren nicht aktualisiert, Leitlinie wird zur Zeit überarbeitet

Schlüsselfrage 1	**Für welche Indikationen wird der Epikutantest (ECT) empfohlen, kann empfohlen bzw. erwogen werden oder nicht empfohlen werden?**
SF1a	Arzneimittel
SF1b	weitere Indikationen
Schlüsselfrage 2	**Welche Expositionsdauer (24h versus 48h), welcher Expositionsort und welche Ablesezeitpunkte sind überlegen im Nachweis einer bestehenden Sensibilisierung?**
SF2a	Expositionsdauer
SF2b	Expositionsart
SF2c	nach 48h; nach 72-96h; nach 7-10 Tagen
Schlüsselfrage 3	**Welche Sensitivität, welche Spezifität hat der Epikutantest im allgemeinen und allergenbezogen?**
SF3a	ROAT vs. Anamnese
SF3b	sync
SF3c	Zyklusabhängigkeit
Schlüsselfrage 4	**Beeinflussen hormonelle Einflüsse das Epikutantestergebnis (Zyklusabhängigkeit)?**
Schlüsselfrage 5	**Beeinflusst die Einnahme folgender Medikamente das Epikutantestergebnis?** *Medikamente: Antihistaminika; syst. Glukokortikoide; Cellcept; Cyclosporin; Azathioprin; Methotrexat; Alitretinoin/Acitretin/Isotretinoin; ACE Hemmer; Opioide; Etanercept; Adalimumab; Infliximab; topische Glukokortikoide; Calcineurininhibitoren*
Schlüsselfrage 6	**Welche Risiken und Nebenwirkungen bestehen bei der Durchführung eines Epikutantests?**

Study characteristics				Methods								Results												Critical Appraisal of Study				
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposure**	**Application site**	**Time interval and treatment(s) administered between the tests**	**Investigator(s) and assessor(s) training**	**Inclusion criteria**	**Patients included [n]**	**Patients [age (mean/range); gender (M/F)]**	**presumed Diagnose**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (overall positive reactions)**	**Results II (reactions at different time points)**	**Results II (3 most frequently reported substances?)**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
Barbaud et al. 2001	Source of funding: not described Competing interests: not stated	Nancy, France	To determine the causes of non-relevant pos. patch tests and IDT with drugs in Cutaneous adverse drug reactions (CADR). To establish the thresholds of non-irritability for drugs tested by IDT.	Monocentricstudy, n/s, presumably non consecutive study, retrospective analysis	n/a	Patch test and IDT	not described	upper back	6 weeks to 6 months	n/s	Patients with CADR	800	n/s	CADR	n/s	positive patch tests, positive IDT	n/s	n/s	n/s	n/a	n/a	n/a	IDT/patch test	not reported	Skin tests with drugs are of value in investigating CADR. False-positive results should be compared with negative control subjects	Exclusion criteria missing, Patient data missing: mean age, sex strength of patch-test reaction missing No blinding	study population not described	3b	inclexcl criteria missing
Barbaud 2014	Source of funding: not described Competing interests: not stated	literature review	Recommendation of skin testing in non-IgE-mediated drug allergy	expert opinion based on literature review	n/a	Skin prick test, Intradermal test, Patch test	not described	n/s	at least 1 month after the resolution of the CADR and during the year following the CADR		n/a	n/a	n/a	Non-IgE-mediated drug allergy	n/s	positive test results	n/s	n/s	n/s	n/a	n/a	n/a	skin prick test, intradermal test, patch test	n/s	Drug patch tests are safe; positive in only 9-23 % of the reported cases. Drug patch tests may have their best indication in SCARs such as AGEP or DRESS	n/a	n/a	5	systematic literature review
Bircher et al. 1995	Labor of Dermatochemistry, Strasbourg; Astra Draco, AG Sweden; Ciba Inc. Switzerland; Ymanouchi Europe, NL; Glaxo Inc, UK, University Hospital, Geneva, Bral Allergen GmbH, Germany	Basel, Berne, Geneva, Zurich Lausanne, 10 dermatologists in private practice	To determine the prevalence of positive patch tests to corticosteroids in Switzerland of patients undergoing routine patch tests.	prospective multicentre exploratory cohort study with good reference standards	retesting with the screeing series snd 12 corticosteroid commonly used in Switzerland	patch test	48 h	n/s	n/s		consecutive dermatologic patients with an indication for patch testing	3016 patients	age 42 (6-96); gender: 1189/1826	presumed allergic contact dermatitis (ACD)	International Contact Dermatitis Research Group (IC- DRG)	positive patch tests to corticosteroids	65 patients (2.2 %), 26 male and 39 females with a total of 106 positive reactions to corticosteroids	n/s	31 (1%) reactions to TXP; 30 (1%) reactions to BUD; 29 (1%) reactions to HCB; 16 (0.5 %) reactions to HCA	n/a	70-98 % concordance in retesting	n/a	n/a	n/s	Corticosteroids should be included in routine patch-testing; as markers of corticosteroid sensitization tixocortol pivalate, budesonide and hydrocortisone butyrate may be suited; Patch test reactions of 2+ or higher have a better reproducibility than 1+ reactions; to establish the clinical relevance in an individual patient a usage test should be performed	n/a	n/a	2b	
Bircher et al. 2006	n/s	literature review	Clinical and diagnostic aspects and management options of hypersensitivity reactions to anticoagulant drugs	expert opinion based on literature review	n/a	Skin prick test, Intradermal test, Patch test	n/a	n/s	n/s		n/a	n/a	n/a	patients with hypersensitivity to anticoagulant drugs	n/s	n/s	n/s	n/s	n/s	n/a	n/a	n/a	n/a	n/s	In cell-mediated hypersensitivity reactions, such as erythematous plaques and exanthemas, skin prick or intradermal tests, with e.g. 1:10 or undiluted heparins can be performed. Patch tests, possibly with tape strippings, are less sensitive but may be positive	n/a	n/a	5	
Brockow et al. 2002	n/s	Rostrum based on literature review	Skin test procedures in the diagnosis of drug hypersensitivity	expert opinion based on literature review	n/a	Skin prick test, Intradermal test, Patch test	2 days	upper back	3 weeks to 3 months		n/a	n/a	n/a	presumed drug hypersensitivity	ECDRG	n/s	n/s	n/s	n/s	n/a	n/a	n/a	n/a	n/s	Skin tests have to be applied according the suspected pathomechanism of the drug hypersensitivity. Skin testing with SPT, IDT and/or patch test is especially recommended in adverse drug reactions to betalactam-antibiotics (mainly penicillins, cephalosporins). In non-immediate possibly drug-related reactions patch tests and/or late readings of intradermal	n/a	n/a	5	
Brockow et al. 2013	n/s	European position paper based on systematic literature review	To promote and standardize reproducible skin testing with safe and non-irritant drug concentrations in the clinical practice.Safe and non-irritant drug concentrations with specificity of at least 95 % in diagnosis for drug allergy	Systematic review of literature with data on skin test concentrations for drugs by searching the databases of Medline and Embase, reference lists of identified articles, textbooks, existing guidelines, personal experience by members of the task force. Inclusion of observational studies, case series, case reports, personal experience of members of the group when other reliable data were lacking.	n/a	Skin prick test, Intradermal test, Patch test	n/s	n/s	n/a		n/a	n/a	n/a	patients with drug allergy	n/s	n/s	n/s	n/s	n/s	n/a	n/a	n/a	There is paucity of literature on skin drug test concentration and method protocols. For NIHR, the patch test has an equal or slightly lower sensitivity than IDT with delayed readings	n/s	There is paucity of literature on skin drug test concentration and method protocols. For NIHR, the patch test has an equal or slightly lower sensitivity than IDT with delayed readings	Review of the literature and evidence grading established for recommendations	Review of the literature and evidence grading established for recommendations	3a	

Isaksson et al. 1999	Source of funding: work supported by grants from The Swedish Foundation for Health Care Sciences and Allergy Research, the Edvard Welander Foundation and the Finsen Foundation. Budesonide was supplied by Yamanouchi Pharma, Denmark. No competing interests.	University Hospital Leuven, Belgium	Patch testing with budesonide: influence of dose, occlusion time, reading time	Prospective one centre non-consecutive study; patch testing with budesonide in serial dilutions	n/a	patch test	48 h, 5 days for 1 column, 24 h for 1 column.	upper back	n/s		patients previously known to be hypersensitive to 1 % budesonide tested in ethanol	10	n/s	patients previously known to be hypersensitive to 1 % budesonide tested in ethanol	ICDRG	Readings on day 2, 4 and 7	9 of 10 (9/10) patients reacted to budesonide	More patients tested positively to low concentrations of budesonide. The most positive reactors were found when budesonide was tested with 48h occlusion in low concentrations (0.002 %) and read on D4.	n/a	n/a	n/a	n/a	n/a	n/s	One and the same concentration cannot be used to detect contact allergy in all budesonide-allergic patients. - With early readings low concentrations may be preferable. With late readings high concentrations may be recommended. There may be therefore be an argument for patch testing with 2 concentrations (high and low). As not to miss a contact allergy, a late reading after 1	No blinding. Exclusion criteria not defined	Small sample size	3b	
Lammintausta et Kortekangas 2005	n/s	Turku University Central Hospital, Finland	To analyse the usefulness of skin tests in revealing drug allergy. The relevance of skin test results was evaluated with drug provocation studies.	Retrospective one center study (1989-2001)	Provocation test	Patch test, prick test, intradermal test, oral provocation test	48 h	upper back	Time interval between skin reaction and test: 2 months to 20 years. Was not recorded systematically		Patients with history of suspected cutaneous adverse drug reactions	947	n/s	presumed diagnosis of CADR	n/s	If erythema and infiltration and/or edema had developed, the reaction was interpreted as positive. Macular erythema was regarded as nonsignificant	positive patch test reaction in 89 of 826 patients (10.8%); 13 of 16 patch test positive patients (81.3 %) developed exanthema after provocation	n/s	beta-lactams, clindamycin, trimethoprim	n/a	n/a	n/a	n/a	n/s	Skin testing, especially PT, was a useful screening method to find a cause of CADR if the reaction was exanthema and if antimicrobial, cardiovascular or antiepileptic drugs were suspected. When skin tests are negative or dubious, oral challenge should be carried out to confirm association.	Time interval between skin reaction and test not recorded systematically. Acute CADRs were seen in only a few cases and the type of the reaction was often based on the history of the patient. IDT was used in only 31 cases and it could have been useful more often. No blinding.	no blinding	3b	
Lippo et al. 2013	n/s	Turku University Central Hospital, Finland	To identify patient cases with multiple delayed-type drug sensitizations by using patch testing.	n/s, presumably consecutive patients (N=811) with suspected cutaneous adverse drug reactions (CADR)	n/a	commercial products 30%, 15%,10% in pet or water, pure substances 10%, 1%, 0,1% in water, baseline series from Chemotechnique Application with Finn Chambers or Smart Practice	n/s, according to the guidelines of the Eur. Society of Contact Dermatitis	upper back	n/s		general dermatology patients with suspected CADR in a 9 year period	811	n/s	suspected drug allergy	interpretation performed according to the international criteria for patch testing, ESCD	number of patients with positive patch test reactions and patch test reactions to multiple drugs at 48 and 96 h	Positive patch test reactions of drugs were found in 34/811 patients	Multiple delayed drug sensitizations were found in 4/34 patients (12 %) of those patients with positive results in drug patch testing. All tese patients had clinical CADR.	They were all sensitized to one or more antibiotic drugs. Co-sensitization to other drugs was seen in 3 of 4 patients. Patients with multiple sensitizations: Amoxicillin, cephalosporins, Pseudoephedrine, Opioids	n/a	n/a	n/a	n/a	n/s	Drug patch testing is useful in cutaneous adverse drug reactions where multiple drugs are suspected. Importance of testing all culprit drugs. Multiple drug sensitizations can be found in a proportion of patients who have delayed drug allergies.	Small sample size. - Concentrations of the pharmacologically active ingredients varied in the studied patients. No blinding. Frequency of testing per test substance not stated.	unclear whether all tested patients had experienced clinical symptoms	3b	
Osawa et al. 1990	The work was partially supported by Grant-in-Aid for Scientific Research (01570570) from the Ministry of Education, Science and Culture, Japan. No competing interests declared.	Department of Dermatology, Yokohama City University School of Medicine, Yokohama, Japan.	Evaluation of the usefulness of intradermal testing and patch testing in patients with various types of eruptions caused by many kinds of drugs.	Retrospective monocentric non-consecutive study	Provocation test	Intradermal test, Patch test	patch test: 48 h	patch test: upper back	n/s		patients with generalized drug eruptions	242	age:47.2 (1-85); M:F = 97:145	suspected non-immediate drug-eruption; Patients with delayed type drug eruptions: maculopapular erythematous type (MP), erythema multiforme type (EM), erythrodermic type (ED), eczematous type (ECz), lichenoid type (LP), fixed type (FD).	ICDRG	positive: delayed reaction at 48 and 72 h	Positive skin test reactions were found in 31.5 % of the cases patch tested. Patients with anticonvulsant-induced eruptions showed a relatively high positive rate in patch testing (sodium valproate most frequently, but should be tested with less than 5 % in petrolatum).	n/s	n/s	n/a	n/a	n/a	patch test - intradermal test	n/s	Patch testing is safe, but it is still not thought to be as useful as intradermal tests because of low responsiveness to sensitized drugs, except in ED type, ECz type, and anticonvulsant-induced drug eruptions.Intradermal testing and patch testing are useful in vivo assays for detection of drug allergy, because there is still no reliable in vitro assay.The intradermal	n/s	n/d	3b	
Walton et al. 2009	The study was sustained by funds of regional research of University Hospital of Nancy . No competing interests	One centre, retrospective study, University Hospital Nancy, France	To evaluate the negative predictive value of drug skin tests.	One centre, retrospective exploratory study	Provocation test	Patch test, prick test, intradermal test, oral provocation test	patch test: 48 h	According recommendation ESCD	At least 6 weeks after complete disappearance of the CADR		Patients with cutaneous adverse drug reactions	200	mean age: 43.8 years; 72 males, 128 females	cutaneous adverse drug reactions	ESCD	positive: strong drug causality or positive oral provocation test: negative: negative oral provocation test:	42 of 403 rechallenges were positive, thus the negative predictive value of drug skin tests in our unit was 89.6 % : negative skin test (Patch, prick, IDT) 260 oral provocation test: negative predictive value 89.6 %; 143 substitution test: negative predivitive value 89.5 %.	n/s	antibiotics, paracetamol, Nsaid, corticosteroids	n/a	n/a	n/a	skin prick test, intradermal test, patch test and oral provocation	Negative drug skin tests do not eliminate the responsibility of a drug in drug reactions, and must be followed by drug re-administration under hospital surveillance; The rechallenge can be positive even with low drug causality assessment and negative drug skin tests.All the drugs taken	Negative drug skin tests do not eliminate the responsibility of a drug in drug reactions, and must be followed by drug re-administration under hospital surveillance.	no blinding	n/a	2b	
Barbaud 2005	n/s	literature review	Are patch tests helpful in drug allergy?	expert opinion based on literature review	n/a	Patch test, Prick-test, Intradermal-test	patch test: 48 h	back	during the 6 months following the CADR		n/a	n/a	n/a	CADR	ICDRG	according ICDRG	n/a	n/a	n/a	n/a	n/a	n/a	n/a	One relapse of AGEP during patch testing	Drug patch tests can be helpful in determining the cause of CADR. They induce only rarely adverse reactions. - They can be done with any commercialized form of a drug. - A negative patch test does not exclude its role in causing a CADR. - Sensitivity of patch test seems lower than with IDT. - Patch test can be positive in patients with negative IDT.	n/a	Specificity and their negative predictive value of patch tests have not been yet determined.	5	

