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# Acne

## Natural history, facts and myths

This article describes the epidemiology and natural history of acne and discusses the common aetiological myths and beliefs surrounding acne. Acne is a polymorphic disease with noninflammatory and inflammatory aspects and a wide spectrum of severity. The severe inflammatory patterns tend to be those that most frequently scar and therefore require early intervention. The pattern of disease, relative severity, distribution, and patient's social circumstances will influence appropriate management. However, effective management also includes patient education about acne, its natural history, and dispelling acne myths.

**Acne is very common in adolescence. Its prevalence has been estimated at 95–100% in boys aged 16–17 years and 83–85% in girls.<sup>1–4</sup> Acne begins as a noninflammatory comedonal condition, then evolves to the mildly inflammatory papular pustular acne before proceeding to the more inflammatory nodulocystic lesions. Each stage seems to be separated by 2–3 years.<sup>5,6</sup> It becomes more common and severe, reaching its peak between 14–17 years in females and 16–19 years in males.<sup>1</sup>**

Atypical age presentation does occur in acne. Neonatal and infantile acne usually occurs in males in their first 12 months of life and lasts for 3–4 years.<sup>7,8</sup> Often a family history of acne is present in these patients. Early age development of comedonal acne, in females at least, appears predictive of later, more severe disease<sup>9</sup> (see *Case study Jodie*).

Acne will mostly resolve by 23–25 years of age, but at 40 years of age 1% of men and 5% of women exhibit acne lesions.<sup>10</sup> Women may also develop acne for the first time, or redevelop acne, in their mid to late 20s<sup>11</sup> (see *Case study Carol*). One study<sup>4</sup> reviewed 200 patients with acne aged 25–55 years (mean age, 35.5 years), with the majority being women (76%). Among this cohort, inflammatory lesions with mild to moderate severity and scarring predominated. Persistent acne was present in most of the patients, although 18.4% of women and 8.3% of men had onset of acne after 25 years of age. Most patients (82%) had not responded to multiple courses of oral antibiotics, and approximately one-third

of the patients had experienced a relapse after treatment with one or more courses of isotretinoin. Eighty-five percent of the women experienced a premenstrual flare of their acne.<sup>12</sup>

### Patterns of clinical disease

Acne is most often a polymorphic disease,<sup>13</sup> however the patient and practitioner will probably note two main patterns of disease.

The first pattern is that of essentially noninflammatory disease, which tends to be an early phase often seen in the peri-pubertal age group. There is increased oil production on the face, chest, back and shoulders. This may be accompanied by an increase in pores, blackheads or open comedones. Occasionally noninflammatory whiteheads or closed comedones will also be seen, premonitory of other more significant inflammatory disease (see *Case study Jodie*).

The second clinical pattern is that of inflammatory disease, which is the pattern that tends to lead to more scarring. This may span the full gamut from papules, pustules, nodules and cysts and any combination of these. Postinflammatory macular disease may follow resolution and these may be red or hyperpigmented, representing a component of postinflammatory change. Severe forms of inflammatory acne such as nodular cystic disease, with all its potentially destructive sequelae, often occur later in predisposed individuals (see *Case study Branco*).

The different patterns of disease, their relative severity and distribution, and the patient's social circumstances, will influence management. For all patients, it is important

to address commonly held, but often incorrect, beliefs about acne.

## Aetiological beliefs

The patient will often carry beliefs about the aetiology of their acne,<sup>14-16</sup> and often well meaning friends and relatives will exacerbate the problem by attributing blame to the patient. This will often worsen the feelings of low self esteem, worthlessness and self loathing that the disease already engenders. In one study, 74% of patients waited more than 1 year before seeking medical attention for their acne.<sup>16</sup> First line treatments used by patients were: over-the-counter cleansers, acne washes and similar products. Commonly diet (32%), poor skin hygiene (29%), and infection (18%) were implicated by patients as causes for their acne. Factors most often believed to aggravate

acne were stress (71%), dirt (62%), heat and humidity (54%), cosmetics (46%), exercise and sweating (45%), and diet (44%). Information on acne was obtained primarily from family physicians, mass media, friends, and family, but was largely believed to be inadequate. Acne was believed to be curable by almost half the patients with anticipated treatment duration of less than 6 months.

