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evaluated postoperative pain at 3, 24 and 48 hours postoperatively. Interestingly, it is known that adhesion formation occurs during the 3–5 postoperative days,[3] therefore, postoperative pain cannot be attributed to formed adhesions. Furthermore, postoperative adhesions are more commonly associated with chronic pelvic pain,[4] rather than acute postoperative pain.

Second, the authors state that acute inflammation is the key factor for postoperative pain and recommend management options for a reduction of the latter. Nevertheless, the aetiology of pain after laparoscopy is multifactorial[5] and might be mainly caused by peritoneal insufflation with CO_2 and phrenic nerve irritation in the peritoneal cavity, as peritoneal acidosis has been suggested to be one of the most important determinants responsible for irritation of the mesothelial lining of the peritoneum. The phrenic nerve, which is possibly damaged by the acidic environment created by CO_2 and the peritoneal acidosis, both lead to postoperative pain. Hence, decreasing CO_2 concentration by the addition of N_2O to the CO_2 pneumoperitoneum may be beneficial when postoperative pain is discussed.

As painless and adhesions-free laparoscopy is at stake, there is no better place to mention that meticulous surgical technique, physical barrier agents and pharmacological agents should all be discussed, for each carries its benefits and limitations, and although it has been suggested that a combination of a low temperature and a humidified gas mixture of carbon dioxide, nitrous oxide and oxygen is the best way to reduce postoperative adhesions,[6] no formal studies have addressed this in humans. ■

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Authors' reply

Sir,

We thank Gabriel Levin and Amihai Rottenstreich for their comments on our article.[1,2] However, it should be clear that our hypothesis is that mesothelial retraction and the acute inflammation in the entire peritoneal cavity are important as a cause of postoperative pain and adhesion formation.[3]

A mouse model was used to investigate the pathophysiology of this mechanism with obviously only adhesion formation as end point. The conclusions were that pneumoperitoneum-enhanced adhesion formation increased with the duration and insufflation pressure of the CO_2 pneumoperitoneum, desiccation, intraperitoneal temperature, and intraperitoneal partial oxygen concentrations (<7 mmHg or >70 mmHg, or <1% or >10% of oxygen) in the pneumoperitoneum gas. The mechanisms involved were irritation of the mesothelium, mesothelial cell retraction, and acute inflammation. The causes can be mechanical trauma, irritation by blood or by saline, mesothelial cell hypoxia with induction of hypoxia-inducible factor, or mesothelial hyperoxia with reactive oxygen formation and their effects on fibrinolysis. Mesothelial pH changes were of minor importance. N_2O in a concentration of >5% in CO_2 was the single most effective prevention. Also, dexamethasone given at the end of surgery was beneficial.[3]

This mechanism was evaluated in a proof-of-concept human trial using 10% N_2O and 4% oxygen in CO_2 for the pneumoperitoneum, humidification of the gas, an intra-abdominal temperature of 31°C, dexamethasone 5 mg, and the use of Hyalobarrier® gel in women undergoing deep endometriosis surgery. This confirmed in the human the virtual absence of postoperative adhesion formation, with as additional observations the reduction of the progressively increasing CO_2 resorption during surgery, a strong decrease in postoperative pain, and a decrease in postoperative C-reactive protein concentrations. The decreased peritoneal irritation and the decrease in postoperative pain were subsequently confirmed by laparoscopy under local anaesthesia and following myomectomy when using 10% of N_2O in CO_2.[4]

Until today, our hypothesis has not been invalidated, and the recent observations by Radosa et al.[5] are consistent with our hypothesis. Given the limited possibilities of research in the human we anticipate by extrapolation, that also in the human, conditioning will reduce tumour implantation and will prevent damage of the ovarian oocyte reserve and the risk of late bowel perforation. ■

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Re: Evaluation of a simple risk score to predict preterm pre-eclampsia using maternal characteristics: a prospective cohort study

Sir,

We were interested to read Sovio and Smith's findings that a simple risk score was clinically useful in predicting the risk of preterm pre-eclampsia.[1] However, as GPs we are also interested in what happens to women with pre-eclampsia after delivery, particularly when they return to the care of their GPs. These women have four times the long-term risk of hypertension and double the risk of heart attack or stroke of women with a normotensive pregnancy.[2] The National Institute for Health and Care Excellence recommends using the 6- to 8-week postnatal check in primary care as a chance to initiate lifestyle changes to reduce cardiovascular risk.[3] However, it is underutilised for this purpose.[4]

We are planning a trial of promoting fast walking in postnatal women who have had hypertensive disorders of pregnancy. In 2018–2019, we did a pilot study in 15 postpartum women in primary care to assess whether physical activity had been promoted at their postnatal check. We also explored their acceptance of using the Active 10 smartphone application to facilitate this process. Active 10 was created by Public Health England to promote and track brisk walking at 3–4 mph starting with a target of 10 minutes a day.[4]

Data were gathered from 15 women aged 29–40 of mixed ethnicities from 8 to 24 weeks postpartum. Only two of the 15 women reported receiving advice regarding physical activity during their 6- to 8-week checkup. However, all but one of the women were doing some form of exercise, largely in the form of walking (although not brisk walking). Four of the women were already using an application to track their exercise but one woman could not, as she did not own a smartphone. All the women were keen to receive advice about brisk walking, and nine agreed to download the Active 10 app. At the 2-week review, seven had downloaded the application and some reported their surprise at how little brisk walking they actually did. By the 6-week mark, five women continued to use the Active 10 app. The women who tried brisk walking reported positive feedback and continued to incorporate this into their daily routine whether they tracked it or not.

Most of these women were not given any form of advice regarding physical activity during their postnatal check. Given the broad health benefits of exercising in the postnatal period, this has important implications for future cardiovascular health outcomes. Contributory barriers in primary care may include GPs' time constraints while also addressing other important postnatal issues, and a lack of confidence in delivering tailored physical activity advice. Like Sovio and Smith, we aim to improve management of women with pre-eclampsia.[1] Using Active 10 to encourage brisk walking when pushing a buggy may be a feasible idea to keep active in the postnatal period. ■

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Author's reply

Sir,

I thank Roaa Al-bedaery and Pippa Oakeshott[1] for their interest in our paper, which demonstrated a clinically useful prediction of the risk of preterm pre-eclampsia by a simple risk score derived from the model used in the ASPRE trial. In a related mini commentary, Peter von Dadelszen[2] endorsed the external validation achieved by our study and the conversion of the model into a risk score that could be used in guiding the clinical