Barbaud 2009	n/s	literature review	skin testing in delayed reactions to drugs	expert opinion based on literature review	n/a	Patch test, Prick-test, IDT	patch test: 48 h	back	during the 6 months following the CADR		n/a	n/a	n/s	delayed reactions to drugs	ICDRG	patch test: according ICDRG	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Drug skin tests can be helpful in determining the cause of a CADR caused by a delayed hypersensitivity.Drug skin tests can induce adverse reactions, however rare. The results of drug skin tests depend on the clinical features of the CADR and on the tested drug.It is advised to perform drug skin tests during the 6 months following the CADR.Patch tests and prick tests can be done with any	n/a	n/a	5	
Barbaud et al. 2013	n/s	French Multicentre study: Nancy, Dijon, Bordeaux, Créteil, Lille, Angers, Reims, Clermont-Ferrand, Besancon, Suresnes, Thionville, Lomme	To determine the value and safety of drug patch tests in patients with SCAR (DRESS, AGEP, SJS/TEN)	Prospective 3-year french multicentre exploratory cohort study of the "Toxidermies" group of the French Society of Dermatology"	n/a	Patch test, (Prick test, IDT)	patch test: 48 h	upper back	within the 12 months following the resolution of SCAR		Patients with SCAR	134	mean age 51.7 years (range 3-94 years); 48 male, 86 female.	SCAR	according ESCD guidelines	value and safety of drug patch tests in SCAR	tests positive in 64 % (DRESS), 58 % (AGEP), 24 % (SJS/TEN)	n/a	beta lactams (22 cases), pristinamycin (11 cases), pump proton inhibitors (five cases)	n/a	n/a	n/a	n/a	One relapse of AGEP during patch testing	Patch tests conducted with commercialized forms of some drugs diluted to 30 % in petrolatum are of value and safe for investigating AGEP and DRESS. As any inflammatory stimulation could be responsible for virus reactivation in DRESS, we propose conducting patch tests 6 months after the onset rash in DRESS	Few or no controls. No blinding.	No quality-control measures.	2b	
Brahimi et al. 2010	n/s	Multicentric french study: Paris (Hôpital Bichat), Créteil, Montpellier, Rouen, Nancy, Clermont-Ferrand, Tours, Paris, Metz, Brest, Caen, Reims, Paris (Hôpital Saint-Louis), Guadeloupe, Limoges, Bordeaux, Pessac, Paris (Hôpital Pasteur), Paris	to retrospectively collect and analyse well informed cases of fixed drug eruptions observed in a hospital setting.	Retrospective multicentric French nation-wide 3-year-period descriptive non-interventional study (2005-2007).	n/a	patch test	n/s	inconsistenty mentioned whether patch test was done on involved or normal skin or both	n/s		patients with fixed drug eruption	59	mean age: 59 years (8-93); W:M = 1.35 (34 w, 25 m)	fixed drug eruption	n/s	characterisitcs of fixed drug eruptions	tests positive in 12 cases	n/s	paracetamol > piroxicam > Amoxicillin, Carbocystein, > Hydroxyzin, Thiocolchicin; pharmacological groups: NSAIDS > antibiotics	n/a	n/a	n/a	n/a	n/s	NSAID are common causes of FDE. Based on FDE pathogenesis, which is a lymphocyte CD-8-mediated reaction, it has been proposed that the offending drug may induce local reactivation of memory T-cell lymphocytes localized in epidermal and dermal tissues and initially targeted by the viral infection.	no blinding; small number;	retrospective descriptive study	3b	
Duong et al. 2010	n/s	one center, Hopital Henri Mondor, Créteil, France	Sensitivity of patch tests in different SCARs	Retrospective one center study, Hopital Henri Mondor, Créteil, France	n/a	patch test	n/s	n/s	3 to 8 weeks after recovery of drug reaction		patients with SCAR (AGEP, DRESS, FDE, SJS/TEN	111	Mean age : 53 years (21-89); sex ratio 1.3 (F/M);	SCAR	n/s	sensitivity of patch test	46/111 (41 %);	n/s	AGEP (63%), DRESS (50 %), FDE (17 %), SJS/TEN (26 %)	n/a	n/a	n/a	n/a	n/s	Patch test with suspected drug: weak sensitivity. But is very useful tool in assessing the drug responsibility in adverse drug reaction.Sensitivity of patch test is higher with AGEP than with SJS/TEN.Nevertheless an negative patch test will not eliminate the suspected culprit drug.	Inclusion and exclusion criteria specified.No control group.Force of patch test reactions (Reaktionsstärke) not mentioned No information about occlusion time	n/a	4	
Soria et al. 2011	the work (M. Baeck) was partly funded by the Foundation Saint-Luc, Cliniques Universitaires Saint-Luc from Belgium (M. Baeck) the Groupe d'Etudes et de Recherche en Dermato-Allergologie (GERDA), France. A. Soria was supported by a grant from Institut Servier from France. No competing interests declared.	3 centres: Brussels (Belgium), Leuven (Belgium), Lyon (France)	To compare the test results obtained with patch, prick and intradermal testing, to assess the most sensitive method for diagnosing corticosteroid hypersensitivity	3 centre study	n/a	patch test, prick test, intradermal test	8 h, 24 h, 48 h, 96 h	upper back	n/s		subjects with positive patch test reactions to corticosteroids, 3 control subjects	19 patients (positive to corticosteroids); 3 patients (control subjects);	11 women: mean age 55 years; 8 men: mean age 49 years; control subject: 2 women, 54 and 64 years old, 1 men, 66 years old	patients with corticosteroid sensitization, diagnosed by patch test	ICDRG	positive skin test (patch, prick, ICT);	patch and intradermal test results were concordant in 11 of 15 patients.	patch tests most often positive when removed after 48 h and read on day 4 and /or day 7. The intradermal tests gave positive results earlier than patch tests in 11 of 15 subjects, at the same time point in 2 subjects and later than the patch tests in 1 subject.	n/a	n/a	n/a	n/a	patch test, Prick test, intradermal test	n/s	Patch tests with 0.1 % ethanolic dilution showed to be the most adequate and effective way of detecting delayed corticosteroid hypersensitivity. Removing the patch tests ad D2 (or D4), with later readings between 3 and 7 days, provided optimal detection of delayed hypersensitivity to corticosteroids. The use of intradermal tests allows the detection of additional contact allergy cases.	Small sample size; Exclusion criteria not defined; No blinding	3b (study without consistently applied reference standard)	3b	
Tanno et al. 2011	n/s	two centres: Sao Paulo, Brasil	To determine sensitivity and specificity of drug patch test in severe cutaneous adverse reactions	Prospective two-center-study, Sao Paulo, Brazil	History of NIHR to drugs based on adapted ENDA questionnaire	patch test	48 h	n/s	at least 6 weeks after recovery; Mean delay of 3.7 months between adverse reaction and patch testing		patients with SCAR (SJS/DRESS), 20 with history of maculo-papular exanthema 15 with DRESS 10 with SJS 7 with macular exanthema 3 with multiform erythema 3 with photodermatosis 2 with fixed eruption 1 with late urticaria	Patients: 58 females, 3 males, mean age: 48.6 years	mean age: 48.6 years, 90.7 % were women.	patients with SCAR (DRESS, SJS)	European Environmental Contact Dermatitis Research Group	positive patch test reaction on 48 and/or 72 h.	Sensitivity of patch test in all NIHR: 37 %; Specificity of patch test in all NIHR: 100 % Positive predictive value: 100 % Negative predictive value: 20 % Sensitivity of patch test in SCAR: 53.5 %	n/s	aromatic anticonvulsants > antibiotics > NSAID, Sulfonasmides	n/a	n/a	n/a	n/a	none	Patch test may be an useful and safe diagnostic method in assessing the drug involved in NIHR, particularly in SCAR, but low sensitivity	Inclusion and exclusion criteria specified.Control group not specified. Force of patch test reactions (Reaktionsstärke) not mentioned. No blinding		3b	

Wolkenstein et al. 1996	n/s	One center, Department of Dermatology, Hôpital Henri-Mondor, Créteil, France	To study patch testing in severe ADRs (SJS/TEN, AGEP, other severe cutaneous ADRs resulting in hospitalization)	one center study, exploratory cohort with good reference standard	History of severe CADR, scoring system of likelyhood for each drug at occurence of rash	patch test	48 h	back	n/s		Patients with experienced CADRs	59, 20 control subjects (healthy volunteers)	mean age 49 (+/- 15), age 23-76 years, 30 females, 29 males	Patients with experienced CADRs	ICDRG	n/s	Proportion of relevant positive tests significantly higher in AGEP. The proportion of antibiotics among the culprit drugs was significantly lower in SJS/TEN than in AGEP. The proportion of NSAID among the culprit drugs was significantly higher in SJS/TEN than in AGEP	n/s	SJS/TEN: Determination of culprit drug: SJS/TEN (n=22): anticonvulsants n=7, NSAR n=7, sulphonamides N=4, miscellaneous n=4 1 positive test to sulphonamide 1 positive test to phenobarbitale AGEP (n=14): antibiotics n=11, anticonvulsants n=2, diltiazem n=1 2 positive tests to	n/a	n/a	n/a	n/a	n/s	1. Patch testing has a weak sensitivity in SJS/TEN2. Patch testing seems to be rather specific in SJS/TEN3. Patch testing seems to be more adapted to other cutaneous ADRs, such as AGEP4. One can hypothesize that the difference of sensitivity of patch testing in SJS/TEN, AGEP or other cutaneous ADRs could be linked not to the clinical type of eruption, but to the different spectrum of	Small sample size. Exclusion criteria not specified (e.g. prior therapy with immunosuppressants, phototherapy, topical/systemic corticosteroids etc.); no blinding		2b	
Barbaud et al. 1998	The work was supported in part by grants from the Clinical Research Commission of the University Hospital of Nancy and the French Minister of Education and Research. Competing interests not stated.	One center study, University Hospital Nancy, France	The use of skin testing in the investigation of cutaneous adverse drug reactions	one center study, exploratory cohort with good reference standard	Clinical feature of the CADR documented at time of drug rash	Patch test, Prick-test, IDT	48 h	upper back	6 weeks after onset of CADR		Patients with delayed drug eruptions	72 patients	Mean age 52.3 years, SD 21.4 years; 24 men, 48 women	delayed drug eruptions	ICDRG	n/s	Positive results were obtained in 43 % ((photo-)patch), 24 % (prick), 67 % (IDT).	n/s	n/a	n/a	n/a	n/a	nn	n/s		Inclusion criteria defined; Statistical analysis; Control subjects		2b	
Brockow et al. 2009	n/s	European multicentre study; München/Germany, Rome and Troina/Italy, Graz/Austria, Basel/Switzerland, Nancy/France, Verona/Italy, Coimbra/Portugal Bern/Switzerland, Porto/Portugal, Setubal/Portugal, Montpellier/France, Oslo/Norway	To determine the specificity and sensitivity of skin tests in patients who have experienced hypersensitivity reactions to iodinated contrast media.	Prospective European multicentre study, exploratory cohort with good reference standard	History of a typical drug hypersensitivity recorded using the ENDA drug allergy questionnaire	Skin prick test, Intradermal test (IDT), Patch test (PT)	patch test: 48 h	back	minimum delay of 1 week and median delay of 6 months after the CM-induced hypersensitivity		patients with reported previous hypersensitivity reactions after CM exposure	220, 82 control patients	Median age at the time of the diagnostic testing: 54 years (age range 12-83 years) for immediate group and 58 years (age range 12-80 years) in non-immediate group, 80 females, 57 males	hypersensitivity reactions to iodinated contrast media	ESCD	n/s	Patch tests were conducted in 79 patients with non-immediate reactions, 22 were tested positive. About 50 % of patients in the immediate and non-immediate group could be diagnosed by standardized skin tests, if testing was conducted within 2-6 months after the reaction. 50 % of the hypersensitivity reactions to RCM are cause by an immunological reaction. Specificity of delayed IDT and PT were both 100%.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	At least 50 % of hypersensitivity reactions to contrast media are caused by an immunological mechanism. Skin testing appears to be a useful tool for diagnosis of contrast medium allergy and may play an important role in selection of a safe product in previous reactors.Skin testing seems to be a useful tool for diagnosis of CM allergy and may play an important role in selection of a safe product in previous reactors.Specificity of skin tests is as high as 96-100 %.Further studies are required to establish their negative predictive value.	Recruitment bias possible (missing patients with milder reactions); No provocation -> skin test sensitivity cannot determined with certainty; No blinding.	Control group (71 never exposed subjects, 11 subjects who had tolerated contrast medium exposure); Negative predictive value has yet to be determined	2b	
Brockow et al. 2005	n/s	literature review	Clinical and diagnostic aspects of hypersensitivity reactions to iodinated contrast media	expert opinion based on literature review	n/a	Skin prick test, Intradermal test, Patch test	patch test: 48 h	back	n/a		n/a	n/a	n/a	hypersensitivity reactions to iodinated contrast media	n/s	n/s	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Specifity and sensitivity of skin testing in contrast media allergy remain to be established	n/a	n/a	5	
Kleinhans et al. 2002	n/s	One centre study, University Hospital Frankfurt	to evaluate tolerability of Celecoxib in NSAID-sensitive patients using patch test, scratch test and oral provocation	consecutive patients,exploratory cohort with good reference standard	single blind placebo controlled oral provocation test	Patch test with homogenized Celebrex undiluted (?), 5% and 10% in pet and oral provocation	48 h	n/s, presumably back	n/s		patients with history of NSAID sensitivity (symptoms within 6 h after ingestion and other compounds of the drug subsequently tolerated)	14	6 males, 8 females, age 18-72 years	presumed NSAID sensitivity	International Contact Dermatitis Research Group (IC- DRG)	non irritant patch test concentration of Celebrex	Patch test with homogenized Celebrex: 8 of 10 patients + at D2 with decrescendo between D2 and D3. In 9 control patients without NSAID-hypersensitivity similar reactions in patch test.	Celebrex 5% and 10% caused no reaction in any patient. All 14 patients tolerated Celebrex in oral provocation	n/a	n/a	n/a	n/a	scratch tests with homogenized Celebrex (undiluted ?) was negative, as was oral provocation	n/s	When performing patch tests with Celebrex, final concentrations of about 10 % homenized Celebrex in petrolatum should be used.	Small sample size; Exclusion criteria not defined; No blinding	it is not clear whether nonirritant skin test concenrations are able to detect sensitization to COX 2 Inhibitors	2b	

Barbaud et al. 2001	n/s	guideline	To give guidance for diagnostic procedures in the diagnosis of cutaneaous adverse drug reactions	literature review and expert consens	n/a	Skin prick test, Intradermal test, Patch test, in vitro tests (spec. IgE, CAST, LTT, Elispot)	PT: n/s readings after 20 minutes, 48h, (72h), 96h, if negative: also: after one week.	upper back, in FDE also previous site of drug eruption	6 weeks to 6 months		Patients with cutaneaous adverse drug reactions	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	The results of drug skin tests also depend on the clinical features of the CADR. The use of appropriate control patients is necessary to avoid false-positive results. To determine the sensitivity and specificity of drug skin tests in investigating CADR, it is necessary to organize multicentre studies using the same guidelines	n/a	n/a	5	
Johansen et al. 2015	individually stated for each author	guideline	To give guidance for diagnostic patch testing-recommendations on best practice including the diagnosis of drug eruptions	literature review and expert consens	n/a	PT, ROAT, Semi-open test, Open test, Photo-PT	D2 and D3 or D4 and around D7 (optimum):	Upper back (same as for the investigation of allergic contact dermatitis, except for fixed drug eruption: additional lesional patch testing is advised	at least 4–6weeks after complete resolution of the CADR		Patients with cutaneaous adverse drug reactions	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Patch testing is a safe procedure, even in patients with severe CADRs, apart from exceptional cases of reactivation of the CADR	n/a	n/a	5	
Brockow et al. 2015	n/s	guideline	To give guidance for diagnostic procedures in the diagnosis of drug hypersensitivity	literature review and expert consens	n/a	Skin prick test, Intradermal test, Patch test, in vitro tests (spec. IgE, CAST, LTT, Elispot)	PT: in cases with reported exanthema: 24h or 48h; in case of previous anaphylactic reactions: reading after exposure of 20 or 30 minutes	n/s	n/a		Patients with drug allergy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Although drug hypersensitivity cannot be reliably ruled out even by applying all available test methods, they do make better risk assessment easier.	n/a	n/a	5	

n subgroup/ study population
N total number of patients
m mean
n/s not stated
n/a not applicable
M/F male /female

Study characteristics					Methods								Results										Critical Appraisal of Study					
First Author year	Sources of funding and competing interests	Setting	Aims and Objectives	Questions addressed	Study Design	Reference standard test	Diagnostic test(s) evaluated	Duration of exposition	Application site	Investigator(s) and assessor(s) training	Inclusion criteria	Control group	Patients included [n]	Patients [age (mean/range); gender (M/F)]	Grading/Classification/Strength of reaction	Definition of outcome	Results	Statistics	Accuracy	Reproducibility	Cut-Off determination	Comparison of two or more tests	Adverse effects	Authors' conclusion	Author conclusion	Internal validity	external validity	Evidence level (Oxford)	Other/ Addendum (Optional)
Rajagopalan 1997	n/a	Winston-Salem USA	To study the costs associated with diagnosis and treatment of suspected allergic contact dermatitis and the benefits of diagnosis with and without patch testing.		cohort study	n/a	patch testing	n/a	n/a		expected contact allergy	not patch tested	587	mean age: 46,5 female: 71%	n/a	costs of disease and quality of life	There was significantly better improvement in each of the DLQI domains in patch tested subjects compared with non-patch-tested subjects.	two-sample t-test	n/a	n/a	n/a	n/a	n/a		Patch testing helps to diagnose the etiology of contact dermatitis early and treat the disease before it becomes chronic, thus reducing resources used and improving patient quality of life considerably.	differences in the methods used for diagnosis might have influenced the outcome and were not controlled, reasons why patients were patch tested or not are not transparent	it can not be proven, that the study groups are representative for the general population	IV	
Rajagopalan 1998	n/a	Winston-Salem Wilmington Louisevilla, USA	To show the cost-effectiveness of patch testing in patients suspected of allergic contact dermatitis and the importance of disease severity in terms of cost-effectiveness.		cohort study	n/a	patch testing	n/a	n/a		expected contact allergy	not patch tested	587	mean age: 46,5 female: 71%	n/a	costs of disease in correlation to severity	Early confirmation of diagnosis helped reduce the prediagnosis costs of treatment. The greatest quality of life benefits from patch testing, relative to no patch testing, occurred in subjects with recurrent or chronic ACD.	two-sample t-test	n/a	n/a	n/a	n/a	n/a		Patch testing is most cost-effective and reduces the rest of therapy in patients with severe ACD.	differences in the methods used for diagnosis might have influenced the outcome and were not controlled, reasons why patients were patch tested or not are not transparent	it can not be proven, that the study groups are representative for the general population	IV	
Raap 2009	n/a	Hannover, Germany	To analyse positive patch test reactions to metals used in dentistry together with clinical symptoms and possible relevance to dental fillings.		case series	n/a	patch testing	48h	back		suspected contact allergy to dental metals	n/a	206	n/a	n/a	patch test reaction to dental metals	14 (7%) of 206 patients had a clinically relevant contact allergy with conditions of the oral mucosa (n = 7 with lichen planus and n = 7 with stomatitis) and positive patch test reactions to dental metals containing the suspected allergen.	n/a	n/a	n/a	n/a	n/a	n/a		Clinically relevant contact allergies to dental metals are infrequent. Patch test reactions may be of clinical significance in association with stomatitis and lichen planus close to dental fillings containing the contact allergen.	n/a	the population studied may not be representative for the general population	IV	
Schalock 2011	n/a	Boston Cleveland San Francisco, USA, Copenhagen, Denmark Stockholm Malmö, Sweden	To review the evidence regarding diagnostic tools, especially patch and lymphocyte transformation tests, for hypersensitivity reactions to implanted metal devices		systematic review of case reports and case series expert opinion	n/a	patch testing lymphocyte transformation test	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		Patch test evaluation is the gold standard for metal hypersensitivity, although the results may be subjective. Regarding pre-implant testing, those patients with a reported history of metal dermatitis should be evaluated by patch testing. Those without a history of dermatitis should not be tested unless considerable concern exists. Regarding post-implant testing, a subset of patients with metal hypersensitivity may develop cutaneous or systemic reactions to implanted metals following implant.	n/a	n/a	IV	
Thomas 2015	n/a	Munich Göttingen Bochum Heidelberg Essen Halle Frauenberg Erlangen, Germany	To state the position of the DKG regarding the use of metal alloy discs for patch testing in suspected intolerance to metal implants		systematic review of case reports and case series expert opinion	n/a	patch testing	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		Patch testing with metal alloy discs can not be recommended	n/a	n/a	IV	
van der Valk 2003	n/a	Nijmegen, The Netherlands Gent, Belgium Groningen, The Netherlands	To review the criteria for evidence based patch testing		expert opinion and case series	n/a	patch testing	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		Patch testing is safe and cost-effective if patients are selected properly. Random patch testing should be discouraged. Tests are routinely performed. Tests are hardly informative.	n/a	n/a	IV	