Before treatment is undertaken, education about the disease, its pathogenesis and likely outcome, as well as requirement for ongoing treatment, is required (see *Case study George*). Commonly held beliefs surrounding acne need to be rationally discussed with the patient (and their family), thereby minimising the patient's sense of guilt or blame for the disease if successful treatment is to prevail. There is some difficulty with totally debunking these

perceptions, as definitive literature may not exist to do so.<sup>17</sup>

## Diet

No direct link has been found between acne and diet.<sup>18,19</sup> In particular, no effect has been established between chocolate, dairy products, shellfish, or fatty foods.<sup>20</sup> There are some dissenting studies,<sup>21,22</sup> with criticism of studies looking at diet and acne, and some showing exogenous fatty acids can end up in sebaceous gland output.

Unjustified perceptions are widely held (even among final year medical students) of the importance of diet and acne<sup>23</sup> (see *Case study Lisa*). A difference in the prevalence of acne between nonwesternised and fully modernised societies has been noted.<sup>24</sup> Diet has been suggested to be a factor, but many other environmental influences are also at play.

## Weight

Weight loss and the use of metformin are both associated with lower plasma insulin levels and decreased androgen levels. Insulin-like growth factor levels are reported to be elevated in acne.<sup>25,26</sup> With hyperinsulinaemia, there may be an increase in androgen production, resulting in a stimulation of sebaceous glands. It may be that in a small subset of obese acne patients, hyperinsulinaemia may stimulate endogenous androgen production resulting in development or worsening of acne. For this cohort of acne patients, a weight loss diet may be indicated.<sup>27</sup>

## Sexual activity

There are misconceptions regarding variably too little or too much sexual activity and acne. First that too much sex or masturbation may worsen acne. Second that somehow when females begin having a regular sex life their acne will be improved. Although acne is tied up with androgen metabolism at the level of the sebaceous glands, there appears no basis to either of these rather strange extrapolations. Acne is occurring at a similar stage as sexual adventure and this may be a plausible reason for the uninformed to associate the two. One may also possibly look at the beneficial effect of oral contraceptives on acne as a possible explanation for improvement associated with

### Case study – Jodie

Jodie, 11 years of age, has mild papulopustular acne. She has tried many over-the-counter remedies without success. She has a strong family history of severe acne in her two elder brothers and mother. Potential issues in this patient may be the increased acne likely with menarche and adolescence, the prolonging of acne therapy and compliance. This is a typical patient who may go on to more severe disease, who may suffer from 'treatment fatigue', and who is at risk of future scarring.

### Case study – Carol

Carol, 28 years of age, has had a recent increase in her acne, mainly papulopustular along her chin and jaw line, but with the occasional cyst. Carol illustrates the difficult acne subtype 'acne tarda'. This condition usually produces inflammatory disease in older women. Factors such as family circumstances, any impending pregnancy, desire for long term contraception, severity of disease, desire for a finite and definitive treatment, and the ability to cope with potential adverse effects of treatment will all impact on selected therapies.

### Case study – Branco

Branco, 19 years of age, has severe nodular cystic disease in his face, neck, back, chest and shoulders. He has severe scarring on all areas with some evidence of hypertrophic disease on his trunk and jaw line and atrophic facial scars elsewhere. He is very withdrawn, and socially introverted. In this case, the emphasis needs to be on definitive, rapid and long term control to prevent further scarring, further social dislocation, and cosmetic disfigurement. Branco needs social support from his family and practitioner, and significant time spent explaining the benefits of therapy and any likely short term issues this therapy may demand. It is very important that a line of communication is open as Branco fits the profile of a patient at risk of self harm.

the beginning of sexual activity in females. The only correlation between sex and acne that appears supported in the literature is that of a decreased quality of life and sexual satisfaction among women who suffer from polycystic ovary syndrome and acne.<sup>28</sup>

### Dirt and infection

There are probably four reasons why patients believe that washing their acne will help. First, they perceive that open comedones or blackheads are full of dirt. The black colour of open comedones is felt not to be composed of any extraneous dirt. It was initially thought to be result of oxidation of fats, however melanin staining has been incriminated by some,<sup>29</sup> but refuted by others.<sup>30</sup>

Second, excessive sebum production does occur in most acne patients.<sup>31–33</sup> This surface oil is perceived as dirty, and washing away these oils from the skin will stop pores blocking and decrease acne. These surface lipids have little to do with acne production, and while it is true that pores do get functionally blocked, this is at a depth well beyond washing techniques, and attempts at scrubbing and obsessive washing will add nothing to management.

Third, patients believe that acne is an infection and that they are infectious to others. Although *Propionibacterium acnes* is important in the extension of the disease from simple comedones to full blown inflammatory lesions, it is a secondary phenomenon once the disease has been initiated. The relevant bacterium is an obligate anaerobe living in the oxygen free environment of the pilosebaceous apparatus and beyond any influence of surface washing.

