Puberty is a transitional period between childhood and adulthood of which the onset is demonstrated by the appearance of breast buds in girls and testicular enlargement in boys. The control of onset of puberty is caused by the activation of hypothalamo-pituitary-gonadal axis causing the sex hormone production and subsequent signs of puberty. Early activation of this axis causes central precocious puberty (CPP). In general, the onset and tempo of normal puberty has been referred to a study by Marshall and Tanner in England in 1969. According to this study, the mean age of breast development (breast Tanner II) is 11.15 ± 1.1 years suggesting that girls should have breast development between 8-13 years. Pediatricians use this study as a reference in their clinical practice. However, some pediatricians disagree with these criteria because the number of white girls in the study was too small and they came from an unusually low socioeconomic status that cannot represent normal British girls. Similar studies in the USA showed comparable results: the mean age of puberty onset in girls varies from 10.8 to 11.2 years.

Until 1997, a study from the USA based on "Pediatric Research in Office Setting (PROS)—which involved a large number of normal white and black girls (17,077 girls) from 65 pediatric clinics — demonstrated that the onset of puberty in girls is earlier than the aforementioned study reported by Marshall and Tanner: 9.96 ± 1.82 years in white girls and 8.78 ± 2.0 years in black girls. This study suggests that the cut-off age of puberty onset in normal girls should be lower by 1-2 years. Nevertheless, most pediatric endocrinologists called into question the puberty onset prescribed in this study as it was evaluated by photography, not by direct physical examination. Therefore, it is very likely for the examiner to misinterpret the fat tissue in obese girls as breast tissue because the incidence of childhood obesity is increasing worldwide. In addition, the mean age of breast development is decreasing as observed by many pediatricians and reported by many studies. However, the mean age of menarche does not see much change, which remains around 12-12.5 years of age. Nobody knows the reasons why girls in the previous decade have early breast development. It may be due to better socioeconomic status — resulting in over-nourishment and obesity — or endocrine disruptors in the environment. In contrast, a trend of puberty onset in boys has not changed so much in the last decade.

Previous studies regarding puberty in Asian girls usually report the age of menarche, but not the age of thelarche because it's not too difficult to recall. In addition, the study of breast development is more difficult because it's not a polite and accepted way to examine breast tissue in normal girls. Every decade, the age of menarche comes earlier by 4.4 and 7.7 months in Japanese girls and South Korean girls, respectively. A study reported by WHO in 1986 showed girls in Hong Kong, urban areas in Sri Lanka and rural area in Sri Lanka had menarche at 12 y 9 m, 13 y 6 m, and 14 y 5 m, respectively. A recent study in Hong Kong in 1993 showed the median age of breast development in girls was 9.78 years and that of menarche was 12.38 years which are lower than the previous study. In China, a study in 2002 showed the median age of menarche was 12.8 years in urban areas and 13.2 years in rural area.

Studies of puberty in Thailand showed similar results. In 1997, a median age of menarche in Bangkokian girls was 12.3 years and 12.2 years from a survey in 5 different parts of Thailand. Obese girls tend to have a younger age of menarche (11 y 6 m VS 12 y 4 m). Self-assessment of sexual maturation in Thai Children showed the median age of breast development in girls was 10.4 years and the onset of puberty in boys (testicular enlargement more than 4 ml assessed by Prader ochidemeter) was 11.3 years.

Nowadays, many studies around the world show the same pattern of earlier breast development in girls than in the past. However, they did not find that the age of menarche has changed. This means that girls tend to have early breast development and then progress in a slow pace and complete their puberty in terms of menarche at the normal age. Therefore, many pediatricians try to decrease the cut-off age of normal puberty to 6-7 years and they might consider not to treat these girls. However, we suggest to follow-up girls who have earlier breast development without treatment because some of them may have the concealed pathological conditions such as hypothyroidism, ovarian cyst, or pituitary microadenoma. Even though they have no pathological conditions, their puberty may progress in a fast pace and develop early menarche which we define as "rapidly progressive puberty" and then treatment to inhibit puberty may be required.

The benefit of treatment with GnRH agonist in central precocious puberty has been confirmed especially in girls with puberty onset before 5-6 years of age. The
aims of treatment are to inhibit signs of puberty and slow down bone age advancement and then improve the final height outcome.

In August 2007, the seminar on “National Forum for Normal and Abnormal Puberty in Thai Children” was hosted by the Institute of Health Research & The College of Public Health, Chulalongkorn University and the Thai Pediatric Endocrine Society in order to discuss among pediatric endocrinologists about their clinical practices and previous researches regarding the normal and abnormal puberty in Thai children. From this seminar, we still accept to use the cut-off age of onset of puberty in girls is 8 years and 9 years in boys. Therefore, if girls present with signs of puberty before 8 and boys before 9, we could diagnose them as precious puberty. We all accept that, in the near future, a national wide study should be performed to define the norm of puberty in Thai children. To reach the most accuracy of study, direct physical examination is much more beneficial than self-assessment.

Regarding the final height outcome of treatment with GnRH agonist in girls with CPP, treatment should be advised only in girls with onset of puberty before 8 years and bone age less than 12.5 years. If onset after 8 years or bone age more than 12.5 years, final height may be equivocal. In addition, parents and patients should be educated about the long-term side effect of treatment such as decreased bone mineral density. Medroxyprogesterone acetate (DMPA) may be an alternative in girls with CPP and good height prognosis. The aim of treatment in these girls is only to suppress signs of puberty and delay menstruation.

In conclusion, girls in the present day start into the puberty earlier than those in the past, but the age of menarche has not changed. Treatment with GnRH agonist has been approved only in CPP girls with onset before 8 years and bone age less than 12.5 years. A cheaper way of treatment with DMPA is still beneficial to suppress estrogen production and signs of puberty in girls whose final height is within normal range.

REFERENCES