Study characteristics					Methods									Results													Critical Appraisal of Study					
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Questions addressed**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposure**	**Application site**	**Reading times**	**Time interval and treatment(s) administered between the tests**	**Investigator(s) and assessor(s) training**	**Inclusion criteria**	**Patients included [n]**	**Patients [age (mean/range); gender (M/F)]**	**presumed Diagnosis**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (overall positive reactions)**	**Results II (reactions with different exposure times)**	**Results II (3 most frequently reported substances?)**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**	**Authors' conclusion**	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
Brasch 1994	n/s	11 centers of the Information Network of Departments of Dermatology (IVDK), Germany	To determine the efficiency and reproducibility of patch tests to identify factors influencing these features		prospective cohort	n/a	"10 distinct allergens" (in duplicates on right and left back)	24h (n=647), 48h (638)	back	1. D1/2 (24/48h) 2. D3 (72h)	n/a		patients with an indication for patch testing	1285 patients	487/798	n/s	International Contact Dermatitis Research Group and German Contact Dermatitis Research Group	Number of questionable (?) reactions at D3 reading (comparison 24h vs. 48h exposure time)	(at D3): 1857 allergic reactions (no significant difference between exposure times)	Significantly more questionable reactions at D3 reading in the 48h group as compared to the 24h group	n/a	n/a	n/a	n/a	n/a	not reported		Since no data on clinical relevance were obtained in this study, no firm conclusion can be drawn with regard to advantages or disadvantages of the different exposure times	no blinding, only 10 allergens tested, aim of study was not to find optimum occlusion time		3b	
Brasch 1995	n/s	18 centers of the Information Network of Departments of Dermatology (IVDK), Germany	To use the reaction index (RI) as a tool to analyse the dependency of patch test results on characteristics of patients and on patch test methods		retrospective analysis of patch test data from the database of the IVDK (15.553 patients)	n/a	13 European standard series allergens showing positive reactions most frequently	24h (7 centers), 48h (11 centers, 64% of patients)	n/s	1. D1/2 (24/48h) 2. D3 (72h) 3. D4 (96h, "sometimes")	n/a		patients tested with the standard series	15.553 patients	36.3% male, 27.2% younger than 30 years, 20.5% older than 60 years	n/s	International Contact Dermatitis Research Group and German Contact Dermatitis Research Group	RI at different reading time points RI= (a-q-i) / (a+q+i) a=number of allergic reactions q=number of questionable reactions i=number of irritant reactions -1: all non-negative reactions are i/q +1: all non-negative reactions are a	n/s	Consistently higher RI (i.e. more irritant / questionable reactions) for patients with patch tests attached for 1 day as compared to 2 days (p<0.01)	n/a	n/a	n/a	n/a	n/a	not reported		Allergen exposure for 1 day instead of 2 days should be considered	no blinding, no exclusion criteria		4	
Goh 1994	n/s	Dermatological Clinic, Singapore	to investigate whether 1-day allergen occlusion could elicit positive patch test reactions reliably		prospective study (15 patients)	n/a	the clinic`s standard series allergens	24h versus 48h	both scapular areas of the back (two sets of the standard series)	1. D2 2. D4	n/a		patients with at least one positive patch test reactions to the standard series 1 year ago	15 patients	n/s	n/s	n/s ("standard method")	concordance rates at D4 reading (reactions at least +) (comparison 24h vs. 48h occlusion)	43 positive patch test reactions	37/43 (86%) reactions concordant 4 reactions positive only after 48h occlusion, 2 reactions positive only after 24h occlusion	n/a	n/a	n/a	n/a	n/a	not reported		"our study showed that we could patch test patients with 1-day occlusion to the same concentrations as those used for 2-day occlusion, with a satisfactory concordance rate"	no blinding, small n, discordance might be due to poor reproducibility of patch tests (left-right comparison)		3b	
Kalimo 1984 (Handsuche)	n/s	Department of Dermatology, Turku, Finland	comparative study (occlusion time 24h vs. 48 h)		prospective study	n/a	11 allergens of the ICDRG standard series in duplicate	24 and 48h for each allergen	back	In all but 3 cases at least twice (decisive test reading 72 or 96h)	n/a		n/s	390 patients	n/s	n/s	n/s	Concordant / discordant allergic / irritant reactions at D3/D4 (comparison 24/48h occlusion)	Positive reactions: Erythema plus induration or papules / vesicles: 129 reactions Irritant reactions: Macular erythema or pustular folliculitis: 55 reactions	Allergic reactions: n=96 (74%) concordant reactions, n=33 (26%) discordant reactions (n=22 only after 48h occlusion, n=11 only after 24h occlusion) Irritant reactions: n=19 (35%) concordant reactions, n=36 (65%) discordant reactions (n=15 only after 24h occlusion, n=21 only after 48h occlusion)		n/a	n/a	n/a	n/a	not reported		Allergic and irritant reactions were more frequent with th 48h than with the 24h occlusion time	No blinding, small n, no diagnosis, no inclusion / exclusion criteria, "Allergic and irritant reactions were only recorded if they were seen at 72h or later", reading "at least twice" (not clearly defined)		3b	
Skog 1978	none	Dermatology Department, Stockholm, Sweden	Comparison between 24- and 48-hour exposure time in patch testing		prospective cohort	n/a	"the test substances and concentrations recommended by the ICDRG" in duplicate	24/48h	back	1. 15 min after removal (24/48h) 2. 24h after removal (48/72h)	n/a		n/s	n/s	n/s	n/s	International Contact Dermatitis Research Group	Concordant / discordant reactions : At least + reactions (erythema, infiltration) at last reading reading (comparison 24h/48h occlusion)	24h occlusion: 27 48h occlusion: 26	22 substances concordant results 8 substances in 7 patients discordant results (4 substances: 24h occlusion + / 48h occlusion -, 4 substances 24h occlusion - / 48h occlusion +)	discordant allergens: 2x formaldehyde	n/a	n/a	n/a	n/a	not reported		The two methods can give different results	no blinding, sample size unknown, no inclusion/exclusion criteria, indication for patch test not given, formaldehyd tested 2% (many irritant reactions), final reading 24h occlusion at 48h, 48h occlusion at 72h		3b	
Uter 1996	German Federal Ministry of Research and Technology	17 centers of the Information Network of Departments of Dermatology (IVDK), Germany	To assess the necessity of late readings and the influence of the exposure time ("comparison of exposure time not the main topic of the study")		retrospective analysis of patch test data from the database of the IVDK (21.062 patients)	n/a	standard methods described elsewhere. 9216/9946 patients were tested with the standard series	48h (subgroup 24h: 32,7% of 9946 patients analysed)	n/s	1. D2 (48h) 2. D3 (72h) 3. D4 (96h) (subgroup)	n/a		patients who had at least one positive reaction at D2 or later, provided readings were done on D2 and D3	9946 patients	n/s	n/s	International Contact Dermatitis Research Group	Number of crescendo reactions D2-D3, decrescendo reactions D2-D3, reactions positive D2 and D3	Reactions positive either on D2 and /or D3: 30.699	comparison: reactions negative D2, positive D3 of all reactions positive D2 and/or D3: 10.589/30.699 (34.5%), dependent on exposure time (significantly more reactions positive exclusively at D3 with exposure 48h) reactions positive on D2, negative on D3 of all reactions positive D2 and/or D3: 2.561/30.699 (8.3%), not dependent on exposure time reactions positive both on D2 and D3 of all positive reactions: 17.549/30.699 (57.2%), dependent on exposure time (significantly more reactions positive at both readings with 24h occlusion)		n/a	n/a	n/a	n/a	not reported		1. Shorter allergen exposure may result in false-negative reactions in weak sensitization because an insufficient quantity of allergen penetrates the skin 2. occlusion itself may modulate immune responses	no blinding, comparison of 24vs48h occlusion not main aim of study, no exclusion criteria		4	

n subgroup/ study population
N total number of patients
m mean
n/s not stated
n/a not applicable
M/F male /female

Study characteristics					Methods									Results												Critical Appraisal of Study					
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Questions addressed**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposure**	**Application site**	**Reading times**	**Time interval and treatment(s) administered between the tests**	**Investigator(s) and assessor(s) training**	**Inclusion criteria**	**Patients included [n]**	**Patients [age (mean/range); gender (M/F)]**	**presumed Diagnosis**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (visual reading)**	**Results II (flowmetry)**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**	**Authors' conclusion**	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
Van Strien 1994	n/s	University Hospital Leiden, The Netherlands	To establish the existence of intra-regional variations in response to allergen on the back		prospective cohort	n/a	The allergen to which the patient had a positive reaction on routine patch test was applied in duplicate	2 days	1. regio scapularis 2. regio lumbalis of the back	D2	n/a		patients who had a ++ patch test response on routine patch testing	21 patients	7/14, aged 17-70 yrs	n/s	International Contact Dermatitis Research Group and German Contact Dermatitis Research Group	Comparison of 1. visual readings 2. laser Doppler Flowmetry of both test sites (Student t-test)	1. no significant difference in visual scores between both test sites	Significant difference in doppler flowmetry with stronger responses on upper back	n/a	n/a	n/a	n/a	not reported		Symmetrical sites (left versus right) should be studied	no blinding, low patient number, differences in inflammatory response due to enhanced pressure of the test patches could not be excluded, reading only at D2		3b	
Simonetti 1998	n/s	University Hospital Modena, Italy	To assess if positive responses to nickel sulfate are missing owing to contingent problems, referring to patch test site, patch test execution of variations in skin reactivtity		prospective cohort of consecutive patients undergoing patch tests	n/a	2 nickel preparations (nickel sulfate 5% pet provided by Hermal and Firma Company) applied on 2 different sites of back. After 2 months the test was repeated with cross application of allergens	3 days	1. upper left side of back 2. lower right side of the back	1. after 75h 2. after 96h	n/a		patients undergoing routine patch tests	3040 patients, 30 of these with cross application after 1-2 months	1117/1923, aged 1-75yrs	Allergic contact dermatitis	International Contact Dermatitis Research Group and German Contact Dermatitis Research Group	comparison of visual reading of both test sites	the same number of positive reactions was observed when the patch test site had changed	n/a	n/a	n/a	n/a	n/a	not reported		No variations in patch test responses in relation to application sites were observed	no blinding, occlusion for 3 D, reading only at D3, low number of patients undergoing cross allergen application		3b	
Lindelöf 1992	n/s	Karolinska Hospital Stockholm, Sweden	To investigate regional variations of patch test response in nickel-sensitive patients		prospective cohort	n/a	nickel patch from the TRUE Test series on 6 different areas (hexaplicates)	2 days	1. chin 2. neck 3. back 4. upper arm 5. thigh 6. palm	D3	n/a		patients who had ++ or +++ patch test reactions to nickel prior to the study	24 patients	1 male, 23 female	Allergic contact dermatitis	0-3 with intermediate half steps	Visual reading: Comparison of mean skin response in different patch test sites	Patch test reactivity on the back was significantly higher than on the palm. Decreasing reactivity: 1. chin 2. neck 3. back 4. upper arm 5. thigh 6. palm	n/a	n/a	n/a	n/a	n/a	not reported		Regional variations in the patch test response must be considered when patch testing is performed on the limbs.	no blinding, reading only at D3, low number of patients		3b	
Memon 1996	n/s	University of Liverpool, UK	To compare the effects of varying the quantity, dose and application site of the antigen		prospective cohort	n/a	1. Nickel containing coins on different sites of the back (n=24) 2. Diluation series of Nickel sulfate (5 concentrations) on back and flexor surface (n=10) 3. 5 mg Nickel along the forarm (n=6)	2 days	see diagnostic tests evaluated	D2	n/a		nickel sensitive individuals	see diagnostic tests evaluated	n/s	nickel sensitivity	International Contact Dermatitis Research Group and German Contact Dermatitis Research Group	Comparison of 1. visual readings 2. erythema meter (n=7)	1. Coins: 95% reproducibility between upper and lower back 2. Dilution series: 5/10 pats no difference between back and forearm 4/10 pats back > forarm, 1/10 pt forearm > back 3. 5%Nickel: 4/6 pats lower forearm more reactive than upper, 2/6 pats identical reactivity	2. No significant difference between between forearm and back (erythema meter)	n/a	n/a	n/a	n/a	not reported		There are variations in reactivity in widely separated body sites, i.e. back and arm. Provided the quantity of applied antigen /vehicle is above a minimum level, the patch-test method for the assessment of contact hypersensitivity is reliably robust	no blinding, low patient number, reading only at D2		3b	

n	subgroup/ study population
N	total number of patients
m	mean
n/s	not stated
n/a	not applicable
M/F	male /female

