

# ADOLESCENT BRAIN DEVELOPMENT &

# SMOKING



## Key Messages for Health Care Providers and Policy Makers

### Overview

Researchers are still trying to understand the links between smoking and the impact it has on adolescents. Smoking can affect the function of the prefrontal cortex, an area of the brain that continues to develop through adolescence and may therefore have a more serious and lasting impact on brain development during this critical developmental period.

### The Link between Smoking and Adolescent Brain Development

- Animal studies<sup>1,2</sup> found that adolescents who are exposed to nicotine demonstrated cognitive deficits resulting from nicotine exposure.
- The toxic effects of tobacco on the nervous system may be most marked if smoking commences in the early adolescent years, when the main neurodevelopment involving inhibitory control occurs.<sup>3</sup>
- In adolescents, depression predicts smoking (pooled estimates 1.41 [95% CI: 1.21, 1.63]), and smoking predicts depression (pooled estimates 1.73 [95% CI: 1.32, 2.40]).<sup>4</sup>
- Smoking in adolescence may be influenced by the use or abuse of other substances and trouble in school, and by poor family relations and low involvement in active pastimes among girls. Among boys, smoking may be influenced by low religiosity and delinquency.<sup>5</sup> Impulsive behaviour may play an important role in smoking initiation.<sup>6</sup>
- Adolescents with parents who smoke have an increased risk for substance use.<sup>7</sup>
- A study<sup>8</sup> of adolescents found that according to the Heaviness of Smoking Index, which is a measure of smoking behaviour and dependence, smoking adversely affects neural function in the brain cortex.

### Impact

- Adolescents who stop smoking may experience acute memory impairments, along with chronic decrements in cognitive performance. Performance problems were more severe among those who started smoking at earlier ages.<sup>9,10</sup>
- In one study, adolescents who smoked were 4.5 times more likely to have alcohol use disorders than those who never smoked.<sup>11</sup>
- Nicotine dependence in adulthood can be predicted by high smoking levels, initiation of daily smoking, duration of smoking, time to increase in smoking, and duration of stopping smoking during adolescence.<sup>12</sup>

### Actions

- By contributing to education, screening, detection, and management/referral, health care providers can play a crucial role in reducing tobacco use and addiction, thereby helping to decrease exposure of children to second hand tobacco smoke.<sup>13,14</sup>
- American Academy of Pediatrics recommendations<sup>13</sup> include prohibiting the advertising of tobacco and the use of tobacco products in the media; attaining universal smoke-free environments at home, in the car, at school, at work, and at play; offering to treat tobacco use and dependence, and implementing tobacco-control measures.



## Actions (cont'd)

- The CAN-ADAPTT Guideline Development Group<sup>15</sup> recommends that health care providers should:
  - Ask patients about tobacco use status on a regular basis.
  - Clearly advise patients/clients to quit.
  - Assess the willingness of patients or clients to begin treatment to quit smoking.
  - Offer assistance to every tobacco user who expresses the willingness to begin treatment to quit.
  - Conduct regular follow-up to assess response, provide support and modify treatment as necessary.
  - Refer patients or clients to relevant resources as part of the treatment, where appropriate.

## Helpful Resources

- Public Health Agency Canada. *Trends in the Health of Canadian Youth. Chapter 10: Tobacco, Alcohol and Drugs.* <[http://www.phac-aspc.gc.ca/hp-ps/dca-dea/publications/trends-tendances/hbsc\\_10-eng.php](http://www.phac-aspc.gc.ca/hp-ps/dca-dea/publications/trends-tendances/hbsc_10-eng.php)>
- Public Health Agency Canada. *Young people in Canada: their health and well-being - Chapter 6: Youth Health Risk Behaviours.* <[http://www.phac-aspc.gc.ca/hp-ps/dca-dea/publications/hbsc-2004/chapter\\_6-eng.php](http://www.phac-aspc.gc.ca/hp-ps/dca-dea/publications/hbsc-2004/chapter_6-eng.php)>
- Public Health Agency Canada. *School-based tobacco-control programming and student smoking behaviour.* <[http://www.phac-aspc.gc.ca/publicat/cdic-mcc/29-4/ar\\_04-eng.php](http://www.phac-aspc.gc.ca/publicat/cdic-mcc/29-4/ar_04-eng.php)>

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