Finally, is the use of antibiotics. It is useful to explain to patients that we are using antibiotics as much for their anti-inflammatory effects as for their bacteriostatic or cidal effects.

Whatever the reason, this belief in the need for cleanliness is remarkably widely held<sup>16,15,19</sup> and most patients will resort to cleansing products long before consulting a medical practitioner.<sup>16</sup>

### Hair and hairstyles

Irregular or infrequent shampooing does not predispose to acne. Leaving the hair long or greasy or wearing the hair over the face likewise

#### Case study – George

George, 16 years of age, has moderate papulopustular acne on his face, chest, neck and back. George is not particularly motivated, perhaps a little depressed, and has been brought in by his mother who is appropriately concerned. In patients such as George, it is important to appreciate that acne is a depressing disease and that it is important to motivate and educate both the patient and their family. It needs to be emphasised that treatment in George's case will probably not be a course of therapy, but an ongoing, long term preparation with a cure not likely for some time. It is important to discuss the natural history of acne, how common it is as a disease pattern, and emphasise the requirement of a partnership to the success of therapy.

#### Case study – Lisa

Lisa, 16 years of age, has comedonal acne. She has open and closed comedones, both blackheads and whiteheads. She has mostly noninflammatory disease, however there is some early inflammation. Lisa cleanses many times during the day and is on a liver cleansing diet prescribed by her naturopath. She applies 'pancake' makeup to cover the offending lesions. Lisa requires education regarding the relative importance of the comedogenic effect of some topical agents, a condition that has been termed 'acne cosmetica'. It should also be discussed with Lisa that there is no strong association between cleanliness or diet and acne.

has no demonstrable effect. One case report did suggest that the excessive combing and brushing of hair may lead to acne exacerbation.<sup>34</sup> This is suggested to be a type of mechanical acne of which many forms exist.<sup>35</sup>

### Sunlight and solariums

Although there has been little evidence that sunlight has any reliable beneficial effect on acne,<sup>36</sup> and even less so for the role of solariums, there has been a resurgence of interest in this area. Rarely, acne may worsen with sunlight.<sup>37</sup> Any positive effect must be weighed against the possible long term carcinogenetic effects of ultraviolet light. However, visible light may be relatively benign and useful in treatment by stimulating the natural porphyrins produced by *P. acnes*. Blue and other longer wavelengths may induce a toxic effect on the bacteria inducing their destruction and lessening the clinical disease.<sup>38,39</sup> This may be augmented by the use of exogenous porphyrins utilising photodynamic therapy.<sup>40,41</sup>

### Curing acne

There is a widespread belief that acne is curable and that a course of antibiotics is all that is required. Patients will often make statements

such as: 'the treatment didn't work because when I stopped the tablets the acne came back again' or, 'the acne only improved but didn't completely disappear'. It must be made clear that continued treatment is required and that there is no cure (although isotretinoin may cause long term remission of the disease).

### Cosmetics

Some years ago many cosmetics contained comedogenic agents that blocked follicular structures and induced comedonal disease on the cheeks of females. There are still preparations that contain comedogenic substances such as isopropyl myristate. However, as most manufacturers now produce reasonably noncomedogenic products, cosmetics are now an uncommon cause for acneiform conditions<sup>42–45</sup> (see *Case study Lisa*).

### Sweating

There is some indirect evidence that sweating or humid environments may induce acne. Tropical acne was a significant problem during World War II and was presumably due to partial poral obstruction. Similar acne flaring in humid environs presumably operates via a similar mechanism.<sup>46,47</sup>

## Stress

A study of 215 graduating medical students showed that 67% believed that stress plays a role in acne exacerbations.<sup>23</sup> Anxiety was also thought to be an exacerbating factor by 74% of patients and their relatives.<sup>48</sup> There is also evidence that stress may exacerbate acne during examinations.<sup>49</sup> It has also been noted that treatment with biofeedback mechanisms is useful in some acne sufferers.<sup>50</sup>

## Conclusion

Acne is a polymorphic disease with noninflammatory and inflammatory aspects and a wide spectrum of severity. The pattern of disease, relative severity and distribution, and the patient's social circumstances will influence management. Before treatment is undertaken, education about acne, its pathogenesis and likely outcome, as well as requirement for ongoing treatment, is required. Commonly held beliefs surrounding acne need to be rationally discussed with both the patient and their family.

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