Study characteristics				Methods										Results											Critical Appraisal of Study				
	Sources of funding and competing				Reference	Diagnostic test(s)	Duration of	Application		Time interval and treatment(s) administered between the	Inclusion		Patients [age (mean/range); gender	presumed								Cut-Off	Comparison of						
[illegible]																													
[illegible]	[illegible]	18 centers of the Information Network of Departments of Dermatology	To use the reaction index (RI) as a tool to analyse the dependency of patch test	retrospective analysis of patch test data from the database of the		13 European standard series allergens showing positive	24h (7 centers), 48h (11 centers,		1. D1/2 (24/48h) 2. D3 (72h) 3. D4 (96h,		patients tested with the standard	[illegible]	36.3% male, 27.2% younger than 30		International Contact Dermatitis Research Group	RI at different reading time points RI= (a-q-i) / (a+q+i) a=number of allergic reactions q=number of questionable reactions i=number of irritant reactions -1: all non-negative reactions are i/q +1: all non-negative reactions are		RI higher at D3 than at D2 readings for all allergens. Patients with D3 AND D4 readings: increase of RI from D3 to D4.								no blinding, occlusion time 24 or 48 h, aim not comparison of reading			
Massone 1989	n/s	Genova, Italy	to evaluate 4-day patch test reactions to neomycin and formaldehyde	retrospective data analysis	n/a	"GIRDCA standard series"	48h?	n/s	1. D2 (48h) 2. D4	n/a	patients who were tested with the GIRDCA standard series	526	gender: 171/405	n/s	"according to Wilkinson" (Acta Derm Venereol 1970)	% patch tests negative at D2, positive at D4 (of all positive on D2 and / or D4)	Neomycin: 17 (3.0%), Formaldehyde: 15 (2.6%)	Reactions negative at D2, positive at D4: Neomycine 13/17 (76.5%) Formaldehyde 10/15 (66.7%) Diaminodiphenylmethane (45.5%)		n/a	n/a	n/a	n/a	not reported	need for 4-day patch test reading in order not to underestimate the frequency of neomycine sensitivity	no blinding, no reading on D3, figures given only for neomycine, formaldehyde and diaminophenylmethane, exclusion criteria missing, to explore necessity of reading after D2 was not the main aim of study. What is meant by GIRDCA standard series ? Occlusion time not clear, grading according to Wilkinson not clear	study population not described	4	
Rietschel 1988	n/s	4 centers, USA	not clearly stated, review of data of continued reading after D2	retrospective data review	n/a	"32 different substances"	48h	n/s	1. D2 (48h) 2. D3 or D4 or D7	n/a	n/s	579	n/s	n/s	n/s	"% found reactions": D2 negative, subsequent readings (D3-7) positive	n/s	204 found / 594 (true positives = persistent + found) (34% missed true positives) "Large number of additional positive reactions regardless of when the delayed reading was taken"		n/a	n/a	n/a	n/a	not reported	The delayed reading can be adjusted to a wide variety of time schedules within the 3- to 7-day range.	no blinding, no inclusion criteria/diagnosis, reading times differ, grading unclear, "32 different substances", cinnamic aldehyd tested with 2% concentration	study population not described	4	
Shehade 1991	n/s	University Hospital, Manchester, U.K.	To analyse the results of the standard series and to quantify the proportion of persons who had negative patch test results at day2 but who were shown to be allergic at day 4	retrospective data analysis ?	n/a	"modified standard series" (International Contact Dermatitis Research Group), 34 substances	48h	n/s	1. D2 (48h) 2. D4	n/a	n/s	n/s	n/s	n/s	International Contact Dermatitis Research Group	%reactions negative at D2, positive at D4 of all positive reactions	4210 positive allergic reactions	D4-only reactions: 995 (24%)		n/a	n/a	n/a	n/a	not reported	D2-only patch test reading gives inaccurate conclusions and should be abandoned	no blinding, to explore necessity of reading after D2 was not main aim of the study, "modified" standard series, inclusion criteria/diagnosis not clear, number of patients included not clear, exclusion criteria missing	study populations not described	4	
Soni 1997	n/s	University Hospital, India	to determine the number of positive reactions at D3 that are negative at D2, the number of positive reactions on D2 that are negative at D3 and the number of positive reactions at both readings	retrospective chart review of 226 patients	n/a	23 allergens of the European Standard series plus 3 additional allergens (landin, cresol, gentamycin)	48h?	n/s	1. D2 (48h) 2. D3	n/a	n/s	[illegible]	n/s	n/s	n/s	1. reactions negative at D2, positive at D3 2. reactions negative at D3, positive at D2	212 positive reactions in 125 patients	1. 68 (32%) 2. 28 (13%)		n/a	n/a	n/a	n/a	not reported	D3 (or D4) reading should be made of every patch test	no blinding, occlusion time not clear, no inclusion criteria/diagnosis, grading not clear, exclusion criteria missing sparse information about patch test performance, no information about allergens inducing early and late reactions	study populations not described	4	
Thyssen 2008	Copenhagen County Research Foundation, Nickel Producers Environmental Research Association (NIPERA)	Gentofte University Hospital, Denmark	To investigate the optimal patch test reading time with repeated nickel patch test readings	prospective cohort, unselected schoolgirls	n/a	nickel sulfate 5% (TRUE test)	48h	upper back	1. D2 (48h) 2. D4	n/a	n/s	430 with readings D2 and D4	all patients female girls 1. girls from public schools: mean 12.4y 2. girls from high schools: mean 18.8 y	unselected schoolgirls, no diagnosis	International Contact Dermatitis Research Group	reactions positive D4, negative D2	44 positive allergic reactions (+ at D4)=100%	reactions negative D2, positive D4: 18.2% (group 1) resp 29.6% (group 2)		n/a	n/a	n/a	n/a	not reported	18.2-29.6% of positive patch test reactions may be missed if readings are performed only on D2	no diagnosis, unselected children, exclusion criteria missing, no blinding, two groups with differing mean age, nickel only allergen tested	study population only females only children / adolescents	3b	
[illegible]	German Federal Ministry of Research and	17 centers of the Information Network of Departments of Dermatology	To assess the necessity of late readings and discuss the consequences of	retrospective analysis of patch test data from the database of the		standard methods described elsewhere,	48h (subgroup		1. D2 (48h) 2. D3 (72h)		patients who had at least one positive reaction at D2 or later, provided readings were done on D2	9946 (32.7% of patients with exposure time 24h); 9216 of these were tested with the					Reactions positive either on D2, D3 or	D2/3 comparison: reactions negative D2, positive D3 of all reactions positive D2 and/or D3: 10.589/30.699 (34.5%) D2/3 comparison: reactions								no blinding; bias: patch tests with highly suspected allergens that were doubtful or negative on D2 and D3 had been selectively followed up,			
Geier 1999	n/s	University Hospital, Göttingen, Germany	to obtain information on the optimum day for the second reading after D2	retrospective data review	n/a	for single allergen analysis: 15 standard allergens which produced positive reactions most frequently (otherwise n/s)	48h	n/s	1. D2 2. D3 3. D4 or D5 or D6	n/a	Test which were applied on Monday (read at D3,4), Tuesday (read at D3,6) or Wednesday (read at D3,5)	Monday group (D4): n=1096, Tuesday group (D6): n=1136, Wednesday group (D5): n=1243	n/s	allergic contact dermatitis	International Contact Dermatitis Research Group, German Contact Dermatitis Research Group	1. gained reactions = increasing reactions: negative/doubtful/irritant D3, positive D4/5/6 2. lost reactions= decreasing reactions: positive D3, negative/doubtful/irritant D4/5/6	reactions at D3 and / or D4/5/6: D4 group: 1980/68.807 D5 group: 1920/65.394 D6 group: 1840/61.894	More positive reactions were lost than gained (also in patient subgroup analysis) : D3/4 comparison: lost 17%, found 13%		n/a	n/a	n/a	n/a	not reported	A 2nd reading at D4 is not superior to a 2nd reading at D3.	no blinding		4	
Todd 1996	Louis Forman Charitable Trust, Chemotechniques Diagnostics	4 centers (Jordan, Northern Ireland, Egypt)	To determine whether a single patch test reading is best performed on D3 or D4 after application of the test	prospective cohort	n/a	European standard series and other allergens determined by clinical presentation	48h	back	1. D2 2. D3 3. D4	n/a	patients referred from general dermatology clinics for patch testing who consented to return for 3 readings	88	n/s	n/s	International Contact Dermatitis Research Group	True allergic reactions detected by a single D2, D3 or D4 reading (true positive reactions: allergic reactions of past or present relevance) false-positive: + or more which was interpreted as irritant false-negative: ?+ or - which was interpreted as allergic criteria: morphology, nature of patch test substance, presence of other reactions, clinical history, examination of patient)	90 reactions in 49 patients were considered to be true allergic reactions of past or present relevance	Single D2 reading detected 58 (64.4%) of all true-positive reactions Single D3 reading detected 77 (85.6%) of all true-positive reactions Single D4 reading detected 85 (94.4%) If all true-positive reactions		n/a	n/a	n/a	n/a	not reported	Paired readings are more accurate than a single reading When paired reading is not possible single reading should be performed on D4	small n, definition of true positive patch test reactions not only based on morphologic criteria, but also on history etc., no blinding, exclusion criteria missing	study population not described	3b	
[illegible]	German Federal Ministry of Research and	17 centers of the Information Network of Departments of Dermatology	To assess the necessity of late readings and discuss the consequences of	retrospective analysis of patch test data from the database of the		standard methods described elsewhere,	48h (subgroup		1. D2 (48h) 2. D3 (72h)		patients who had at least one positive reaction at D2 or later, provided readings were done on D2	9946 (32.7% of patients with exposure time 24h); 9216 of these were tested with the				Positive: D2 and/or D3 and/or D4 Comparisons of readings: 1. D2 to	Reactions positive either on D2, D3 or	D3/4 comparison: reactions negative D3, positive D4 of all reactions positive D3 and/or D4: 982/6.510 (15.1%) D3/D4 comparison: Reactions positive on D3 but not D4: 1.037/6510								no blinding; bias: patch tests with highly suspected allergens that were doubtful or negative on D2 and D3 had been selectively followed up,			
after 7-10 days																													
[illegible]	[illegible]	[illegible]	To report the authors´ experience with extended readings (day 7 and beyond) of	retrospective chart review (n= 150					1. D3 (48h) 2. D5 (96h)		patients suspected of having allergic contact dermatitis to topical corticosteroids , complete readings	135 patients (1.656		allergic contact dermatitis to topical											Low yield of late reactions to corticosteroids. To adequately address whether extended readings are necessary when patients are tested with corticosteroids, a correctly powered study of patients with known corticosteroid allergy and	no blinding, small n, no other allergens than corticosteroid were tested, time point for third reading not exactly defined: readings "between" D7-			
[illegible]			to determine 1. which allergens show delayed-positive reactions (after D5) and to measure the frequency of delayed-positive reactions, 2. whether a later reading could replace the day-5 reading and to determine whether some positive	retrospective chart review (n=372					1. D3 (48h) 2. D5 (96h) 3. once during D7-D10 suspected metal allergy: additionally once during D10-14,		"predominantly patients with suspected allergic contact dermatitis to metals and corticosteroids	n = ? patients ? ("reactions to 170 allergens that had been tested in at least 50 patients (30.817		allergic contact		1. newly positive reactions after D5 (i.e. D7-21)		1. 165 newly positive patch test reactions out of 30.817 individual patch tests	newly positive reactions: gold sodium thiosulfate, dodecyl gallate, palladium chloride, neomycine sulfate and others dissipating reactions: balsam						1. If reactions to metals or topical antibiotics are suspected, consideration should be given to readings after day 5 2.Substituting a later reading (day 7 and after) for the D5 reading might exclude reactions to	1.bias: inclusion criterion patients who were tested due to suspected metal and corticosteroid allergy, but also test reactions to other allergens were evaluated (bias towards negative results for these allergens) 2."macular erythema reactions were considered positive if the results were relevant" 3. physicians with modest patch test experience were involved in reading patch tests 4. exclusion criteria missing 5. only metals read at D10-14, D21 6. allergens			
Dickel 2000 [additional methods paper]	Biocontinental Association for Education and Research in Dermatology	University Hospital Two centers Cleveland, Ohio, USA	to determine the frequency of lost, found, and persistent reactions to standard screening tray	retrospective chart review of 1005 patients	n/a	standard screening tray - patch test [standard methods described elsewhere]	48 h	back	1. D3 (72h) 2. between D4 (96h) and D8 (192h)	n/a	patients in whom readings were performed twice, first at day 3 (72 hours) and again between day 4 (96 hours) and day 8 (192 hours)	587 patients	n/s	n/s	American Academy of Dermatology	positive day 3 (72h) and onwards - persistent reactions positive day 3 only - lost reactions negative day 3 neg and positive later on - found reactions	550 reactions	found: 81/550 (15%) reactions persistent: 342/550 reactions lost: 127/550 reactions	found: neomycin sulphate (19/36); ethylene diamine dihydrochloride (5/13); p-tert-butylphenol formaldehyde resin (2/6), diazolidinyl urea (6/20), mercaptobenzothiazole (2/7), p-phenylenediamine (10/34)	n/a	n/a	n/a	n/a	not reported	No evidence for the conclusion "Found reactions are probably significant and clinically relevant in most cases"	no blinding; small n per test substance; time point for second reading (D4-D8) not exactly defined, exclusion criteria missing	study population not described	4	
Higgins 2013	n/s	University Hospital, Dublin, Ireland	To identify the benefit of performing a day 7 reading to identify relevant late positive reactions and to identify allergens with delayed positive reactions	retrospective review	n/a	British Society for Cutaneous Allergy (BSCA) standard series, additional tests according to patient´s history	48h	upper back	1. D2 (48h) 2. D4 3. D7	n/a	n/s	203 patients	>14 years	n/s	International Contact Dermatitis Research Group	delayed reaction: Negative or doubtful positive reaction on D2 and 4 and positive reaction on D7	n/s	26 patients had delayed reactions (12.8%): 28 reactions to 21 allergens	mercury (2), cobald chloride (2), colophony (2), disperse blue mix 106/124 (2), others in 1 patient each	n/a	n/a	n/a	n/a	not reported	This study confirms that late reactions occur to metals, fragrances, colophony, and dyes.…supporting the need for 168-hour readings	no blinding, small n; inclusion and exclusion criteria missing	study population not described, "40 patients were referred from the oral medicine department"	4	
Isaksson 2000	Swedish Foundation for Health Care Sciences and Allergy Research, Alfred Österlund Foundation, Edvard Welander Foundation, Finsen Foundation	Multicenter study (centers within the European Experimental Contact Dermatitis Research Group)	To investigate whether a corticosteroid mix could be used to detect contact allergy to corticosteroids, 5 different topics (A-E). Topic E: to compare the outcome of 1 reading on D3 or D4 to 2 readings on D3 or D4 and D7	prospective cohort	n/a	2 corticosteroid mixtures (high and low concentrations) and individual constituents of each mixture	48 h	back	1. D3 (72h) or D4, 2. D7	n/a	dermatitis patients	Topic E: 3379 patients	n/s	Dermatitis	International Contact Dermatitis Research Group	Reactions - at D3/4, + D7 of all +	Positive: D3 or D4 and / or D7: 256 reactions	63/256 (24.6%)	n/a (no other allergens than corticosteroids were tested)	n/a	n/a	n/a	n/a	not reported	Corticosteroid testing cannot be recommended without a reading after a week in addition to a D3 or D4 reading	no blinding, inclusion criterium "Dermatitis"(?), exclusion criteria missing, only corticosteroids were tested, first reading on D3 or D4, no reading on D1 or D2	study population not described	3b	
Jonker 2000	n/s	University Hospital Amsterdam, The Netherlands	To investigate the usefulness of an additional patch-test reading on D6 or D7	retrospective chart review of 1254 patients	n/a	European standard series and an "additional standard series" (17 allergens)	48h	back	1. D2 (48h) 2. D3 3. D6 or D7	n/a	patients who were tested to the standard series and the additional standard series, who attended D2, D3 and D6 or 7 visit	760 patients	age :41 (5-88) gender: 292/468	n/s	International Contact Dermatitis Research Group	Late positive reaction: change from a negative (-) or doubtful (?) reaction at D3 to a positive (+, ++, +++) reaction at D6 or D7	n/s	77 late-positive reactions in 62/760 cases (8.2%)	Late-positive-reactions: tixocortol-21-pivalate (45.6%), neomycine sulfate (42.2%), thiomersal (21.4%), phenol formaldehyde resin (20%), pt butylphenolformaldehyde resin (19.2%)	n/a	n/a	n/a	n/a	not reported	An additional patch test reading on D6 or D7 is useful	no blinding, "additional allergens" not specified, no reading on D3/4, second reading on D6 or D7, exclusion criteria missing	study population not described	4	
MacFarlane 1989	n/s	University Hospital, Liverpool, UK	To investigate the incidence of late positive reactions	prospective cohort, 429 patients	n/a	International Contact Dermatitis Research Group standard series	48h	n/s	1. D2 (48h) 2. D4 3. D7 4. D9	n/a	patients who agreed to attend for patch test readings on days 2,4,7,9	403 (n=377:D2, D4, D7, D9; n=26: D2, D4, D7)	n/s	n/s	International Contact Dermatitis Research Group	late positive reaction: change from a negative (- or -/+) to a positive (+,++,+++) reaction from D4 to D7 or from D7 to D9	positive reactions (at any time point): n/s	34 late positive reactions in 29/403 patients (7.2%) Readings D2,4,7,9: 30/31 late reactions seen already on D7 Repeat testing in 11 patients: 7 patients showed earlier reactions (all patients with late reactions to neomycin)	Late positive reactions: bronopol (2/4;50%), neomycin (7/27;26%), quinoline mix (2/10;20%), p-phenylendiamine (1/5;20%).	n/a	n/a	n/a	n/a	not reported	D9 reading is of limited value. Patch testing with neomycin may carry the risk of active sensitization.	no blinding, no exclusion criteria, no D9 reading in 26 patients	study population not described	3b	
Madsen 2012	n/s	University Hospital, Odense, Denmark	To evaluate the outcome of a second patch test reading of TRUE test allergens on D6/7 in relation to doubtful reactions on D3/4	retrospective chart review of 9997 patients	n/a	TRUE test allergens	48h	back	1. D3/4 (48/72h) 2. D6/7	n/a	patients who were tested with TRUE test allergens	9997	n/s	allergic contact dermatitis	International Contact Dermatitis Research Group	Delayed reaction: Negative or doubtful positive reaction on D3/4 and positive reaction on D6/7	6509 positive reactions (positive at any time point)	delayed: 881/6509 (13.5%) reactions	Delayed reactions (% in relation to all positive reactions): neomycin (57%), budenoside (42%), tixocortol-21-pivalate (25%), imidazolidinyl urea (28%), lanolin (24%), p-phenylenediamine (22%), epoxy resin (22%) thiomersal (18%), caine mix (18%), diazolidinyl urea (17%), methylchloroisothiazolinone/methylisothiazolinone (11%)	n/a	n/a	n/a	n/a	not reported	Many negative and doubtful reactions at D3/4 may develop into positive reactions at a later reading. This may have important implications for evaluation of the clinical relevance of the test result	no blinding, no exclusion criteria, reading either D3 or D4, either D6 or D7	study population not described	4	
Matiz 2011	n/s	University Hospital San Diego, California, USA	to examine frequency and relevance of positive reactions at diff. time intervals, to check late-delayed patch-test reactions in children	prospective cohort	n/a	Thin Layer Rapid-Use Epicutaneous test (29 allergens) T.R.U.E. test	48h	back	1. D2 (48h) 2. D3 (72h) 3. between D7-9	n/a	children with high suspicion of ACD	38	age 11.6 (6-17) gender [illegible]	presumed allergic contact dermatitis (ACD)	International Contact Dermatitis Research Group (IC- DRG)	New reaction at day 7-9 : late-delayed reaction	n/s	late-delayed: 5/38 childen, 7 reactions, 6 different allergens	new/late-delayed: formaldehyde (2/5)*, diazolidinyl urea (1/5), epoxy resin (1/5)*, neomycin sulphate (1/5), p-tert-butylphenol formaldehyde resin (1/5)*, quaternium 15 (1/5),	n/a	n/a	n/a	n/a	not reported	Importance of detecting late-delayed reactions, particularly to formaldehyde-related allergens	no blinding, small n; exclusion criteria missing, no exact reading time point (D7-9) , also -/+ reaction rated positive		3b	
Mitchell 1978	n/s	University Hospital, Vancouver, Canada	To examine whether a day 7 patch test reading is valuable or not	prospective cohort or retrospective analysis ?	n/a	31 chemicals of the standard screening set recommended by the North American Contact Dermatitis Research Group	48h	n/s	1. D2 (48h) 2. D7 (Additional D3-reading in 9 patients)	n/a	n/s	499	n/s	n/s	n/s	Reactions negative at D2, positive at D7	n/s	"1/5 of all patients had new positive reactions at D7"	neomycin (26), p-phenylenediamine (9), potassium dichromate (8), caine mix	n/a	n/a	n/a	n/a	not reported	It is proposed to add a fourth patient visit with readings at D2, 4 and 7 to clarify the significance of positive D7 reactions	not clear whether retrospective or prospective study, no blinding, D3 readings in only 9 patients, therefore conclusion not justified. Exclusion / inclusion criteria missing	study population not described	4	
Saino 1995	n/s	2 centers, Italy	To study the significance of patch test reactions later than day 3 or 4	retrospective chart review	n/a	Italian standard series, other allergens according to patient´s history	48h	n/s	1. D2 (48h) 2. D3 3. D7	n/a	n/s	784	165/619	n/s	n/s	late reactions: -/?+ at D3, +/++/+++ on D7	1209 reactions in 387 patients	late reactions: 36/1209 (3%) in 33 patients 12 patients retested, reactions in 5 patients again on D7, reactions in 2 patients now on D2 (active sensitization ?), in 5 patients not reproduced (irritant, variations ?)	neomycin (7), palladium (4), cobalt (4), Kathon CG (4)	n/a	n/a	n/a	n/a	not reported	Procedure too time consuming. The patient should be advised to call again whenever any new inflammatory reaction is detected at the patch test site	no blinding, sparse information about patch test procedure (tested allergens and grading), no inclusion and exclusion criteria	study population not described	4	

n	subgroup/ study population
N	total number of patients
m	mean
n/s	not stated
n/a	not applicable
M/F	male /female

