Allergic contact dermatitis (ACD) was once thought to be an uncommon entity in children. Recently, the burden of pediatric ACD has been increasingly recognized due to heightened reporting of US patch test evaluations and improved awareness among providers. In 2008, researchers determined that children were as likely to develop ACD as adults, which was unexpected given that children inherently have had less time to gather exposures to environmental and chemical sensitizers.

The gold standard for diagnosing ACD is epicutaneous patch testing, a proven safe and efficacious method. This said, patch testing is currently not FDA indicated in children. Furthermore, due to lack of population-based studies in children, there is still no consensus for prevalence rates of allergen sensitization among children in the general population in the US.

Initial studies in European children with suspected ACD showed a wide range of positive patch test rates ranging from 14.5 percent (ages ≤14 years, n=585) to 70.7 percent (ages 3-16 years, n=147). A recent study from the North American Contact Dermatitis Group representing referral centers in the US and Canada (from 2005 to 2012) reported that 883 children were patch tested; 62.3 percent had a positive patch test and 56.7 percent had a relevant positive patch test. Pediatric patch testing data from 2001 to 2006 at the University of Miami and University of Pennsylvania demonstrated a staggering positive patch test prevalence of 83.0 percent, which the authors attribute to selection bias. In addition, the Mayo Clinics (including Rochester, Jacksonville, and Arizona) performed studies between 2000 to 2006 that revealed a positive patch rate of 61.0 percent in children tested. Again, while these rates are not representative of the general population, they demonstrate the importance of evaluating for contact dermatitis in children with chronic dermatitis.

In 2004, the Society of Investigative Dermatology revealed that there were approximately 72.3 million people with contact dermatitis in the US, representing one of the top five most economically burdensome skin diseases. Its estimated economic burden was $1.6 billion in direct costs and $566 million in indirect costs. The current pediatric population, in 2014, consisted of 73.7 million children. Conservatively speaking, if 1.5 percent to 5.4 percent of the general population has ACD, then there would be an estimated one million to three million incident cases of ACD in children each year.

There is a stark discrepancy between the number of children with a confirmed diagnosis of ACD by patch testing and the estimated prevalence, suggesting the possibility of under-diagnosis or misclassification bias. This is of both economic and medical importance given that patch testing has been shown to be a cost effective measure which decreases morbidity and alleviates economic strain on the healthcare establishment.

**THE PEDIATRIC CONTACT DERMATITIS REGISTRY**

In an effort to better understand medical provider practices in regard to pediatric patch testing in the US, in 2014 Loma Linda University established the Pediatric Contact Dermatitis Registry (PCDR) whereby US providers performing pediatric patch testing could enroll and collaborate. Over the course of one year, more than 250 healthcare providers from all 50 states and Washington DC participated in an online survey focusing on their demographics and practice parameters. Of the participating providers, the majority were medical doctors (n=189; 75.2 percent), with ancillary providers accounting for 21 percent. There were two states (North Dakota and Idaho) where only ancillary providers responded, one physician assistant and one nurse practitioner. The range of time in practice was 1 to 40 years, with the median...
time in practice for the registry participants noted to be
12 years, which suggests a wide range of providers are
utilizing patch tests in their practices. Providers were pre-
dominantly dermatologists (n=200, 79.6), which is most
likely a consequence of more frequent patch test training
in dermatology residencies compared to others. In fact,
a 2010 study of 112 US-based dermatology programs
revealed that program directors estimated increases in
the number of dermatology residents utilizing expanded
patch tests.17

The provider registry also gave an insight into
which populations are being actively tested for ACD.
Average population density across providers was 4,493
people/mi², suggesting that there were high numbers
of academic-based providers in dense metropolitan
areas. Furthermore, providers practiced in areas with a
median income of $58,119, which is above the national
average.18 That said, there were more people below
the poverty line in areas with providers (17.1 percent)
compared to nationwide (14.8 percent).18 These find-
ings suggest that the providers that responded to
the survey practiced in primarily urban, underserved
populations.

Providers in the PCDR were separated into two groups
based on the number of members in each city: cities
with a single provider response versus cities with two or
more provider responses. Cities with multiple provid-
ers of pediatric ACD had a higher average population
density (6,172 person/mi²) compared to cities with only
one member (2,629 person/mi²), p-value < 0.001. It was
noted that providers in metropolitan areas tended to
group together geographically. Distances between pro-
viders and the locations of pediatric dermatology fellow-
ships and/or confirmed Society for Pediatric Dermatology
(SPD) were calculated by using the spherical law of
cosines.19 Most registry members were found to be locat-
ed within a 27-mile radius of a pediatric dermatology fel-
lowship or confirmed SPD member (51 percent, n=129),
suggesting that pediatric dermatologists serve as a critical
access points for patient care, provider training and refer-
ral (Figure 1).

The question arises as to whether the providers
are grouping in high density areas due to increased
demand for contact dermatitis treatment due to high
prevalence of the condition or whether patients trav-
eling to urban tertiary referral centers because there is
limited access to specialist contact dermatitis care in
peripheral cities. Again, it is a possibility that contact
dermatitis is more prevalent in higher density metro-
politan/urban areas.

Of interest, recent studies have shown increased sen-
sitization rates of ACD in patients with atopic derma-
titis (AD).20,21 Researchers have also found that eczema
was associated with small particle air pollution.22 These

Figure 1
authors noted that pollutants in conjunction with climate factors may have harmful effects and differentially impact eczema prevalence and severity. This concept that AD is influenced by environmental factors has been previously studied. It remains a possibility that cities that are larger and more densely populated are likely to have higher levels of small particle air pollution and are at higher risk for eczema, and potentially ACD. Several studies have identified increased prevalence of AD in association with moving to a more industrialized area, and this may also be the case for ACD.

**A CALL TO ACTION**

Overall, the confirmation of these providers in the PCDR study demonstrates a larger number of access-to-contact dermatitis-care-points in the US for pediatric contact dermatitis evaluation than previously recognized. Nonetheless, we believe a significant number of US-based providers are not yet represented in the registry. In order to provide a more accurate representation of the evaluative practice of patch test providers in the US, recruitment and collaboration with these providers is necessary. This is being currently addressed by active efforts to expand provider recruitment. We encourage all clinicians who are providing patch test services to children in the US to take the PCDR survey (Figure 2).

Beyond the documentation of provider distribution and dermatologic healthcare access, this registry’s collaborative research effort presents an opportunity to improve communication between healthcare providers who are at the forefront of treating ACD. Thus, registered providers are helping expand and propel the knowledge of pediatric ACD and its associations.

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Figure 2