Study characteristics				Methods							Results													Critical Appraisal of Study				
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposition**	**Application site**	**Time interval and treatment(s) administered between the tests**	**Inclusion criteria**	**Patients included [n]**	**Patients [age (mean/range); gender (M/F)]**	**presumed Diagnosis**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (overall positive reactions)**	**Results II (reactions at different time points)**	**Results II (3 most frequently reported substances?)**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
Ackermann et al. 2011	supported by a grant from the Finnish Allergy Foundation	8 Finnish dermatology departments	To study the frequency of positive patch test reactions to MI, and its relevance and relation to MCI/MI sensitivity, in Finland	clinical provocation study (patients only)	ROAT b.i.d. (up to 14 days) on forearm with lotion with 100 ppm MI	patch test with methylisothiazolinone (MI) 0.03 and 0.1% aq.	2 days	not stated (presumably back, as according to ICDRG guidelines)	PT before ROAT	patients with a previous pos. PT reaction to MI in 2008	10 patients	not given	Contact allergy to MI leading to allergic contact dermatitis of the forearm	International Contact Dermatitis Research Group (ICDRG)	positive patch test D2 or D4 or D5	10 of 10 PT pos.	not stated	not applicable	10 pos. PT with pos. ROAT	not applicable	not applicable	see above	none reported	none of relevance here	controlled (vehicle control application container) and patient-blinded	results can be transferred to patients meeting the inclusion criteria	not classifiable	
Andersen et al. 2001	supported by the European Commission (BMH4-CT96-0877)	5 hospital departments of Dermatology (Europe)	to describe the time-concentration relationship for elicitation	clinical provocation study ("case-control")	ROAT b.i.d. on forearm with 0.2 and 0.05% isoeugenol in ethanol	patch test with isoeugenol (1% in case of previous +++ reaction, else 2% ethanol w/v, with dilution series)	48 h	back	simultaneous start of tests	isoeugenol-sensitive patients	27 (3 later excluded due to neg. PT), 7 controls	Mean age 46, SD 11; 4 male, 23 female	Contact allergy to isoeugenol leading to allergic contact dermatitis of the forearm	not reported (presumbably ICDRG)	positive patch test D3 or D7	24 pos. of 27, 7 controls neg.	pos. to 0.0005 to 2% isoeugenol in ethanol	not applicable	16 pos. PT with pos. ROAT, 8 pos. PT with neg. ROAT, 7 (or 10, with 3 excluded patients) neg. PT with neg. ROAT	not applicable	not applicable	see above	none reported	none of relevance here	controlled (vehicle control dropper bottle) and double-blinded	the time until an isoeugenol allergic individual reacts in a ROAT depends on the individual sensitivity as well as the exposure concentrations	2b	
Astarita et al. 2001	not stated	Napoli, Italy	among others, "to determine the usefulness of a diagnostic protocol involving patch testing"	prospective cohort of patients	Intradermal challenge with mepivacaine	patch test with 1% mepivacaine solution	48 h	"healthy skin"	not applicable	"patients, who shared concerns with their dentist/physician as to the safety of imminent administration of Las"	247 consecutive, 198 with informed consent included	Mean age 27.9, SD +-12.42; 101 male, 97 female	adverse reaction(s) to local anaesthetics	International Contact Dermatitis Research Group (ICDRG)	positive patch test D2 or D3 or D4	1/72	not stated	not applicable	1 pos. PT with pos. i.d. challenge, 71 neg. PT with neg. I.d. challenge	not applicable	not applicable	see above	none reported	"PT screening can predict delayed-type reactions"	no blinding	results can be transferred to patients meeting the inclusion criteria	2b	
Bruze et al. 2005	EU Commission, Biomed-2, Contract no. BMH4-CT96-0877; Swedish Foundation for Health Care Sciences and Allergy Research; Danish Research Councils (9601876)	5 hospital departments of Dermatology (Europe)	to investigate the significance of isoeugenol in deodorants for the development of axillary dermatitis when used by people with and without contact allergy to isoeugenol	clinical provocation study ("case-control")	Axillary ROAT b.i.d. with roll-on deodorants without and with isoeugenol at 3 different concentrations (0.063%, 0.02%, 0.0063%)	patch test with isoeugenol (1% in case of previous +++ reaction, else 2% ethanol w/v, with dilution series)	48 h	back	simultaneous start of tests	"dermatitis patients who previously had been showed to be hypersensitive to isoeugenol on patch testing"	25 patients (13 completed study), 10 controls	Mean age not given, range 34-64; 1 male, 12 female	Contact allergy to isoeugenol leading to allergic contact dermatitis of the axilla	not reported (presumbably ICDRG)	positive patch test D3 or D7	13 pos. of 23; all 10 controls neg.	pos. to 0.0005 to 2% isoeugenol in ethanol	not applicable	10 pos. PT with pos. ROAT, 3 pos. PT with neg. ROAT, 10 neg. PT with neg. ROAT	not applicable	not applicable	see above	none reported	none of relevance here	controlled (control deodorant randomly allocated to side) and double-blinded	results serve to identify a "safe" concentration of isoeugenol in deodorants (< 0.0063%)	2b	
Fartasch et al. 1999	None / none declared (2 co-authors from industry)	Erlangen, Germany	to analyse whether subjects with previous pos. PT to CAPB would react in provocative use tests …	clinical provocation study ("case-control")	ROAT b.i.d. (7 days, partly 14 days) on forearm with CAPB containing commercial shower gel 25% aq.	patch test with cocamidopropyl betaine (CAPB) 1% aq.	2 days	not stated	PT before ROAT	"Subjects with delayed contact hypersensitivity to CAPB"	10 patients and 10 controls	adult, no further details given	Contact allergy to CAPB leading to allergic contact dermatitis of the forearm	International Contact Dermatitis Research Group (ICDRG)	positive patch test D2 or D3 or D4	5 pos. of 10 patients, 1 pos. of 10 controls	not stated	not applicable	0 pos. PT with pos. ROAT, 5 pos. PT with neg. ROAT, 5 neg. PT with neg. ROAT	not applicable	not applicable	see above	concerning PT: none reported	none of relevance here	no control, no blinding reported	"CAPB-sensitive individuals can use a CAPB-based rinse-off product ..:"	4	
Hauksson et al. 2011	None / none declared	Malmö, Sweden	To study the clinical relevance of contact allergy to formaldehyde detected by 2% formaldehyde but not by 1%	clinical provocation study ("case-control")	ROAT b.i.d. on forearm with 0.2% w/w formaldehyde in a moisturiser	patch test with formaldehyde 2% and 1%	not stated (but known to be 48 h)	not stated (but known to be back)	PT before ROAT	patients with a previous pos. PT reaction to 2%, but not to 1% formaldehyde	17 patients, 19 controls (without formaldehyde allergy)	mean age 44.1 years, range 23–64; four male, 14 female	Contact allergy to formaldehyde leading to allergic contact dermatitis of the forearm	not reported (presumbably ICDRG)	not stated; known to be "positive at D3 or D7"	17 of 17 patients and 0 of 19 controls pos.	not stated	not applicable	9 pos. PT with pos. ROAT, 8 pos. PT with neg. ROAT, 19 neg. PT with neg. ROAT	not applicable	not applicable	see above	none reported	contact allergy to formaldehyde 2% may be clinically relevant	controlled (vehicle control) and blinded (colour coded)	results can be transferred to patients meeting the inclusion criteria	2b	
Jensen et al. 2005	supported by the Aage Bang Foundation and the A. J. Andersen og Hustrus Foundation	Odense, Denmark	to investigate the allergic responses elicited in presensitized individuals when exposed to a specific amount of allergen	clinical provocation study ("case-control")	ROAT on forearm with 0.04% MDBNG 1x/day and 0.01% 3x/day, resp.	patch test with MDBGN 0.3% pet.; dilution series with MDBGN in eth./aq.	2 days	back	PT with 0.3% MDBGN pet. (inclusion criterion) prior to ROAT	patients with previous pos. PT reaction to 0.3% MDBGN, confirmed upon re-PT-ing	19 patients, 12 controls	Patients: mean age 51 years, range 20-83; 2 male, 17 female. Controls: mean age 43 years (range 28-56); 2 male, 10 female.	Contact allergy to MDBGN leading to allergic contact dermatitis of the forearm	ICDRG (according to textbook chapter "Contact Dermatitis" 2001 edition)	positive patch test D3 or D7	14 pos. of 19 patients, 0 pos. of 12 controls	none relevant	not applicable	14 pos. PT with pos. ROAT, 5 pos. PT with neg. ROAT, none neg. PT with pos. ROAT, 12 neg. PT with neg. ROAT	not applicable	not applicable	see above	none reported	none of relevance here	controlled (vehicle control), randomised, double-blinded (concerning ROAT reactions). PT: none reported	results can be transferred to patients meeting the inclusion criteria	2b	
Johansen et al. 1996	Danish EPA, Chemicals group under the Nordic Council, Danish Hospital Foundation for Medical Research, Prof. Niels Hjorth Foundation	Copenhagen and Odense, Denmark	to provide quantitative data on the eliciting capacity of isoeugenol	clinical provocation study ("case-control")	ROAT b.i.d. on forearm with 0.2% isoeugenol in ethanol, after 14 days also on neck	patch test with isoeugenol (2% pet., with dilution series)	2 days	back	not stated	Previous positive PT to fragrance mix I with positive or doubtful PT to isoeugenol	19 patients, 20 controls	Patients: age range 18-69; 2 male, 17 female. Controls: mean age 43; 20 female	Contact allergy to isoeugenol leading to allergic contact dermatitis of the forearm	ICDRG (according to Wilkinson et al. 1970)	positive patch test D2 or D3 or D7	19 patients pos, 20 controls negative (per definition)	none relevant	not applicable	12 pos. PT with pos. ROAT, 7 pos. PT witn neg. ROAT, none neg. PT witn pos. ROAT, 20 neg. PT witn neg. ROAT	not applicable	not applicable	see above	none reported	none of relevance here	controlled (vehicle control), randomised, double-blinded (concerning ROAT and PT reactions)	results can be transferred to patients meeting the inclusion criteria	2b	
Johansen et al. 1996A	Supported by Danish EPA, Nordic Chemicals Group (Nordic Council), EU Consumer Policy Service, Danish Hospital Foundation for Medical Research …	2 hospital departments in Denmark (Copenhagen, Odense)	to provide quantitative data on the eliciting capacity of cinnamal	clinical provocation study ("case-control")	ROAT b.i.d. on forearm with 0.1 and 0.8% cinnamal in ethanol	patch test with cinnamal (2% pet.) and a dilution series; controls tested with fragrance mix I	48 h	back	not stated	Previous positive PT to fragrance mix I with positive or doubtful PT to cinnamal	22 patients, 20 healthy controls	Age mean not given, age range 18-69; 4 male, 18 female	Contact allergy to cinnamal leading to allergic contact dermatitis of the forearm	International Contact Dermatitis Research Group (ICDRG)	positive patch test D3 or D7 (also D2 in one department)	18 pos. of 38 (0 pos. of 20 controls, with 1% cinnamal included in FM I (pet.))	pos. to 0.02% (pet. or ethanol) to 2% pet.	not applicable	13 pos. PT with pos. ROAT, 5 pos. PT with neg. ROAT, 20 neg. PT with neg. ROAT	not applicable (metachronous: 17 of 18 previously PT pos. again pos.)	not applicable	see above	none reported	none of relevance here	controlled (vehicle control dropper bottle) and patient-blinded	results provide evidence regarding dose-elicitation characteristics	2b	
Möller et al. 1996	Swedish Asthma and Allergy Association	Malmö, Sweden	to study the clinical reactions to a circulating gold hapten	clinical provocation study	I.m. Injection of 10 mg gold sodium thiomalate	patch test with gold sodium thiosulfate 5% aq.	not stated (but known to be 48 h)	not stated	PT prior to I.m. provocation	Previous positive PT to GSTS	20 patients, no controls	Age range 20-79, 1 male, 19 female	Different reactions, e.g. flare-up of previous pos. PT to gold, "toxicodermia", fever	not reported (presumbably ICDRG)	positive patch test D7	20/20 pos. (inclusion criterion)	none relevant	not applicable	9 pos. PT with pos. provocation, 1 pos. PT with neg. provocation, 1 pos. PT with pos. provocation to placebo	not applicable	not applicable	see above	none reported	none of relevance here	Patient-blinded I.m. injection with GSTM or placebo; none concerning PT	unclear	4	
Schnuch et al. 2009	AS is a consultant for the fragrance industry. The study has been funded by International Flavor & Fragrances Inc., Hilversum/NL	15 departments of the IVDK network and Hospital del Mar, Barcelona, Spain	To identify the concentration of … HICC sufficiently low not elicit patients with proven sensitization	clinical provocation study	ROAT b.i.d. on forearm with increasing doses of HICC (0.005, 0.01, 0.1, 0.5 and 2.5% in ethanol and cream, resp.)	patch test with 2.5 and 5% HICC	not stated	not stated	PT after end of ROAT	patients with at least a + reaction at D3 to HICC at prior routine PT-ing	67 patients, 3 excluded, i.e. 64 patients with ROAT, 58 of these PT-ed with HICC	Median age 46.5 years, range 18-65; "68% female"	Contact allergy to HICC leading to allergic contact dermatitis of the forearm	International Contact Dermatitis Research Group (ICDRG)	Not stated; according to DGK guidelines: positive patch test at D2, D3 or occasionally D4	51 pos. of 58	not stated	not applicable	48 pos. PT with pos. ROAT, 3 pos. PT with neg. ROAT, 3 neg. PT with pos. ROAT, 4 neg. PT with neg. ROAT	not applicable	not applicable	see above	none reported	none of relevance here	controlled (ethanol and cream vehicle control), unblinded	HICC use concentration should be less than 0.009-0.027%	2b	
Waton et al. 2009	no conflicts stated; funding by "funds of regional research of University Hospital of Nancy"	Nancy, France	To evaluate the negative predictive value of drug skin tests	clinical provocation study	Oral provocation test with suspected drug (class)	patch test with culprit drug, as individually indicated (details given)	not stated (presumably 2 days)	back	provocation test after negative PT	Previous negative PT to culprit drug	133 patients, 260 oral provocation tests	Age not given; 49 males, 84 females	Tolerance of suspected drug	not specified	positive patch test 20 min or D2 or D4	all PT negative by inclusion	not stated	not applicable	27 of 260 oral provocation tests pos. with neg. PT	not applicable	not applicable	see above	none reported	Negative drug skin tests do not eliminate the responsibility of a drug in drug reactions, and must be followed by drug re-administration under hospital surveillance	not blinded	standardised definition of CADR causality, adequate test methodology	not classifiable	
Andrade et al. 2011	None / none declared	Coimbra, Portugal	to evaluate the diagnostic value of patch testing in … fixed drug eruptions (FDE)	retrospective chart review of 52 patients with FDE tested in 20 years	clinical diagnosis of FDE	patch test with culprit drug, as individually indicated, 1 to 20% pet., on non-lesional skin	2 days	not stated	PT after clinical event	patients with FDE due to a variety of drugs, mostly NSAID and antibiotics	52 patients	Age mean 53, SE 17 years; 17 male, 35 female	FDE due to delayed type hypersensitivity	not reported (presumbably ICDRG)	positive patch test D2 or D3	1 of 52 patients	not stated	piroxicam and tenoxicam	1 pos. PT with pos. history of 52 patients, 51 patients: neg. PT, pos. history, all involving 190 single patches	not applicable	not applicable	see above	none reported	PT-ing (on lesional skin, W.Uter) ... simple and safe method to confirm drug imputabilility in fixed drug eruption, mainly when NSAID or multiple drugs are suspected.	no blinding	results can be transferred to patients meeting the inclusion criteria	4	
Böhm et al. 1997	None / none declared	Bonn, Germany	"to compare the validity of patient personal history of contact sensitivity to metal alloys with patch test results"	clinical series	History of allergic reactions to metals (no details given)	patch test with the German baseline series (at that time including nickel, cobalt and dichromate)	not stated	back	PT after interview	consecutive patients with hand eczema (eligible for patch testing)	160 patients	Age not given; 51 male, 109 female	hand eczema	not reported (presumbably ICDRG)	positive patch test D3	46 of 160 patients PT pos. to metals (of the baseline series)	not stated	not applicable	34 pos. PT with pos. history, 12 pos. PT with neg. nistory, 44 neg. PT with pos. history, 70 neg. PT with neg. history	not applicable	not applicable	see above	none reported	"both false positive patch tests and false negative histories are possible."	no blinding	Allergens and interview items not specified, no external validity	not classifiable	
Brockow et al. 2009	not stated	12 allergy departments of the ENDA CM task force members	to determine the specificity and sensitivity of skin tests in patients who have experienced both immediate and nonimmediate hypersensitivity reactions to iodinated contrast media	prospective patient series	a reported previous hypersensitivity reaction after CM exposure	Patch tests with CM soaked on a filter paper in a 12 mm aluminium Finn chamber	48 h	back	not applicable	Patients with a reported previous hypersensitivity reaction after CM exposure	220 patients (98 with non-immediate reactions), 71 controls	Non-immediate reactors: 58 years (age range 12–80); 41 male, 57 female	hypersensitivity reaction after CM exposure	European Society of Contact Dermatitis (on drug testing, Barbaud et al., COD 2001; 45: 321–328	positive patch test D2 or D3	22 of 79	3 pos. D2 only, 10 with additional D3 reactions, 1 Pos. only on D3	not reported	22 PT pos. with pos. history, 57 PT neg. with pos. history, "None of the 82 negative controls had a positive delayed skin test"	not applicable	not applicable	see above	none reported	Skin testing seems to be a useful tool for diagnosis of CM allergy and may play an important role in selection of a safe product in previous reactors. The specificity of our skin tests is as high as 96–100%, but further studies are required to establish their negative predictive value.	no blinding	results can be transferred to patients meeting the inclusion criteria	4	
Dickel et al. 2010	supported with test material (BlendermTM surgical tapes, Clippers) by 3MTM Medica, 3M Deutschland GmbH	7 allergy departments in Germany	To compare the diagnostic accuracy of strip patch tests and patch tests in detecting sensitizations in patients with suspected allergic contact dermatitis by using patient history as the reference standard.	prospective, investigator-blinded study 790 patients	standardised history of skin intolerance to the 3 allergens considered	Standard Ni, Co and Cr allergen preparations	1 day	back	PT after interview	Clinical suspicion of current or past allergic contact dermatitis because of presenting symptoms or referral by another dermatologist	787 included patients	Median age 51, range 18 to 92; 289 male, 498 female	suspected allergic contact dermatitis (due to nickel, chromium or lanolin alcohols)	ICDRG (according to textbook chapter "Contact Dermatitis" 2001 edition)	positive patch test D3 to D5	Nickel: 112/787, chromium 37/787, lanolin alcohols 7/787	further results obtained with the 'strip patch test'	not applicable	no absolute numbers given. See text for Sens., Spec. and PV estimates	not applicable	not applicable	see above	none reported	none of relevance here	no blinding	results can be transferred to patients meeting the inclusion criteria	2b	
Dotterud and Falk 1994	not stated	Tromsö, Norway	"... to estimate the frequency of metal allergy in an unselected population of schoolchildren ..."	Cross-sectional , population-based epidemiological study	questionnaire data on previous "metal reactions"	patch test with nickel sulfate 5% aq., cobalt chloride 1% aq., potassium dichromate 0.5% pet.	2 days	back	questionnaire and interview before PT	424 of 575 eligible children in one Norwegian community	424 children examined	Children age 7 to 12; 223 male, 201 female	none	ICDRG	positive patch test D2	Nickel: 63/424, cobalt 24/424, dichromate 5/424	not stated	not applicable	27 PT pos with pos. history, 46 PT positive with neg. history, 52 PT neg. with pos. history, 299 PT neg. with neg. history	not applicable	not applicable	see above	none reported	none of relevance here	no blinding	results are probably representative of a children/adolescent population at that time in Norway	2b	

Frosch et al. 2005	EU Commission: QLK4-CT-1999-01558 'Fragrance chemical allergy: a major environmental and consumer problem in Europe.'	6 European departments	"Does the FM I identify additional patients with a positive fragrance history missed by FM I? Is it necessary to add FM II to the European standard series?"	prospective cohort of patients	a reported "certain" or "probable" history of fragrance intolerance, vs. a "questionable" or no history	Patch test with baseline series with FM II (2.8%; 14%; 28% pet.)	2 days	back	PT after interview	Consecutive patients eligible for patch testing	1701 patients	Median age 44, range 13-96; 62.2% female	suspected allergic contact dermatitis	ICDRG (according Fregert 1981)	positive patch test: D3 or D4	50 of 1701	not stated	not applicable	33 pos PT with pos. history, 17 pos. PT with neg. history, 252 neg. PT with pos. history, 1399 neg. PT with neg. history	not applicable	not applicable	see above	none reported	the new FM II detects additional patients sensitive to fragrances missed by FM I	no blinding	results can be transferred to patients meeting the inclusion criteria	4	
Frosch et al. 2005	EU Commission: QLK4-CT-1999-01558 'Fragrance chemical allergy: a major environmental and consumer problem in Europe.'	6 European departments	"Does the FM I identify additional patients with a positive fragrance history missed by FM I? Is it necessary to add FM II to the European standard series?"	prospective cohort of patients	a reported "certain" or "probable" history of fragrance intolerance, vs. a "questionable" or no history	Patch test with baseline series with FM I (8% pet.)	2 days	back	PT after interview	Consecutive patients eligible for patch testing	1701 patients	Median age 44, range 13-96; 62.2% female	suspected allergic contact dermatitis	ICDRG (according to textbook chapter "Contact Dermatitis" 2001 edition)	positive patch test: D3 or D4	111 of 1701	not stated	not applicable	58 pos PT with pos. history, 53 pos. PT with neg. history, 226 neg. PT with pos. history, 1364 neg. PT with neg. history	not applicable	not applicable	see above	none reported	the number of false-positive reactions is lower with FM II than with FM I	no blinding	results can be transferred to patients meeting the inclusion criteria	4	
Goksel et al. 2011	Ankara University Commission of Scientific Research Project (2006-09-09-027HPD)	Ankara, Turkey	To evaluate the prevalence of CM hypersensitivity, ... and the role of skin testing in its diagnosis	prospective patient series	observation or a reliable/documented medical history of an allergy-like reaction after administration of CM was used as the gold standard	1,000-, 100- and 10-fold dilutions of the culprit CM in saline	3 days	back	not applicable	Patients with nonimmediate hypersensitivity reactions to CMs	24, only 8 with non-immediate reactions Ptwd	mean age 51.8, SD 14.9 years; 6 males, 18 females	allergy-like reaction after administration of CM	European Society of Contact Dermatitis (on drug testing, Barbaud et al., CCD 2001; 45: 321–328	positive patch test: D3 or D4 or D5 or D6	1 of 8 patients (9 patch tests)	not stated	lomeron: n=1 PT pos.; lohexol: n=5 PT neg.; kottamol: n=2 PT neg.	1 pos. PT with pos. history, 7 neg. PT with pos. history; 37 controls (neg. history) but none PTed with lomeron	not applicable	not applicable	see above	none reported	Skin testing with CMs has a high specificity, but its role in diagnosis is limited by a low sensitivity in mild to moderate reactions to Cms	no blinding	results can be transferred to patients meeting the inclusion criteria	2b	
Johansen et al. 1997 (a)	Prof. Niels Hjorth Foundation, Danish Board of Health and Danish EPA	2 hospital departments and 2 private offices in Denmark	"to investigate the relationship between patients' own recognition of skin problems ... and PT-ing with markers of fragrance sensitisation"	prospective patient series	"skin symptoms from the use of scented products" as reference criterion	Patch test with baseline series with FM I (8% pet.) and Myroxylon peruiferae (25% pet.) and also the corresponding TRUE Test(R) allergens	2 days	back	PT after questionnaire	Consecutive patients eligible for patch testing	925 consecutive patients invited, 884 participated	age range 18 – 89; 271 male, 613 female	suspected allergic contact dermatitis	ICDRG (according to Wilkinson et al. 1970)	positive patch test:D2/3 or D5/7	78 pos. to FM I, 32 pos. to M. braverae (of 884)	not stated	not applicable	60 pos. PT with pos. history, 384 neg. PT with pos. history; 18 pos. PT with neg. history, 422 neg. PT with neg. history	not applicable	not applicable	see above	none reported	"... most fragrance mix-positive patients are aware that the use of scented products may cause skin problems."	no blinding	results can be transferred to patients meeting the inclusion criteria	4	

n	subgroup/ study population total
N	number of patients
m	mean
n/s	not stated
n/a	not applicable
M/F	male /female

Study characteristics				Methods							Results												Critical Appraisal of Study				
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposition**	**Application site**	**Time interval and treatment(s) administered between the tests**	**Inclusion criteria**	**Patients included [n]**	**Patients [age (mean/range) ; gender (M/F)]**	**presumed Diagnosis**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (overall positive reactions)**	**Results II (reactions at different time points)**	**Results II (3 most frequently reported substances?)**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
Frosch et al. 2005 [n]	EU Commission QLK4-CT-1999-01558 "Fragrance chemical allergy: a major environmental and consumer problem in Europe.	6 European departments	"Does the FM II identify additional patients with a positive fragrance history missed by FM I? Is it necessary to add FM II to the European standard series?"	prospective cohort of patients	patch test with all single ingredients of the mix	Patch test with baseline series with FM II (2.8%; 14%; 28% pet.)	2 days	back	simultaneous	Consecutive patients eligible for patch testing	1701 patients	Median age 44, range 13-96; 62.2% female	suspected allergic contact dermatitis	ICDRG (according to textbook chapter "Contact Dermatitis" 2001 edition)	positive patch test D3 or D4	50 of 1701	not stated	not applicable	36 pos. mix and single ingredients (SI); 5 neg. mix, pos. SI; 14 pos. mix, neg. SI; 1646 neg. mix, neg. SI	not applicable	not applicable	see above	none reported	Testing with individual constituents is positive in about 50% of cases reacting to either 14% or 28% FM II	no blinding	results can be transferred to patients meeting the inclusion criteria	4	

n subgroup/ study population
N total number of patients
m mean
n/s not stated
n/a not applicable
M/F male /female

Study characteristics				Methods							Results											Critical Appraisal of Study				
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposition**	**Application site**	**Time interval and treatment(s) administered between the tests**	**Inclusion criteria**	**Patients included [n]**	**Patients [age (mean/range) ; gender (M/F)]**	**presumed Diagnosis**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (overall positive reactions)**	**Results II (reactions at different time points)**	**Results II (3 most frequently reported substances?)**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
Brasch et al. 1994/ Uter et al. 2002	none reported	11 departments of the DKG (10 German, 1 Austrian)	"to determine the efficiency and reproducibility of patch tests..."	prospective clinical study	10 PT allergens (see Tab. X) in publication	duplicate synchronous application on the other side of the back	24 h in 647 patients; 48 h in 638 patients	back	not applicable	consecutive patients eligible for patch testing	1285 patients	Age not given; 467 male, 798 female	Suspected allergic contact dermatitis	ICDRG (according to Wilkinson et al. 1970)	positive PT D3	1857 pos. reactions to 10x1285 single PT-s	992 pos. reactions in the 24 h exposure group; 865 pos. reactions in the 48 h exposure group (not significant)	Nickel (306/1285), fragrance mix I (187/1285), potassium dichromate (158/1285)	not applicable	Cohen's kappa between 0.86 (95% CI: 0.83-0.90) for nickel and 0.56 (95% CI: 0.42-0.71) for formaldehyde	not applicable	see above	none reported	"... preparations of patch test allergens need to be improved"	no blinding (e.g. by permutating randomly the order of allergens in the comparison panel)	results can be transferred to patients meeting the inclusion criteria	4	
Brasch et al. 2001	none reported	13 departments of the DKG (not listed)	to assess reproducibility with nickel and potassium dichromate using the TRUE Test(R) system	prospective clinical study	nickel sulfate (0.2 mg/cm²; potassium dichromate 0.023 mg/cm²	duplicate synchronous application on the other side of the back	2 days	back	not applicable	consecutive patients with a history of metal allergy, eligible for patch testing	589 patients	mean age 35, 148 less than 25, 52 over 54; 66 males, 523 females	Suspected allergic contact dermatitis due to metals (mainly nickel)	DKG (Brehler et al. 1995)	positive PT D3	388 at least one pos. reaction to nickel, 130 at least one pos. reaction to dichromate	no pos. or other reactions at placebo sites	see above	not applicable	Nickel: 385 pos./pos., 202 neg./neg., 3 pos./neg. Dichromate: 118 pos./pos., 460 neg./neg., 2 pos./neg. 10 neg./pos.	not applicable	see above	none reported	"... a highly synchronous reproducibility of results can be achieved by using a well-standardised patch test system, especially with nickel sulfate."	blinding, random permutation of order and distance of Ni / Cr patches	results can be transferred to patients meeting the inclusion criteria	2b	
Lachapelle 1989	none reported	Leuven, Belgium	to compare reproducibility of the Epiquick (TM) system	prospective clinical study	19 allergens of the Epiquick (TM) PT	duplicate, symmetrical synchronous application on the other side of the back	48 h	back	not applicable	consecutive patients eligible for patch testing	100 consecutive patients	mean age 36, range 13 to 81; 47 males, 53 females	Suspected allergic contact dermatitis	ICDRG	positive PT D3	47/100 patients with at least one pos. PT reaction	not assessed	Nickel (25/100), cobalt chloride (5/100), fragrance mix I (5/100)	not applicable	right/left, on the level of patches: 67 pos./pos, 0 pos./neg., 3 neg./pos, 1830 neg./neg.	not applicable	see above	none reported	"good reproducibility rate (95.8%) ..."	no blinding	results can be transferred to patients meeting the inclusion criteria	4b	
Lindelöf 1999	none reported	Stockholm, Sweden	"to investigate the reliability of the Finn Chamber (TM) patch test"	prospective clinical study	10 selected PT allergens from the baseline series	duplicate, symmetrical synchronous application on the other side of the back	48 h	back	not applicable	consecutive patients eligible for patch testing	220 consecutive patients	no information	Suspected allergic contact dermatitis	ICDRG	positive PT D3	76/220 positive on both sides, 8/220 discordant	not assessed	no information	not applicable	right/left, on the level of patches: 76 pos./pos, 5 pos./neg, 3 neg./pos, 2116 neg./neg.	not applicable	see above	none reported	"... one must remain aware of the possibility of false positive or false negative PT reactions."	no blinding	results can be transferred to patients meeting the inclusion criteria	4b	
Memon and Friedmann 1998	none reported	Liverpool, UK	to quantify variability of replicate, standardised challenge in nickel-sensitive subjects	prospective clinical study	patch test with 5% nickel sulfate pet., with serial dilutions	duplicate synchronous application on the other side of the back	2 days	back	not applicable	Nickel-sensitive volunteers	30 volunteers (challenged with PT)	no information	Contact allergy to nickel	ICDRG (according to Wilkinson et al. 1970)	positive PT D2	30/30 positive	identical reactions in 6 subjects re-challenged after 6 months	not applicable	not applicable	Nickel 5% pet.: 30/30 pos./pos.	not applicable	see above	none reported	"the immune system can give highly reproducible responses when presented with standard eliciting stimuli"	no blinding	results can be transferred to patients meeting the inclusion criteria	4b	
Schiavi et al. 2004	scientific grant from brial Allergen GmbH (Grevien, Germany)	Feldkirch, Austria	"to delineate comparatively the efficiency and reproducibility of identical test reagents from 2 different commercial sources"	prospective clinical study	30 allergens from European baseline with extension from brial	duplicate synchronous application on the other side of the back of material from different provider (Hermal)	2 days	not reported	not applicable	consecutive patients eligible for patch testing	71 patients (14 other enrolled patients excluded due to angry back or "questionable results")	Age range 15 to 73 years; 27 male, 44 female	Suspected allergic contact dermatitis	DKG (book chapter by Pozdilla et al. (eds.), 2000	positive PT D4	120 / 4260 patches pos.	not assessed	Nickel sulfate (15/71), Myroxylon pereirae (7/71), Fragrance mix I (6/71)	not applicable	On the level of patches: 60 pos./pos., 2070 neg./neg., discordant in 3 patients, involving 3 allergens	not applicable	see above	none reported	"... patch test preparations from 2 different companies exhibited a high level of reproducibility"	no blinding	limited precision due to samle size	4b	

n subgroup/ study population
N total number of patients
m mean
n/s not stated
n/a not applicable
M/F male /female

Study characteristics				Methods								
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposition**	**Application site**	**Dose range of nickelsulphat patch tests**	**Inclusion criteria**	**Control group**	**Time point of testing (days of menstrual cyclus)**
McLelland 1991	n/s	Newcastle, UK	to see whether objective changes in the dose-response characteristics occurred following patch testing with nickel dilutions at different time points of the menstrual cycle	Crossover interventional study without randomisation	n/a	standard patch testing (Trolab)	48 h	upper inner arm	6 successive twofold dilutions of 5% nickel in white soft paraffin	nickel allergy, regular menstrual cycle, no contraceptive pill	crossover	10 days after and 1 week before first day
Rohold 1994	n/s	Odense University Hospital, Denmark	to investigate the patch test reactivity in nickel allergic women at different points of the menstrual cycle	Crossover interventional study without randomisation	n/a	Patch testing (True-test)	48h	upper back	300 - 0.01 µg/cm²; 2 placebos	previously positve test or strong clinical suspicion of nickel allergy	crossover	7-10 vs 20-24
Tamer 2003	n/s	Ankara Numune Educational and Research Hospital, Turkey	to investigate whether nickel patch test reactivity was different during phases of the menstrual cycle and whether there was an increase in sensitivity to nickel during the premenstrual cycle in nickel-sensitive women	Crossover interventional study without randomisation	n/a	Patch testing (European Standard)	48-72 h	upper back	5%	nickel sensitivity, regular menstrual cycle	crossover	7-10 vs 20-24
Bonamonte 2005	n/s	Policlinico Piazza Giulio Cesare, Bari, Italy	to assess the role of the menstrual cycle on contact allergy, focusing particu-larly on the possibility that ovulation could inhibit contact sensitization mechanisms	Crossover interventional study without randomisation	n/a	Standard patch testing	3 days	upper back	5% - 0.0013%	contact dermatitis to nickel, regular menstrual cycle	crossover	ovulatory vs progestinic phase, determined using ultrasound
Hindsen 199	supported by a grant from the Swedisch Council for Work Life Research	Department of Dermatology, University Hospital, Malmö, Sweden	to study the individual variation in nickel reactivity, also in relation to the menstrual cycle	interventional study without randomisation	n/a	Patch testing	48 h	lower back	12.5%-0.0013%	at least ++ reaction to nickel sulfate 1-10years before study	none	4 occasions over 7 months; unrelated to menstrual cycle
Aktan 1998	n/s	Departments of Dermatology and Obstetrics and Gynaecology, Faculty of Medicine, Pamukkale University, Denizli, Turkey	to investigate if non-reproducibilities for positive nickel sulphate patch tests in the two different phases of the ovulatory menstrual cycle with the endocrine evidence of luteal phase adequacy are statistically different	interventional study without randomisation	n/a	Patch testing	2 days	upper back	5%	positive results in first patch testing (either days 7-10 or 20-24 of the menstrual cycle) and mid-luteal phase serum proges-terone levels ≥ 10 ng/ ml in both cycles, regular and ovulatory menstrual cylce	patients were allocated depending on the phase in which they were first tested positive; group 1 (day 7-10; n=15), group 2 (day 20-24; n=13)	7-10 vs 20-24

	Results													
First Author/ year	**Patients included [n]**	**Patients [age (mean/range); gender (M/F)]**	**presumed Diagnose**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (overall positive reactions)**	**Results II (reactions at different days - day ranges- of the menstrual cycle)**	**Results III (changes in sensitivity to nickel at different time points in menstrual cycle)**	**Statistics**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**
McLelland 1991	8	age n/s; F	nickel allergy	skin thickness; clinical grade (unspecified)	number of patients with similar vs greater responses premenstrually compared to mid-cycle	n/s	n/s	2 patients with much greater responses premenstrually	n/s	n/a	n/a	n/a	n/a	n/a
Rohold 1994	20	median age: 32 y (17-44); F	nickel allergy	ICDRG ranking scale	threshold concentration for doubtful reaction	day 7-10: 19; day 20-24: 20	median threshold concentration day 7-10: 3 µg/cm²; day 20-24: 1 µg/cm²	11 of 20 women had lower threshold on days 20-24	Wilcoxon's rank sum test for matched pairs: p>0.4 (ns)	n/a	n/a	n/a	n/a	n/a
Tamer 2003	30	18-42 y; F	nickel allergy	visual scoring	comparison of visual score	day 7-10: 29; day 20-24: 27	median score day 7-10: ++; day 20-24: ++	individual changes not described	Wilcoxon's rank sum test for matched pairs: ns	n/a	n/a	n/a	n/a	n/a
Bonamonte 2005	30	mean age: 30.7 y (20-48); F	nickel allergy	ICDRG ranking scale with 2 classifications added	Minimal Eliciting Concentration (MEC); Summarized Test Score (STS)		n/s (compare fig. 1)	MEC was lower during the progestinic phase in 23 subjects; STS was higher during the progestinic phase in 29 subjects	MEC: signed rank test for paired samples:pP ≤ 0.0001; STS: signed rank test for paired samples: p < 0.0001	n/a	n/a	n/a	n/a	n/a
Hindsen 199	30 included, 29 analysed, probably 17 without contraceptives	21-45 y; F	nickel allergy	ICDRG ranking scale with 2 classifications added	Correlation of MEC and day of menstrual cycle	2 of 29 patients had no reaction at all on one of the test occasions	n/a	significant correlation at 2 of 4 occasions; no correlation for women on contraceptives; no coefficients reported	significant correlation at 2 of 4 occasions; no correlation for women on contraceptives; no coefficients reported	n/a	n/a	n/a	n/a	n/a
Aktan 1998	28	age n/s; F	nickel allergy	ICDRG ranking scale, consideration as only 'positive or negative'	Reproducibility of positive/negative results in the counter-phase testing	1. test: 28 of 28 (inclusion criterion); 2. test: 23 of 28	n/a	group 1: 3 of 15 false negatives day 20-24; group 2: 2 of 13 false negatives day 7-10	Fisher exact test: ns	n/a	n/a	n/a	n/a	n/a

	Critical Appraisal of Study				
First Author/ year	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
McLelland 1991	Premenstrual exacerbation occurs in some patients. (supported)	very small n; no blinding; no randomisation; incl./excl. criteria not specified	study population not described, time points investigated may no reflect most pronounced differences	IV	
Rohold 1994	We could not demonstrate an increased sensitivity to nickel sulphate patch test premenstrually in 20 nickel allergic women. (supported)	small n; no blinding; deviation from schedule; recruitment and excl. criteria not specified	study population not described in detail, time points investigated may no reflect most pronounced differences	IIIb	test contradicts fig. 1, probably mixed up numbers
Tamer 2003	Even though the results were not statistically significant, the typical accumulation of the results around (+) and (+ +) throughout days 7–10 and (+ +), (+ + +) on days 20–24 was striking. (not supported)	small n; no blinding; no randomisation; recruitment and excl. criteria mentioned briefly	study population not described in detail, time points investigated may no reflect most pronounced differences	IIIb	
Bonamonte 2005	1. In fertile women, in clinical practice it is possible to observe recurrence or exacerbation of allergic contact dermatitis during the premenstrual phase. 2. Negative responses to patch tests executed in the ovulatory phase could likely be false-negatives. (supported)	small n; no randomisation; blinding of outcome assessment; recruitment procedure and exclusion criteria mentioned briefly	population not described in detail; time of patch testing was determined individually to match estrogen peak during ovulation, which may be the time point of maximum inhibition of hypersensitivity, and therefore possibly more appropriate than in other studies	IIIb	
Hindsen 199	To answer the question of higher premenstrual patch test reactivity, further studies are needed in which serum hormone levels should be monitored. (supported)	small n; no scheduled variation of menstrual phase; blinding of outcome assessment; recruitment and excl. criteria not described, unclear if incl. criteria were specified in advance; multiple outcomes concerning cycle dependency (occasions 1-4, women with/without contraceptives)	population described concerning age, eczema group, drugs known to influence allergic contact dermatitis; -limited comparability to other studies due to design (no menstrual phases predefined) and evaluation (correlations instead of group comparison)	IIIb	
Aktan 1998	The reproducibility of positive Finn chamber nickel patch tests does not seem to be affected by the changes in the follicular and luteal phases of the ovulatory cycle. (supported)	small sample size; no randomisation; no blinding described; recruitment procedure and excl. criteria not described; unclear if incl. criteria were specified in advance	study population not described, time points investigated may no reflect most pronounced differences	IIIb	

n subgroup/ study population
N total number of patients
m mean
n/s not stated
n/a not applicable
M/F male /female

Study characteristics				Methods							Results													Critical Appraisal of Study				
First Author/ year	**Sources of funding and competing interests**	**Setting**	**Aims and Objectives**	**Study Design**	**Reference standard test**	**Diagnostic test(s) evaluated**	**Duration of exposition**	**Application site**	**Time interval and treatment(s) administered between the tests**	**Inclusion criteria**	**Patients included [n]**	**Patients [age (mean/range); gender (M/F)]**	**presumed Diagnose**	**Grading/Classification/Strength of reaction**	**Definition of outcome**	**Results I (overall positive reactions)**	**Results II (reactions at different time points)**	**Results II (3 most frequently reported substances?)**	**Accuracy**	**Reproducibility**	**Cut-Off determination**	**Comparison of two or more tests**	**Adverse effects**	**Author conclusion**	**Internal validity**	**external validity**	**Evidence level (Oxford)**	**Other/ Addendum (Optional)**
Inerot 2000	n/s	two centers in Sweden	to document possible generalized side-effects during patch testing (day 0 versus day 3)	prospective case control-study, questionnaire based controlled study (comparison pre (day 0) versus after PT (day 3)	n/a	patch test of European standard series with local additions, finn chambers	48h	back	n/a	consecutive patch test patients from 2 centers in Sweden	401	age n/s gender 135/266	suspected contact dermatitis	n/s	objective symptoms: flare-up, adhesive rection (d0 vs d3); subjective symptoms (d0 vs d3): itch, inflenza, fever, headachte, dizziness, insomnia, stomach problems	216/401 (54%): positive PT	objective: eczematous flare up: 15 patients (12 with positive PT), adhesive reaction: 5%, subjective: no significant increase d0 to d3 except for itch on back (new in 183 patients (45.6%))	no correlation between symtoms and positve patch test reactions	n/a	n/a	n/a	n/a	see aim of study	eczematous flare-ups in 3.7%, adhesive reaction in 5% of study population. There were plenty of different (sybjective) symptoms of malaise, but with exception of itch on back, the symptoms tended to be less on d3 than d0. There was no statistical correlation between symptoms and signs and postive patch tests.	no blinding, controls from same sample	possible selection bias, no inforamtion on age	4	
Mancuso 1999	n/s	single center in Ravenna, Italy	to determine the duration of the patch test reactions and the frequency of long lasting allergic patch test reactions (LLAPTR) and to identify possible risk factors.	individual prospective cohort	n/a	patch test of GIRDACA standrad series (coincides European standard series with local additions), al test chambers	48h	back	n/a	follow up (263/317) of positve PT reaction (d3) every second and third day until cleared in 798 consecutive patch tested patients 1995-1998	263	subjects which completed study (225): age 4-80 a (mean 42), gender 46/179	allergic CD	ICDRG	persistent PT reaction ≥ 14d after removal of PT in days from removal	317/798 tested (39,75); competed follow-up of 225/317 patients with positive PT results. 225 patients displayed a total of 367 positive reactions: 66 (17.9%) persisted ≥ 14d after removal	n/a	incidence (76.1%) and duration of PT reaction (25.4 d): significantly higher for Kathon CG (MCI/MI) than for other allergens; LLAPTR signifcantly associated with atopy (p<0.0000): atopics 5fold risk and longer duration (15.8 vs 10.7d) compared to non-atopics: signicantly higher frequency (25.7%) and longer duration (mean 13.2d) for ++/+++ reactions compared to + (8.4%, mean duration 9.9d).	Kathon CG: Odd ratio 9.3; atopy: OR 5.2; strong PT reacton: OR 2.5	n/a	n/a	n/a	n/a	It was found that a Kathon CG sensitivity was the most important risk factor for LLAPTR. 2nd was atopy. followed by strong patch test reaction. Rejected risk factors were sex, age and sensitivity to nickel sulfate, potassium dichromate, Disperse Bue 124, fragrance mix and p-phenylenediamine.	38/263 (14.4%) lost to follow-up; No significant differences were found with regard to sex, age, atopy and patch test positivity between the group of excluded subjects and those who completed the study (225). Appropriate statistical analysis: mulitvariate stepwise logistic regression.	appropriate	IIb	
Isaksson 2005	n/a	3 centers in Sweden	to study the development and course of positive patch-test reactions to 2-HEMA and EGDMA in patients hypersensitive to these methacrylates	case series of 12 patients with known sensitization to 2-HEMA or EGDEMA: repeate PT with readings at d3, d7, d10, d14, d17, d21, d24, d28.	previously positive test to 2-HEMA or EGDEMA in dental or nail acrylics series	2-HEMA and EGDEMA dilution series. Van der Bend chambers	48h	back	n/s	previous positive test to 2-HEMA or EGDEMA	12	age: 31-63 (mean 47); gender 1/11	contact allergy to 2-HEMA or EGDEMA	n/s	first occurence and last persistence of test reaction in days	11 out of 12 patients	12/25 (48%) positive reactions to 2-HEMA were still present after 4 weeks. 10/19 (53%) positive reactions to EGDMA were still present after 4 weeks.	n/a	n/a	91.6%	n/a	n/a	n/a	Patch-test reactions to 2-HEMA and EGDMA are long-lasting. The patch-test concentrations of 2.0% for 2-HEMA and EGDMA may be continually used. Positive test reactions emerging after 10 days do not automatically imply active sensitization.	unblinded, small sample size. No controls. Repeated PT.	PT with self prepared test preparations.	IV	
Kanerva 1998	n/a	single center in Finland (FIOH)	case report from clinical practice with contact leukoderma after PT with undiluted dental acrylics	Expert opinion	(meth) acrylate series	commercial PT substances from (meth) acrylate series (porvider n/s) and 6 dental acrylic products (undiluted)	48h	upper arm	n/a	n/a	1	0/1	allergic CD (fingertips) to methacrylates (indication for PT). Toxic reaction to PT of undiluted products followed by leukoderma.	n/s	contact leukoderma due to toxic reaction	≥ 2.8 years persistent contact leukoderma at site of toxic PT reaction	n/a	n/a	n/a	n/a	n/a	n/a	aim of case report	dental acrylics should never testes "as is". We discurage the practice of use tests, open tests or repeated open PT with undiluted dental acrylics.	n/a	n/a	V	
Bordel_Gomez 2009	none	single center in Spain	case report from clinical practice with BCC in	Expert opinion	n/a	standard series of the Spanish Group for Research Into Dermatitis and Skin Allergy and the metal panel. Provider of test allergens: Trolab, Marti Tor, Chemotechnique Diagnostics.	n/s	back	n/a	n/a	1	0/1	eyelid dermatitis (indication for PT). BCC at site of previous PT of 1% gold chloride (3+ PT reaction)	ICDRG	superficial BCC at R4 PT site of gold.	superficial BCC 3 years after PT with 1% gold chloride at PT site. Gold particles in excisional biopsy detectable. No solar damage. Fortuitous coincidence versus intense inflammatory response as trigger of caricnogenesis	n/a	n/a	n/a	n/a	n/a	n/a	aim of case report	characteristics of the patient suggested posttraumatic BCC. The possibility of a rare fortuitous coincidence should bebe considered. We have found no reports of skin tumors as possible complications of patch tests.	n/a	n/a	V	
Jacob 2011	Funding by SmartPractice, Phoenix, AZ, USA	single center in San Diego, CA	to determine safety and efficacy o TRUE test in children and adolsecents aged 6-18 years	open label prospective study. Adverse events (AE) and serious adverse events (SAE) were documented d2, d3, d7, d21- late and/or persistent skin reactions were also recorded.	n/a	Thin Layer Rapid-Use Epicutaneous test (28 allergens) T.R.U.E. test	48h	back	n/a	children and adolsecents aged 6-18 years with suspected allergic CD referred to center between Dec. 2008-Oct. 2009	102	age: 28: 6-8yo; 29: 9-12yo; 45: 13-18yo (mean age 11.6); gender: 48/52	suspected allergic contact dermatitis	ICDRG	mild and moderate AE: slight worsening of dermatitis or specific body site; severe AE: extensive worseneing of dermatitis with superinfection	35/100 (34.7%) reported 52 non-serious Aes, of which 96.1% werer mild or moderate, n=2 severe. 20% experienced tape irritation. 4 subjects experienced 7 persistent reactions mild infiltration, mild pruritus or mild to moderate hyperpigmentation)	n/a	n/a	n/a	n/a	n/a	n/a	aim of study see column S	PT is efficaceousand safe in the pediatric population	2 patients lost to follow-up	appropriate, race of study population defined	IIb	
Prue 1998	Glaxo	number of physicians (n/s) form 45 states of the US and Dictricto of Columbia	to evaluate test perfomance an safety	voluntary postmarketing survey by data collection forms (on incidence of dermatitis by body site, reaction frquency to test allergens, clinical relevance and AEs) distributed upon purchase of TRUETest	n/a	Thin Layer Rapid-Use Epicutaneous test (24 allergens) T.R.U.E. test	48h	n/s	n/a	returned data forms from patients tested Jan. 1995-Aug. 1996	3,209	age (given for 2,392): 1month - 95yo: 0.8% <13yo; 3.1% 13-19yo, 52.2%: 20-50yo; 43.9% >50yo. Gender (given for 2,888): 862/2,026	n/s	n/s	AE: tape irriation, persistent or severe PT reaction, sensitization or need for medical Treatment of PT reaction	Tape irritation: 2.2% of patients tested; Itching/burning sensation: 1.59%; excited skin: 1.31% were the most frquent Aes-Erythema: 0.22, hyperpigmentation 0.03%,otherAEs : 0.19%	n/a	n/a	n/a	n/a	n/a	n/a	aim of study see column S	TRUETest provides a standardized, convenient, reliable and safe method of assessing patients with CD	voluntary survey, possible selection bias, missing data on demographics(including race) and reading scale used.	study population not described in detail	IV	
Möller 2002	grant from Lund University Medical Faculty	single center in sweden	to investigate coexisting contact allergy to American as well as Swedish ragweed in patients with contact allergy to SL	prospective case series	n/a	extracts of Ambrosia artemisiifolia L. (ragweed): the American extract 1.0% pet., and Swedish extracts (summer and autumn) in 10-fold serial dilutions 1.0–0.0001% acetone. SL mix 0.1% pet. (Chemotechniques, Sweden). Finn Chambers	48h	back	n/s	patients from Malmö city with previously positive test to sequiterpenlactone in European Standard series;; 16/17 patients had hand eczema of pompholyx type.	17 (plus 5 controls)	age: 34-76 (mean 57.5); gender: 5 male/12 female; gender:3/12	suspected allergic contact dermatitis	ICDRG	reaction frequency of different extracts. Frequency of flares.	A positive test to the American ragweed preparation was obtained in 8/17 patients, in 14/17 patients to the Swedish summer extract, and in 15/17 patients to the Swedish autumn extract. 5/16 (31.2%) patients: flare of hand eczema with itch and new vesicles during PT procedure	n/a	n/a	n/a	100% (SL mix)	n/a	n/a	see column S	patients with SL mix allergy are allergic to American as well as to Swedish ragweed. Pompholyx seems to be a frequent clinical picture in patients with SL mix allergy.	no blinding, small n; possibel seleciton bias, occupational cases excluded	n/a	IV	
Jovanovic 2003	Ministry for Science, Technology and Development of the republic of Serbia.	single center in Serbia	case report from clinical practice with flare of seasonal EEM after PT with weeds (common chickweed)	case report and expert opinion	n/a	European Standard series; specific plants, woods, tars, balsams, perfumes and flavours series (Hermal–TrolabA, Reinbek, Germany), patient's own plants (fresh leaves), Finn Chambers	48h	back	n/a	n/a	1	0/1	allergic CD to weeds	n/s	Flare of seasonal EEM at the 96h-reading of PT	Strongly positive eczematous PT reaction obtained to common chickweed and dandelion. Eczmatous PT reactions to white clover, field milk thistle, alantolactone, usnic acid, atranorin, arnica tincture, d-limonene; Pinaceae tars and balsams (juniper tar, pine tar, storax, spruce balsam, Venice turpentine).	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Erythema multiforme developed in this patient due to contact with weeds, aggravated during occupational exposure, and recurring during patch testing. This is only the 4th report of erythema multiforme in association with patch testing.	n/a	n/a	V	
Isaksson 2002	The Swedish Foundation for Health Care Sciences and Allergy Research, the Swedish Asthma- and Allergy Association's Research Foundation, the Alfred O¨ sterlund Foundation, the Edvard Welander Foundation, and the Finsen Foundation. AstraZeneca, Sweden, supplied Pulmicort Turbuhaler, lactose, and the R and S diastereomers; Yamanouchi Pharma, Denmark, supplied budesonide.	single center in Sweden	to determine whether inhalation of budesonide would result in reactivation of patch test reactions caused by budesonide	randomized, double-blind, and placebo-controlled	previously (<1-8 years ago) positive PT to budesonide	re-patch test with a serial dilution of budesonide (Yamanouchi Pharma, Denmark), the R and S diastereomer(Astra Zeneca), hydrocortisone-17-butyrate (Hc-17-B, Chemotechnique, Sweden) and triamcinolone acetonide (Cilag AG; Switzerland), all in absolute ethanol (99.5% vol/vol)., Finn Chambers). Budesonid inhalation 6 weeks after PT, follow-up for flare of PT reaction to budesonid after inhaled provocation (Placebo inhalation: lactose)	48h	back	1-8 years betwwen Pts, 6weeks between 2nd PT and inhalation	nonasthmatic patients who were initially given a diagnosis of budesonide hypersensitivity on patch testing from less than 1 up to 8 years before the study	15 patients known budesonid PT raction; Provocation: 7 with verum, 8 with placebo	age: mean 46.6 yo; gender: 3/12	budesonide contact allergy	ICDRG	positve PT reactions to re-PT of steroids. Frequency of flare of positive PT reaction upon inhalation after 6 weeks.	In 4 of 7 (57.1 %)patients who inhaled budesonide, experiences reactivation of previously positive patch test reactions was noted within 24 hours (further skin symptoms: flare-up of dermatitis: 1x; gerneralized macular and maculopapular exanthema: 1x each; dermal lesion on back: 1x, in contrast to 0 of 8 patients who inhaled placebo	PT 100% PT positive upon retest	n/a	n/s	100% PT wirh budesonid	n/a	n/a	see column S	This study shows that allergic skin reactions may occur in patients with contact allergy to budesonide when inhaled forms of the drug are used.	small number; appropiate controls. Fisher's exact test and classified as significant when the P value was .05.	appropriate	IIb	
Lauerma 1991	grants from Allergy Research Foundation of Finland, Finnish Medical Foundation, and Paulo Foundation	single center in Finland	to determine whether systemic hydrocortisone can elicit allergic skin reactions in patients with contact hypersensitivity to hydrocortisone	Open oral provocation with 100 or 250 mg hydrocortisone in patients with hydrocortisone contact hypersensitivity	previously (6d->7months ago) positive PT to hydrocortisone-17-butyrate	provocation with 100 or 250 mg hydrocortisone (Orion, Finalnd)	n/s	n/s	n/a	previous positive test to hydrocortisone and/or hydrocortisone-17-butyrate	6 (4 patients with contact hypersensitivity to hydrocortisone and hydrocortisone-17-butyrate and 2 patients with contact hypersensitivity to hydrocortisone-17-butyrate)	age: 31-70 (mean 48); gender: 3/3	hydrocortison allergy	ICDRG	Frequency eliciation of previuos PT stites. Elicitation of of flare of previous allergic dermatitis due to hydrocortison positive PT reaction	cutaneous reactions at sites of previous 5-15 h after oral provocation: allergic dermatitis caused by hydrocortisone in two patients and at sites of earlier allergic patch test reactions caused by hydrocortisone in the other two patients. Provocations in two patients with contact hypersensitivity to hydrocortisone-17-butyrate but not to hydrocortisone remained negative.	n/a	n/a	n/a	n/a	n/a	n/a	see column S	both oral hydrocortisone and intrinsic cortisol are able to induce allergic skin reactions in presensitized subjects	small number; no placebo challenge	appropriate	IV	

Reig Rincon de Arellano 2005	n/s	single center in Spain	case report from clinical practice with flare of intradermal test and exanthema after PT	case report and expert opinion	skin prick test, intradermal test, provocation test	PT with betalactams	48h	back	n/a	n/a	1	age: 31; gender: 0/1	delayed type reaction to betalactams	n/s	n/a	Flare of previous intradermal test and exanthema after PT	n/a	n/a	n/a	n/a	n/a	n/a	see column S	Flare up reactions consist in the reactivation of previously intradermal test reactions or old positive skin tests after the performance from patch testing or after a systemic challenge.	n/a	n/a	V	
Möller 1996	n/s	single center in sweden	case report from clinical practice with flare of PT after intramuscular injection of gold	case report and expert opinion, to study the relationship between contact allergy to gold salts and an attempt to gold therapy in a rheumatic patient	n/a	PT Swedish standard series, gold sodium thiosulfate (0.5-10% pet.) and gold sodium thiomalate (36% pet.) in Finn Chambers, intradermal test, i.m. prococation (10mg gold sodium thiomalate) 33d later	48h	back	33d between skin tests and provocation	n/a	1	age: 52; gender: 0/1	gold allergy	n/s	n/a	dermal flare of PT and intradermal test site within 24h after i.m. provocation	n/a	n/a	n/a	n/a	n/a	n/a	see column S	sine gol allergy is frquent, cutaneous side effects of gold therapy may be explained by such an immunological reaction	n/a	n/a	V	
O´Donnell 1992	n/s	single center in UK	case report from clinical practice with development of Erythema multiforme after PT	case report and expert opinion	n/a	PT European standard series, a fragrance series, and her own cosmetics, including perfumes.	48h	n/s	n/a	n/a	1	age: 22; gender: 0/1	allergic contact dermatitis to perfume	n/s	n/a	development of erythema multiforme 2days after application of PT; and excited skin syndrom. On re-PT: postive to FM I and colophony	n/a	n/a	n/a	no erythma multiforme upon second test	n/a	n/a	see column S	3rd report of EM developing in association with patch testing.	n/a	n/a	V	
Mashiah 2003	n/s	single center in Israel	case report from clinical practice with development of AGEP after PT	case report and expert opinion	n/a	PT with ingredients of Coldex: Acetaminophen (1% and 10% pet.), phenylephrine (1% and 10% pet., 1.5% aqu.), chlorpheniramine (1% pet. 1% aqu.), affein (0.5% pet.)	48h	n/s	1 month; tx n/s	n/a	1	age: 23; gender: 0/1	AGEP to ingredient of Coldex	n/s	n/a	d7 of PT: generalized vesiculopustular eruption, negative PT results; re-PT (Acetaminophen (1% and 10% pet.)) 1 month later: negative, d6: generalized vesiculopustular eruption	reproducible AGEP after PT	n/a	n/a	yes	n/a	n/a	see column S	1st report of AGEP induced by PT to determine culprit drug in case of previous AGEP	n/a	n/a	V	
Perfetti 2008	n/s	single center in Italy	case report from clinical practice with development of anaphylactoid reaction on d1 of PT (ammonium persulfate (1% pet))	case report and expert opinion	n/a	PT (ammonium persulfate (1% pet)) and hourly spirometry	90min	back	n/a	n/a	1	age: 21; gender: 0/1	work-related allergy to ammonium persulfate	n/s	n/a	By 90 min after the PT application, cough, dyspnea, nasal obstruction, itching at the site of the patch, and wheals on neck and face occurred. The patch was removed, showing erythema and wheals. FEV1 progressively decreased with a maximal fall of 49% at 150 min. ++ positive PT (vesicles after 48h) despite shortened exposure;	n/a	n/a	n/a	n/a	n/a	n/a	see column S	the development of a systemic reaction indicates cutaneous absorption of ammonium persulfate. The mechanism of such a reaction remains unknown, but the relatively short interval between patch application and appearance of symptoms indicates an IgE-mediated reaction. Our case suggests the need of a period of observation after application of patches with ammonium persulfate	n/a	n/a	V	
Thyssen 2007	Copenhagen County Research Foundation	single center in Denmark	To determine the risk of PT sensitization, patients were tested twice	population-based individual cohort:In 1990, 567 persons were patch-tested and only one person had a (+) positive reaction to PPD. In 1998, 540 persons were reinvited to a new patch test and 365 (participation rate 68%) were re-tested.	n/a	Re-PT with Thin Layer Rapid-Use Epicutaneous test (28 allergens) T.R.U.E. test (containing PPD 1%)	48h	n/s	8 years	Individuals patch-tested in the population-based Glostrup allergy studies 1990 eligible for retesting in 1998	365	n/s	n/s	n/s	positive PT to PPD.	In 1990, 567 persons were patch tested: In 1998, 365/540 (participation rate 68%) were retested: There were no positive reactions to PPD in the reading (d2 only)	n/a	n/a	sensitivity reduced due to reading only at d2	yes	n/a	n/a	none	This study shows that patch testing with PPD in a random population was done without observing active sensitization. It should be emphasized that readings were done on day 2 (D2) only and that D3 readings might have shown more positive reactions in 1990 as well as in 1998	population-based cohot. reading only d2	adequate	IIb	Linitations of study: reading only d2, not d3
Jensen 2006	n/s	single center in Denmark	to determine the incidence and the consequences of active sensitization	retrospective chart review of 7619 patients tested with standard screening tray	n/a	standard series encompassing the True Test panels 1 and 2 supplemented with petrolatum-based test materials in Finn Chambers, Routine reading twice: on D2–D3 and D5–D7	48h	back	n/a	Patch tested patients with registered occurrence of late reactions (by ticking a box on the patient record, if such an event is registered by the patient or a doctor).	26 (0.3%)	n/s	active PT sensitization	n/s	occurence of positive PT reaction beyond d5-d7	Among 7619 consecutively tested eczema patients in a 14-year period 26 (0.3%) were identified in the database as having had a late patch test reaction, which may be an indication of patch test sensitization. 12 cases: missing detailled inforamtion, 14 patients eligible for evaluation.	n/a	11/14 patient actice sensitization possible: cuprit contact allergens: in 7 patients plant derived allergens, p-tert butylphenol formaldehyd resin(2), PPD (1), Tixolone pivalate (1), Fragrances (1)	incompete register	n/a	n/a	n/a	see column S	subsequent allergic contact dermatitis following an alleged patch test sensitization is very rare	retrospective study. Data patially incomplete. no late reading. no recall system. The patients were not specifically encouraged to report late reactions	In 9 of the patient records, the late reaction was not described adequately to be included in this analysis or the allergen responsible for the late reaction was not identified. The registration number of 3 patients was not recognized by the computer system and their records therefore not traceable.	IV	The patients were not specifically encouraged to report reactions that appeared later than the usual reading days,
Hausen 1983	n/s	single center in Germany	to identify the culprit contact allergen in Alstromeria and feasible PT concentrations	animal model and small case series and expert opinion	PT with alstromeria extracts and Tulipalin A and Tuliposide A	n/s	n/s	n/a	n/a	suspected allergic contact dermatitis to alstromeria species	8	n/s	suspected allergic contact dermatitis to alstromeria species	n/s	psoitive PT results to Tulipalin A at 0.01%	8 growers exposed to Alstroemeria hybrids suffered from skin lesions, out of which 6 could be shown to be allergic to them, while cases 4 and 7 suffered from primary irritant (toxic) dermatitis.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Direct testing of the plant material in human patients carries the risk of false positive reactions and active sensitisation, as the threshold for both forms of the allergen is very high. Only a concentration of 0.0 I% can be considered safe.	no late reading of PT, no study design to detect active sentitization	routine PT conditions, no follow up of patients	V	
Arnold 1995	n/s	Five centers in the Netherlands	to investigate whether addition of PAAB to the standard sereis increases the sensitivity in detecting paradye allergy	retrospective analysis of patch tests performed in 5 Dutch hospitals while PAAB was added to their European standard series	European standard series without PAAB	European standard series with PAAB	n/s	n/s	n/s	PT with standard series	n/s; 3461 tested standard series	n/s	n/s	n/s	gain in sensitivity of detecting contact allergy to para-dyes by adding PAAB was 24%.	gain in sensitivity of detecting contact allergy to para-dyes by adding PAAB was 24%.	0% were solely allergic to PAAB and 22% solely allergic to PPD within 4 days; 35% were allergic to both PPD and PAAB within 4 days, but 43% beyond 4 days (mean 12 days)	n/a	gain in sentitivity 24 % ±10.5 (mean ± SE)	n/a	n/a	n/a	43% late reactions as indicator for active sentitization	Adding PAAB to the European standard series may have the disadvantage of increasing the risk of active sensitization to PPD and PAAB, as compared to testing with PPD alone, since many late reactions were observed.	no infoamtion about routine time points of readings, no retest of late responders	no characteristics of PT patients reported	IV	
Hillen 2001	n/s	Three centers in Germany	to study the risk of patch test sesitization induced by para-tertiary-butylcatechol (PTBC)	prospective study testing a dilution series of PTBC with standardized readings on d1–3, 7, 14 and 21 after application. and retest of late-responders	n/a	A dilution series of PTBC (1%, 0.5%, 0.25%, 0.1% pet.) was used. Patch tests were read on days (D) 1–3, 7, 14 and 21 after application.	24h	1% PTBC and the PTBC dilution series were applied to the left side of the upper back . Additionally 1% PTBC was tested on the volar side of the left upper arm to allow patients to carry out daily self-examination.	Re-PT 1-3 months after first in 2 late responders	Only patients in whom patch testing with PTBC was indicated in investigation of their dermatitis (known or possible exposure to PTBC) were included.	46	n/s	PTBC sensitization	German Contact Dermatitis Research Group	positve PT reactions to PTBC within d1-7 versus beyond d7	4 patients had a positive patch test during late readings only, indicating patch-test sensitization.	2 out of 4 late responders obtained re-PT: 2/2 reacted d1-3 in the rechallenge.	n/a	n/a	n/a	n/a	n/a	assumed active sensitzation in 4/40 patients who completed the study	PTBC clearly induced patch test sensitization in 10% of the patients. It cannot be excluded that patch testing with 0.25% PTBC or with even lower concentrations might induce patch test sensitization. The optimal patch test concentration still has to be determined.	Patients who were not able to return for all scheduled late readings were instructed to carry out self-examination and to return to the clinic if a test reaction occurred. Additionally, they were telephoned on d7, d14 and d21, and asked about reactions at the patch-test sites.	6 patients being discarded from evaluation because of protocol violation. In 1 patient, only a 1% concentration of PTBC was applied. 36 out of the 40 patients who completed the investigation were male and 4 female. 11/40 patients returned for all late readings.	IIb	
Hillen 2006	n/s	Eight centers in Germany	to assess the frequency of late reactions to paraphenylenediamine (PPD) and epoxy resins (ER).	prospective study testing a PPD, ER, Nickel with standardized readings on d1–3, 7, 14 and 21 after application. and retest of late-responders	n/a	PT with PPD-base, 1% pet. and ER based on diglycidylether of bisphenol A (DGEBA, 1% pet.) and/or nickel sulphate (5% pet.). PT substances supplied by Hermal (Reinbek, Germany. Small Finn Chambers (Epitest, Tuusula, Finland) were used in all but one center (Haye's Test Square Chamber (HAL, Haarlem, NL) Patch tests were read on days (D) 1–3, 7, 14 and 21 after application.	24h (588 patients: PPD and ER; 241 nickel) or 48h (1160 patients: PPD and ER; 571 nickel)	medial side of the upper arm	Re-PT 2–20 weeks later in 7/21 PPD-late responders	Patients in whom patch testing with the German standard series (jan. 2003 - sept. 2004) was indicated were asked to participate. Informed consent.	1748 (PPD and ER); 812 (nickel sulphate); 25 late responders	25 late-repsonders: age: 17-67 (mean 36,5); gender: 12/13	allergic contact dermatitis	ICDRG	positve PT reactions to PPD, ER, nickel within d1-7 versus beyond d7	1428 patients (ER and PPD) and 638 patients (nickel) were evaluable: In 25 patients (1.8%), patch tests became positive not before D7, among them 21 reactions to PPD (1.5%) and four reactions to ER (0.3%). No late reactions were seen with nickel sulphate.	In 5/7 PPD repatch-tested patients, patch-test sensitization was identified as the cause of the late reaction. All late reactions, except for one, occurred in patients in whom patch tests were applied for 48 h.	PPD>ER	n/a	n/a	n/a	n/a	assumed active sensitzation in 25/1428 (1.8%) patients who completed the study	PPD (1% pet.) elicited late reactions in 1Æ5% of routine patch tests, the majority of them probably being caused by patch-test sensitization. Therefore, the German Contact Dermatitis Research Group decided to remove PPD 1% pet. from the German standard series. One way to optimize PPD testing could be to reduce the exposure of PPD 1% to 24 h. Alternatively the patch-test concentration of PPD might be reduced.	Patients who were not able to return for all scheduled late readings were instructed to carry out self-examination and to return to the clinic if a test reaction occurred. Additionally, they were telephoned on d7, d14 and d21, and asked about reactions at the patch-test sites.	1428 completed study	IIb	
Vigan 1997	n/s	single center in France	to evaluate the frequency of delayed appearance of positive PT results.	prospective PT study with routine readings (d2, d3 or d4) and additional reading at d15. Re_PT in selected patients with positiv PT result at day 15 only.	n/a	ICDRG standard series with local additon of propylene glycol 5%, budesonide 0.1%, tixocortol pivalate 1%, Euxyl K 400 2%, glutaraldehyde 0.3% all in pet.)	n/s; assumedly 48h	n/s	n/s	patients undergoing PT with the standard series from june 1994-june 1996. informes consent.	550	Age: n/s; gender: 2/3 women; 1/3 men	n/s	ICDRG	positve PT reactions present for the first tim e in the d15-reading.	39 additional positive PT reactions at d15 (per 15,400 allergens tested in 550 individuals) not present at reading untill d7. Percentage of late appearing postive reaction: 0.25%. Women wer not more likely to develop late responsed.	n/s	15/39: belonging to the "para"-group (PPD, IPPD, benzocaine, PTBPF), of which 2,200 substances had been tested in 550 individuals. Percentage of late appearing positive reaction: 0.6%. PPD: 9; neomycine: 7; IPPD: 4; Balsam of Peru, thiuram, budesonid: 3 each; colophony, cobalt, epoxy resin, PTBPF: 2 each; primine, glutaraldyde: 1 each	n/a	n/a	n(a	n/s	late responses as indicatior for active sensitization	The number of delayed positive results is negligible (0.2%) and does not jeoparized the prinziple of PT. The large proportion of late positive results should lead to the exclusion of PT allergens from the "para" group from the additional series and PPD from the standard children series	no systematic retesting of patients with late responses.	patients were informed that late reactions may occur.	IIb	

Kanerva 1992	n/s	single center in Finland (FIOH)	case series from clinical practice and case report with development of double active sensitization caused by acrylics	case sereis and expert opinion	n/a	PT of commercial (meth) acrylate series. sept. 1985-dec. 1986: EA, 2-HEA, 2-HPA 0.5% pet., 1998-1990: 0.1% pet. (Chemotechnique Diagnostics AB, Malmö, Sweden). Finn Chambers. Selected re-PT.	48h	back	2 months later	PT with (meth)acrylate series	sept. 1985- dec. 1986: 24. 1998-1990: 100	n/s	n/s for case series, case report: occupationaldermatitis	ICDRG	positive PT results to acrylics first appearing d10-21	During 16 months from 1985 to 1986: 24 patients tested: 3 had relevant allergic PT reactions. Of the remaining 21 patients, 3 (14%) became actively sensitized to EA 0.5% pet, 2-HEA 0.5% pet and (2-HPA 0.5% pet. Additionally, presentation of *first* subject (out of 100 tested) who became sensitized (d21) to ethyl acrylate (EA 0.1% pet.), 2-hydroxyethyl acrylate (2-HEA 0.1% pet.) and 2-hydroxypropyl acrylate (2-HPA 0.1% pet.). This was confirmed on retesting but on day 13, after retesting, the patient developed further positive acrylate patch test reactions	n/a	commercial test substances caused sensitization, ie, ethyl acrylate (EA; 0.5% pet.), 2-hydroxyethyl acrylate (2-HEA; 0.5% pet.) and 2-hydroxypropyl aerylate (2-HPA; 0.5% pet.). In 1987 test concentration for the above-mentioned acrylics was lowered, initially to 0.167% in pet, and later to 0.1 % according to the suggestions of the manufacturer.	n/a	n/a	n/a	14% late responders with EA, 2-HEA, 2-HPA 0.5% pet., 1% late responders with EA, 2-HEA, 2-HPA 0.1% pet.,	acitve sensitization assumed in 14% EA, 2-HEA, 2-HPA 0.5% pet., 1% with EA, 2-HEA, 2-HPA 0.1% pet.,	EA, 2-HEA, 2-HPA entirely removed from the PT series. PT appears to be a safe test procedure, since in their clinic only PPD or PPD-related substanees (three patients since 1982), acrylics, epichlorohydrin and 4-tert-butylcatechol (unpublished) had been observed to sensitize. No patients have been sensitized to their "own" substances that they have brought in.	no blinding	study population not described.	IV	
Paulsen 2001	n/s	single center in denmark	to study the detection frquency of type IV sensitization to Compositae by routine PT with the sesquiterpene lactone (SL)) mix supplemented with aimed patch testing with the Compositae mix (CM) and other composite extracts and allergens.	retrospective analysis of the patch test standard in a singel department in Denmark with routine testing of SL along with the standard series and aimed testing with the CM and components if positive. Selective retest in late responders.	SL-Mix	SL mix 0.1% pet. and the Compositae mix 6.0% pet. (Trolab, Hermal, Hamburg); TRUE Test panels 1 and 2 and varying additional allergens. Supplementary supplies of the Compositae mix were prepared by Hausen from fresh plant material (yarrow, tansy and feverfew) and predried commercial plant material (arnica and wild (German) chamomile) Finn ChambersA (Epitest Ltd., Helsinki, Finland). Readings d2-4 and d5-8.	48h	n/s	n/s	PT of standard series 1990-1998. If SL Mix positive: aimes testing with CM and components	4386	n/s	Compositae allergy	ICDRG	positive PT to SL and/or CM	190 of 4386 patients tested (4.3%) were Compositae-sensitive, 143 females (mean age 51.5 years) and 47 males (mean age 55 years), and 83% of reactions considered clinically relevant. 22% were suspected of occupational sensitization/dermatitis.late appearing reactions (d7) in 17 patients, in 4 of them active sensitization possible .	n/a	n/a	SL mix detected 65%, CM 87% of Compositae-allergic patients, and the overall detection rate with both mixes was 93%.	n/a	n/a	n/a	late responses 17/190 (8.9%)	the detection rate with SL mix was high enough to support its continued use as a screening mix and it was very well and rather safely supplemented by aimed testing with CM. Active sensitization was not recorded with any of the mixes. In a few patients, however, the pattern of patch test reactions made distinction between active sensitization and late-appearing reactivation reactions difficult.	no standard reading beyond d8; no information of patients to present in case of late responses, no standardized re-PT in late responders.	study population not described.	IV	

n subgroup/ study population
N total number of patients
m mean
n/s not stated
n/a not applicable
M/F male /female